

---

# **AWS Data Wrangler**

***Release 2.7.0***

**Igor Tavares**

**Apr 15, 2021**



# CONTENTS

<b>1</b>	<b>Read The Docs</b>	<b>3</b>
1.1	What is AWS Data Wrangler? . . . . .	3
1.2	Install . . . . .	3
1.3	Tutorials . . . . .	7
1.4	API Reference . . . . .	89
	<b>Index</b>	<b>251</b>



An AWS Professional Service open source initiative | [aws-proserve-opensource@amazon.com](mailto:aws-proserve-opensource@amazon.com)

```
>>> pip install awswrangler
```

```
import awswrangler as wr
import pandas as pd
from datetime import datetime

df = pd.DataFrame({"id": [1, 2], "value": ["foo", "boo"]})

# Storing data on Data Lake
wr.s3.to_parquet(
    df=df,
    path="s3://bucket/dataset/",
    dataset=True,
    database="my_db",
    table="my_table"
)

# Retrieving the data directly from Amazon S3
df = wr.s3.read_parquet("s3://bucket/dataset/", dataset=True)

# Retrieving the data from Amazon Athena
df = wr.athena.read_sql_query("SELECT * FROM my_table", database="my_db")

# Get a Redshift connection from Glue Catalog and retrieving data from Redshift_
↳ Spectrum
con = wr.redshift.connect("my-glue-connection")
df = wr.redshift.read_sql_query("SELECT * FROM external_schema.my_table", con=con)
con.close()

# Amazon Timestream Write
df = pd.DataFrame({
    "time": [datetime.now(), datetime.now()],
    "my_dimension": ["foo", "boo"],
    "measure": [1.0, 1.1],
})
rejected_records = wr.timestream.write(df,
    database="sampleDB",
    table="sampleTable",
    time_col="time",
    measure_col="measure",
    dimensions_cols=["my_dimension"],
)

# Amazon Timestream Query
wr.timestream.query("""
SELECT time, measure_value::double, my_dimension
FROM "sampleDB"."sampleTable" ORDER BY time DESC LIMIT 3
""")
```



## READ THE DOCS

### 1.1 What is AWS Data Wrangler?

An [AWS Professional Service open source](#) python initiative that extends the power of [Pandas](#) library to AWS connecting **DataFrames** and AWS data related services.

Easy integration with Athena, Glue, Redshift, Timestream, QuickSight, Chime, CloudWatchLogs, DynamoDB, EMR, SecretManager, PostgreSQL, MySQL, SQLServer and S3 (Parquet, CSV, JSON and EXCEL).

Built on top of other open-source projects like [Pandas](#), [Apache Arrow](#) and [Boto3](#), it offers abstracted functions to execute usual ETL tasks like load/unload data from **Data Lakes**, **Data Warehouses** and **Databases**.

Check our [tutorials](#) or the [list of functionalities](#).

### 1.2 Install

**AWS Data Wrangler** runs with Python 3.6, 3.7, 3.8 and 3.9 and on several platforms (AWS Lambda, AWS Glue Python Shell, EMR, EC2, on-premises, Amazon SageMaker, local, etc).

**Some good practices for most of the methods bellow are:**

- Use new and individual Virtual Environments for each project ([venv](#)).
- On Notebooks, always restart your kernel after installations.

---

**Note:** If you want to use `aws wrangler` for connecting to Microsoft SQL Server, some additional configuration is needed. Please have a look at the corresponding section below.

---

#### 1.2.1 PyPI (pip)

```
>>> pip install awswrangler
```

## 1.2.2 Conda

```
>>> conda install -c conda-forge awswrangler
```

## 1.2.3 AWS Lambda Layer

- 1 - Go to [GitHub's release section](#) and download the layer zip related to the desired version.
- 2 - Go to the AWS Lambda Panel, open the layer section (left side) and click **create layer**.
- 3 - Set name and python version, upload your fresh downloaded zip file and press **create** to create the layer.
- 4 - Go to your Lambda and select your new layer!

## 1.2.4 AWS Glue Python Shell Jobs

- 1 - Go to [GitHub's release page](#) and download the wheel file (.whl) related to the desired version.
- 2 - Upload the wheel file to any Amazon S3 location.
- 3 - Go to your Glue Python Shell job and point to the wheel file on S3 in the *Python library path* field.

[Official Glue Python Shell Reference](#)

## 1.2.5 AWS Glue PySpark Jobs

---

**Note:** AWS Data Wrangler has compiled dependencies (C/C++) so there is only support for Glue PySpark Jobs `>= 2.0`.

---

Go to your Glue PySpark job and create a new *Job parameters* key/value:

- Key: `--additional-python-modules`
- Value: `pyarrow==2, awswrangler`

To install a specific version, set the value for above Job parameter as follows:

- Value: `pyarrow==2, awswrangler==2.7.0`

---

**Note:** Pyarrow 3 is not currently supported in Glue PySpark Jobs, which is why a previous installation of pyarrow 2 is required.

---

[Official Glue PySpark Reference](#)



## 1.2.6 Amazon SageMaker Notebook

Run this command in any Python 3 notebook paragraph and then make sure to **restart the kernel** before import the **aws wrangler** package.

```
>>> !pip install aws wrangler
```

## 1.2.7 Amazon SageMaker Notebook Lifecycle

Open SageMaker console, go to the lifecycle section and use the follow snippet to configure AWS Data Wrangler for all compatible SageMaker kernels ([Reference](#)).

```
#!/bin/bash

set -e

# OVERVIEW
# This script installs a single pip package in all SageMaker conda environments,
# apart from the JupyterSystemEnv which
# is a system environment reserved for Jupyter.
# Note this may timeout if the package installations in all environments take longer
# than 5 mins, consider using
# "nohup" to run this as a background process in that case.

sudo -u ec2-user -i <<'EOF'

# PARAMETERS
PACKAGE=aws wrangler

# Note that "base" is special environment name, include it there as well.
for env in base /home/ec2-user/anaconda3/envs/*; do
    source /home/ec2-user/anaconda3/bin/activate $(basename "$env")
    if [ $env = 'JupyterSystemEnv' ]; then
        continue
    fi
    nohup pip install --upgrade "$PACKAGE" &
    source /home/ec2-user/anaconda3/bin/deactivate
done
EOF
```

## 1.2.8 EMR Cluster

Even not being a distributed library, AWS Data Wrangler could be a good helper to complement Big Data pipelines.

- Configure Python 3 as the default interpreter for PySpark on your cluster configuration [ONLY REQUIRED FOR EMR < 6]

```
[
  {
    "Classification": "spark-env",
    "Configurations": [
      {
        "Classification": "export",
        "Properties": {
```

(continues on next page)

(continued from previous page)

```
        "PYSPARK_PYTHON": "/usr/bin/python3"
    }
}
]
}
```

- Keep the bootstrap script above on S3 and reference it on your cluster.
  - For EMR Release < 6

```
#!/usr/bin/env bash
set -ex

sudo pip-3.6 install pyarrow==2 awswrangler
```

- For EMR Release >= 6

```
#!/usr/bin/env bash
set -ex

sudo pip install pyarrow==2 awswrangler
```

---

**Note:** Make sure to freeze the Wrangler version in the bootstrap for productive environments (e.g. `awswrangler==2.7.0`)

---

---

**Note:** Pyarrow 3 is not currently supported in the default EMR image, which is why a previous installation of pyarrow 2 is required.

---

## 1.2.9 From Source

```
>>> git clone https://github.com/awslabs/aws-data-wrangler.git
>>> cd aws-data-wrangler
>>> pip install .
```

### 1.2.10 Notes for Microsoft SQL Server

awswrangler is using the `pyodbc` for interacting with Microsoft SQL Server. For installing this package you need the ODBC header files, which can be installed, for example, with the following commands:

```
>>> sudo apt install unixodbc-dev
>>> yum install unixODBC-devel
```

After installing these header files you can either just install `pyodbc` or `awswrangler` with the `sqlserver` extra, which will also install `pyodbc`:

```
>>> pip install pyodbc
>>> pip install awswrangler[sqlserver]
```

Finally you also need the correct ODBC Driver for SQL Server. You can have a look at the [documentation from Microsoft](#) to see how they can be installed in your environment.

If you want to connect to Microsoft SQL Server from AWS Lambda, you can build a separate Layer including the needed ODBC drivers and *pyodbc*.

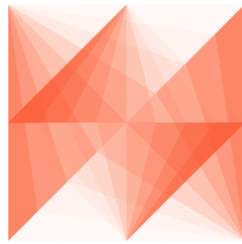
If you maintain your own environment, you need to take care of the above steps. Because of this limitation usage in combination with Glue jobs is limited and you need to rely on the provided [functionality inside Glue itself](#).

## 1.3 Tutorials

---

**Note:** You can also find all Tutorial Notebooks on [GitHub](#).

---



### AWS Data Wrangler

#### 1.3.1 1 - Introduction

##### What is AWS Data Wrangler?

An [open-source](#) Python package that extends the power of [Pandas](#) library to AWS connecting **DataFrames** and AWS data related services (**Amazon Redshift**, **AWS Glue**, **Amazon Athena**, **Amazon Timestream**, **Amazon EMR**, etc).

Built on top of other open-source projects like [Pandas](#), [Apache Arrow](#) and [Boto3](#), it offers abstracted functions to execute usual ETL tasks like load/unload data from **Data Lakes**, **Data Warehouses** and **Databases**.

Check our [list of functionalities](#).

##### How to install?

The Wrangler runs almost anywhere over Python 3.6, 3.7, 3.8 and 3.9, so there are several different ways to install it in the desired environment.

- [PyPi \(pip\)](#)
- [Conda](#)
- [AWS Lambda Layer](#)
- [AWS Glue Python Shell Jobs](#)
- [AWS Glue PySpark Jobs](#)
- [Amazon SageMaker Notebook](#)

- Amazon SageMaker Notebook Lifecycle
- EMR Cluster
- From source

Some good practices for most of the above methods are: - Use new and individual Virtual Environments for each project (`venv`) - On Notebooks, always restart your kernel after installations.

### Let's Install it!

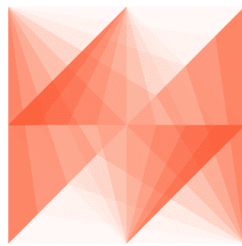
```
[ ]: !pip install awswrangler
```

Restart your kernel after the installation!

```
[1]: import awswrangler as wr
```

```
wr.__version__
```

```
[1]: '2.0.0'
```



**AWS Data Wrangler**

## 1.3.2 2 - Sessions

### How Wrangler handle Sessions and AWS credentials?

After version 1.0.0 Wrangler absolutely relies on `Boto3.Session()` to manage AWS credentials and configurations.

Wrangler will not store any kind of state internally. Users are in charge of managing Sessions.

Most Wrangler functions receive the optional `boto3_session` argument. If `None` is received, the default `boto3` Session will be used.

```
[1]: import awswrangler as wr
import boto3
```

### Using the default Boto3 Session

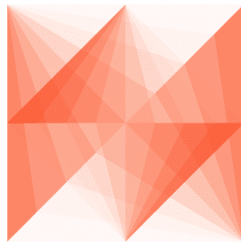
```
[2]: wr.s3.does_object_exist("s3://noaa-ghcn-pds/fake")
[2]: False
```

### Customizing and using the default Boto3 Session

```
[3]: boto3.setup_default_session(region_name="us-east-2")
wr.s3.does_object_exist("s3://noaa-ghcn-pds/fake")
[3]: False
```

### Using a new custom Boto3 Session

```
[4]: my_session = boto3.Session(region_name="us-east-2")
wr.s3.does_object_exist("s3://noaa-ghcn-pds/fake", boto3_session=my_session)
[4]: False
```



**AWS Data Wrangler**

## 1.3.3 3 - Amazon S3

### Table of Contents

- 1. CSV files
  - 1.1 Writing CSV files
  - 1.2 Reading single CSV file
  - 1.3 Reading multiple CSV files
    - \* 1.3.1 Reading CSV by list
    - \* 1.3.2 Reading CSV by prefix
- 2. JSON files
  - 2.1 Writing JSON files
  - 2.2 Reading single JSON file

- 2.3 Reading multiple JSON files
  - \* 2.3.1 Reading JSON by list
  - \* 2.3.2 Reading JSON by prefix
- 3. Parquet files
  - 3.1 Writing Parquet files
  - 3.2 Reading single Parquet file
  - 3.3 Reading multiple Parquet files
    - \* 3.3.1 Reading Parquet by list
    - \* 3.3.2 Reading Parquet by prefix
- 4. Fixed-width formatted files (only read)
  - 4.1 Reading single FWF file
  - 4.2 Reading multiple FWF files
    - \* 4.2.1 Reading FWF by list
    - \* 4.2.2 Reading FWF by prefix
- 5. Excel files
  - 5.1 Writing Excel file
  - 5.2 Reading Excel file
- 6. Reading with lastModified filter
  - 6.1 Define the Date time with UTC Timezone
  - 6.2 Define the Date time and specify the Timezone
  - 6.3 Read json using the LastModified filters
- 7. Download Objects
  - 7.1 Download object to a file path
  - 7.2 Download object to a file-like object in binary mode
- 8. Upload Objects
  - 8.1 Upload object from a file path
  - 8.2 Upload object from a file-like object in binary mode
- 9. Delete objects

```
[1]: import awswrangler as wr
import pandas as pd
import boto3
import pytz
from datetime import datetime

df1 = pd.DataFrame({
    "id": [1, 2],
    "name": ["foo", "boo"]
})

df2 = pd.DataFrame({
```

(continues on next page)

(continued from previous page)

```
"id": [3],  
"name": ["bar"]  
})
```

Enter your bucket name:

```
[2]: import getpass  
bucket = getpass.getpass()
```

## 1. CSV files

### 1.1 Writing CSV files

```
[3]: path1 = f"s3://{bucket}/csv/file1.csv"  
path2 = f"s3://{bucket}/csv/file2.csv"  
  
wr.s3.to_csv(df1, path1, index=False)  
wr.s3.to_csv(df2, path2, index=False);
```

### 1.2 Reading single CSV file

```
[4]: wr.s3.read_csv([path1])  
[4]:   id name  
0    1  foo  
1    2  boo
```

### 1.3 Reading multiple CSV files

#### 1.3.1 Reading CSV by list

```
[5]: wr.s3.read_csv([path1, path2])  
[5]:   id name  
0    1  foo  
1    2  boo  
2    3  bar
```

### 1.3.2 Reading CSV by prefix

```
[6]: wr.s3.read_csv(f"s3://{bucket}/csv/")
[6]:      id name
0     1  foo
1     2  boo
2     3  bar
```

## 2. JSON files

### 2.1 Writing JSON files

```
[7]: path1 = f"s3://{bucket}/json/file1.json"
      path2 = f"s3://{bucket}/json/file2.json"

      wr.s3.to_json(df1, path1)
      wr.s3.to_json(df2, path2)
[7]: ['s3://woodadw-test/json/file2.json']
```

### 2.2 Reading single JSON file

```
[8]: wr.s3.read_json([path1])
[8]:      id name
0     1  foo
1     2  boo
```

### 2.3 Reading multiple JSON files

#### 2.3.1 Reading JSON by list

```
[9]: wr.s3.read_json([path1, path2])
[9]:      id name
0     1  foo
1     2  boo
0     3  bar
```

#### 2.3.2 Reading JSON by prefix

```
[10]: wr.s3.read_json(f"s3://{bucket}/json/")
[10]:      id name
0     1  foo
1     2  boo
0     3  bar
```



### 3. Parquet files

For more complex features related to Parquet Dataset check the tutorial number 4.

#### 3.1 Writing Parquet files

```
[11]: path1 = f"s3://{bucket}/parquet/file1.parquet"
      path2 = f"s3://{bucket}/parquet/file2.parquet"

      wr.s3.to_parquet(df1, path1)
      wr.s3.to_parquet(df2, path2);
```

#### 3.2 Reading single Parquet file

```
[12]: wr.s3.read_parquet([path1])

[12]:   id name
0    1  foo
1    2  boo
```

#### 3.3 Reading multiple Parquet files

##### 3.3.1 Reading Parquet by list

```
[13]: wr.s3.read_parquet([path1, path2])

[13]:   id name
0    1  foo
1    2  boo
2    3  bar
```

##### 3.3.2 Reading Parquet by prefix

```
[14]: wr.s3.read_parquet(f"s3://{bucket}/parquet/")

[14]:   id name
0    1  foo
1    2  boo
2    3  bar
```

## 4. Fixed-width formatted files (only read)

As of today, Pandas doesn't implement a `to_fwf` functionality, so let's manually write two files:

```
[15]: content = "1  Herfelingen 27-12-18\n"\
               "2  Lambusart 14-06-18\n"\
               "3  Spormaggiore 15-04-18"
boto3.client("s3").put_object(Body=content, Bucket=bucket, Key="fwf/file1.txt")

content = "4  Buizingen 05-09-19\n"\
          "5  San Rafael 04-09-19"
boto3.client("s3").put_object(Body=content, Bucket=bucket, Key="fwf/file2.txt")

path1 = f"s3://{bucket}/fwf/file1.txt"
path2 = f"s3://{bucket}/fwf/file2.txt"
```

### 4.1 Reading single FWF file

```
[16]: wr.s3.read_fwf([path1], names=["id", "name", "date"])
```

```
[16]:
```

	id	name	date
0	1	Herfelingen	27-12-18
1	2	Lambusart	14-06-18
2	3	Spormaggiore	15-04-18

### 4.2 Reading multiple FWF files

#### 4.2.1 Reading FWF by list

```
[17]: wr.s3.read_fwf([path1, path2], names=["id", "name", "date"])
```

```
[17]:
```

	id	name	date
0	1	Herfelingen	27-12-18
1	2	Lambusart	14-06-18
2	3	Spormaggiore	15-04-18
3	4	Buizingen	05-09-19
4	5	San Rafael	04-09-19

#### 4.2.2 Reading FWF by prefix

```
[18]: wr.s3.read_fwf(f"s3://{bucket}/fwf/", names=["id", "name", "date"])
```

```
[18]:
```

	id	name	date
0	1	Herfelingen	27-12-18
1	2	Lambusart	14-06-18
2	3	Spormaggiore	15-04-18
3	4	Buizingen	05-09-19
4	5	San Rafael	04-09-19

## 5. Excel files

### 5.1 Writing Excel file

```
[19]: path = f"s3://{bucket}/file0.xlsx"

      wr.s3.to_excel(df1, path, index=False)

[19]: 's3://woodadw-test/file0.xlsx'
```

### 5.2 Reading Excel file

```
[20]: wr.s3.read_excel(path)

[20]:    id name
0     1  foo
1     2  boo
```

## 6. Reading with lastModified filter

Specify the filter by LastModified Date.

The filter needs to be specified as datetime with time zone

Internally the path needs to be listed, after that the filter is applied.

The filter compare the s3 content with the variables lastModified\_begin and lastModified\_end

<https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/s3.html>

### 6.1 Define the Date time with UTC Timezone

```
[21]: begin = datetime.strptime("20-07-31 20:30", "%Y-%m-%d %H:%M")
      end = datetime.strptime("21-07-31 20:30", "%Y-%m-%d %H:%M")

      begin_utc = pytz.utc.localize(begin)
      end_utc = pytz.utc.localize(end)
```

### 6.2 Define the Date time and specify the Timezone

```
[22]: begin = datetime.strptime("20-07-31 20:30", "%Y-%m-%d %H:%M")
      end = datetime.strptime("21-07-31 20:30", "%Y-%m-%d %H:%M")

      timezone = pytz.timezone("America/Los_Angeles")

      begin_Los_Angeles = timezone.localize(begin)
      end_Los_Angeles = timezone.localize(end)
```

## 6.3 Read json using the LastModified filters

```
[23]: wr.s3.read_fwf(f"s3://{bucket}/fwf/", names=["id", "name", "date"], last_modified_
      ↪begin=begin_utc, last_modified_end=end_utc)
wr.s3.read_json(f"s3://{bucket}/json/", last_modified_begin=begin_utc, last_modified_
      ↪end=end_utc)
wr.s3.read_csv(f"s3://{bucket}/csv/", last_modified_begin=begin_utc, last_modified_
      ↪end=end_utc)
wr.s3.read_parquet(f"s3://{bucket}/parquet/", last_modified_begin=begin_utc, last_
      ↪modified_end=end_utc);
```

## 7. Download objects

Objects can be downloaded from S3 using either a path to a local file or a file-like object in binary mode.

### 7.1 Download object to a file path

```
[24]: local_file_dir = getpass.getpass()
```

```
[25]: import os

path1 = f"s3://{bucket}/csv/file1.csv"
local_file = os.path.join(local_file_dir, "file1.csv")
wr.s3.download(path=path1, local_file=local_file)

pd.read_csv(local_file)
```

```
[25]:    id name
0     1  foo
1     2  boo
```

### 7.2 Download object to a file-like object in binary mode

```
[26]: path2 = f"s3://{bucket}/csv/file2.csv"
local_file = os.path.join(local_file_dir, "file2.csv")
with open(local_file, mode="wb") as local_f:
    wr.s3.download(path=path2, local_file=local_f)

pd.read_csv(local_file)
```

```
[26]:    id name
0     3  bar
```

## 8. Upload objects

Objects can be uploaded to S3 using either a path to a local file or a file-like object in binary mode.

### 8.1 Upload object from a file path

```
[27]: local_file = os.path.join(local_file_dir, "file1.csv")
      wr.s3.upload(local_file=local_file, path=path1)

      wr.s3.read_csv(path1)
```

```
[27]:   id name
      0   1  foo
      1   2  boo
```

### 8.2 Upload object from a file-like object in binary mode

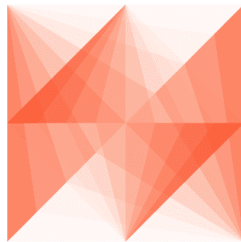
```
[28]: local_file = os.path.join(local_file_dir, "file2.csv")
      with open(local_file, "rb") as local_f:
          wr.s3.upload(local_file=local_f, path=path2)

      wr.s3.read_csv(path2)
```

```
[28]:   id name
      0   3  bar
```

## 9. Delete objects

```
[29]: wr.s3.delete_objects(f"s3://{bucket}/")
```



**AWS Data Wrangler**

### 1.3.4 4 - Parquet Datasets

Wrangler has 3 different write modes to store Parquet Datasets on Amazon S3.

- **append** (Default)  
Only adds new files without any delete.
- **overwrite**  
Deletes everything in the target directory and then add new files.
- **overwrite\_partitions** (Partition Upsert)  
Only deletes the paths of partitions that should be updated and then writes the new partitions files. It's like a "partition Upsert".

```
[1]: from datetime import date
import awswrangler as wr
import pandas as pd
```

Enter your bucket name:

```
[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/dataset/"
.....
```

#### Creating the Dataset

```
[3]: df = pd.DataFrame({
    "id": [1, 2],
    "value": ["foo", "boo"],
    "date": [date(2020, 1, 1), date(2020, 1, 2)]
})

wr.s3.to_parquet(
    df=df,
    path=path,
    dataset=True,
    mode="overwrite"
)

wr.s3.read_parquet(path, dataset=True)
```

```
[3]:   id value      date
0    1  foo  2020-01-01
1    2  boo  2020-01-02
```

## Appending

```
[4]: df = pd.DataFrame({
      "id": [3],
      "value": ["bar"],
      "date": [date(2020, 1, 3)]
    })

    wr.s3.to_parquet(
        df=df,
        path=path,
        dataset=True,
        mode="append"
    )

    wr.s3.read_parquet(path, dataset=True)
```

```
[4]:   id value      date
0    3   bar 2020-01-03
1    1   foo 2020-01-01
2    2   boo 2020-01-02
```

## Overwriting

```
[5]: wr.s3.to_parquet(
      df=df,
      path=path,
      dataset=True,
      mode="overwrite"
    )

    wr.s3.read_parquet(path, dataset=True)
```

```
[5]:   id value      date
0    3   bar 2020-01-03
```

## Creating a Partitioned Dataset

```
[6]: df = pd.DataFrame({
      "id": [1, 2],
      "value": ["foo", "boo"],
      "date": [date(2020, 1, 1), date(2020, 1, 2)]
    })

    wr.s3.to_parquet(
        df=df,
        path=path,
        dataset=True,
        mode="overwrite",
        partition_cols=["date"]
    )

    wr.s3.read_parquet(path, dataset=True)
```

```
[6]:
```

	id	value	date
0	1	foo	2020-01-01
1	2	boo	2020-01-02

### Upserting partitions (overwrite\_partitions)

```
[7]: df = pd.DataFrame({
    "id": [2, 3],
    "value": ["xoo", "bar"],
    "date": [date(2020, 1, 2), date(2020, 1, 3)]
})

wr.s3.to_parquet(
    df=df,
    path=path,
    dataset=True,
    mode="overwrite_partitions",
    partition_cols=["date"]
)

wr.s3.read_parquet(path, dataset=True)
```

```
[7]:
```

	id	value	date
0	1	foo	2020-01-01
1	2	xoo	2020-01-02
2	3	bar	2020-01-03

### BONUS - Glue/Athena integration

```
[8]: df = pd.DataFrame({
    "id": [1, 2],
    "value": ["foo", "boo"],
    "date": [date(2020, 1, 1), date(2020, 1, 2)]
})

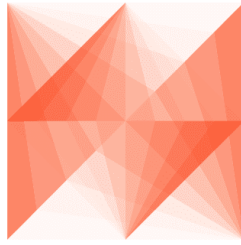
wr.s3.to_parquet(
    df=df,
    path=path,
    dataset=True,
    mode="overwrite",
    database="aws_data_wrangler",
    table="my_table"
)

wr.athena.read_sql_query("SELECT * FROM my_table", database="aws_data_wrangler")
```

```
[8]:
```

	id	value	date
0	1	foo	2020-01-01
1	2	boo	2020-01-02





## AWS Data Wrangler

### 1.3.5 5 - Glue Catalog

Wrangler makes heavy use of [Glue Catalog](#) to store metadata of tables and connections.

```
[1]: import awswrangler as wr
import pandas as pd
```

Enter your bucket name:

```
[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/data/"
.....
```

### Creating a Pandas DataFrame

```
[3]: df = pd.DataFrame({
    "id": [1, 2, 3],
    "name": ["shoes", "tshirt", "ball"],
    "price": [50.3, 10.5, 20.0],
    "in_stock": [True, True, False]
})
df
```

```
[3]:
```

	id	name	price	in_stock
0	1	shoes	50.3	True
1	2	tshirt	10.5	True
2	3	ball	20.0	False

## Checking Glue Catalog Databases

```
[4]: databases = wr.catalog.databases()
     print(databases)
```

	Database	Description
0	aws_data_wrangler	AWS Data Wrangler Test Arena - Glue Database
1	default	Default Hive database

## Create the database awswrangler\_test if not exists

```
[5]: if "awswrangler_test" not in databases.values:
     wr.catalog.create_database("awswrangler_test")
     print(wr.catalog.databases())
     else:
     print("Database awswrangler_test already exists")
```

	Database	Description
0	aws_data_wrangler	AWS Data Wrangler Test Arena - Glue Database
1	awswrangler_test	
2	default	Default Hive database

## Checking the empty database

```
[6]: wr.catalog.tables(database="awswrangler_test")
```

```
[6]: Empty DataFrame
     Columns: [Database, Table, Description, Columns, Partitions]
     Index: []
```

## Writing DataFrames to Data Lake (S3 + Parquet + Glue Catalog)

```
[7]: desc = "This is my product table."

param = {
    "source": "Product Web Service",
    "class": "e-commerce"
}

comments = {
    "id": "Unique product ID.",
    "name": "Product name",
    "price": "Product price (dollar)",
    "in_stock": "Is this product available in the stock?"
}

res = wr.s3.to_parquet(
    df=df,
    path=f"s3://{bucket}/products/",
    dataset=True,
    database="awswrangler_test",
    table="products",
```

(continues on next page)

(continued from previous page)

```

mode="overwrite",
description=desc,
parameters=param,
columns_comments=comments
)

```

## Checking Glue Catalog (AWS Console)

Tables > products

Last updated 18 Sep 2020 Table Version (Current version) ▾

[Edit table](#) [Delete table](#) [View properties](#) [Compare versions](#) [Edit schema](#)

Name	products
Description	This is my product table.
Database	awsdatacatalog_test
Classification	parquet
Location	s3://igor-tavares/products/
Connection	
Deprecated	No
Last updated	Fri Sep 18 19:03:00 GMT-300 2020
Input format	org.apache.hadoop.hive.q1.io.parquet.MapredParquetInputFormat
Output format	org.apache.hadoop.hive.q1.io.parquet.MapredParquetOutputFormat
Serde serialization lib	org.apache.hadoop.hive.q1.io.parquet.serde.ParquetHiveSerDe
Serde parameters	serialization.format 1

Table properties

compressionType	snappy	source	Product Web Service	projection.enabled	false	class	e-commerce	typeOfData	file
-----------------	--------	--------	---------------------	--------------------	-------	-------	------------	------------	------

Schema

Column name	Data type	Partition key	Comment
1 id	bigint		Unique product ID.
2 name	string		Product name
3 price	double		Product price (dollar)
4 in_stock	boolean		Is this product available in the stock?

Showing: 1 - 4 of 4 < >

## Looking Up for the new table!

```
[8]: wr.catalog.tables(name_contains="roduct")
```

```

[8]:      Database      Table      Description \
0  awsdatacatalog_test  products  This is my product table.

      Columns Partitions
0  id, name, price, in_stock

```

```
[9]: wr.catalog.tables(name_prefix="pro")
```

```

[9]:      Database      Table      Description \
0  awsdatacatalog_test  products  This is my product table.

      Columns Partitions
0  id, name, price, in_stock

```

```
[10]: wr.catalog.tables(name_suffix="ts")
```

```

[10]:      Database      Table      Description \
0  awsdatacatalog_test  products  This is my product table.

      Columns Partitions
0  id, name, price, in_stock

```

```
[11]: wr.catalog.tables(search_text="This is my")
```

```
[11]:
```

	Database	Table	Description \
0	awswrangler_test	products	This is my product table.

	Columns	Partitions
0	id, name, price, in_stock	

### Getting tables details

```
[12]: wr.catalog.table(database="awswrangler_test", table="products")
```

```
[12]:
```

	Column Name	Type	Partition	Comment
0	id	bigint	False	Unique product ID.
1	name	string	False	Product name
2	price	double	False	Product price (dollar)
3	in_stock	boolean	False	Is this product available in the stock?

### Cleaning Up the Database

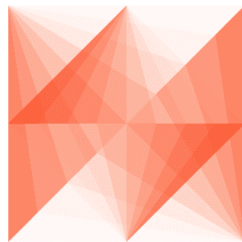
```
[13]: for table in wr.catalog.get_tables(database="awswrangler_test"):
```

```
      wr.catalog.delete_table_if_exists(database="awswrangler_test", table=table["Name
```

```
      ↪ "])
```

### Delete Database

```
[14]: wr.catalog.delete_database('awswrangler_test')
```



**AWS Data Wrangler**

### 1.3.6 6 - Amazon Athena

Wrangler has two ways to run queries on Athena and fetch the result as a DataFrame:

- **ctas\_approach=True** (Default)

Wraps the query with a CTAS and then reads the table data as parquet directly from s3.

- PROS:
  - \* Faster for mid and big result sizes.
  - \* Can handle some level of nested types.
- CONS:
  - \* Requires create/delete table permissions on Glue.
  - \* Does not support timestamp with time zone
  - \* Does not support columns with repeated names.
  - \* Does not support columns with undefined data types.
  - \* A temporary table will be created and then deleted immediately.
  - \* Does not support custom data\_source/catalog\_id.

- **ctas\_approach=False**

Does a regular query on Athena and parse the regular CSV result on s3.

- PROS:
  - \* Faster for small result sizes (less latency).
  - \* Does not require create/delete table permissions on Glue
  - \* Supports timestamp with time zone.
  - \* Support custom data\_source/catalog\_id.
- CONS:
  - \* Slower (But stills faster than other libraries that uses the regular Athena API)
  - \* Does not handle nested types at all.

```
[1]: import awswrangler as wr
```

**Enter your bucket name:**

```
[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/data/"
```

```
.....
```

## Checking/Creating Glue Catalog Databases

```
[3]: if "awsrangler_test" not in wr.catalog.databases().values:
      wr.catalog.create_database("awsrangler_test")
```

## Creating a Parquet Table from the NOAA's CSV files

### Reference

```
[4]: cols = ["id", "dt", "element", "value", "m_flag", "q_flag", "s_flag", "obs_time"]

df = wr.s3.read_csv(
    path="s3://noaa-ghcn-pds/csv/189",
    names=cols,
    parse_dates=["dt", "obs_time"]) # Read 10 files from the 1890 decade (~1GB)
```

df

```
[4]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time
0	AGE00135039	1890-01-01	TMAX	160	NaN	NaN	E	NaN
1	AGE00135039	1890-01-01	TMIN	30	NaN	NaN	E	NaN
2	AGE00135039	1890-01-01	PRCP	45	NaN	NaN	E	NaN
3	AGE00147705	1890-01-01	TMAX	140	NaN	NaN	E	NaN
4	AGE00147705	1890-01-01	TMIN	74	NaN	NaN	E	NaN
...	...	...	...	...	...	...	...	...
29240014	UZM00038457	1899-12-31	PRCP	16	NaN	NaN	r	NaN
29240015	UZM00038457	1899-12-31	TAVG	-73	NaN	NaN	r	NaN
29240016	UZM00038618	1899-12-31	TMIN	-76	NaN	NaN	r	NaN
29240017	UZM00038618	1899-12-31	PRCP	0	NaN	NaN	r	NaN
29240018	UZM00038618	1899-12-31	TAVG	-60	NaN	NaN	r	NaN

[29240019 rows x 8 columns]

```
[5]: wr.s3.to_parquet(
      df=df,
      path=path,
      dataset=True,
      mode="overwrite",
      database="awsrangler_test",
      table="noaa"
    );
```

```
[6]: wr.catalog.table(database="awsrangler_test", table="noaa")
```

```
[6]:
```

	Column Name	Type	Partition	Comment
0	id	string	False	
1	dt	timestamp	False	
2	element	string	False	
3	value	bigint	False	
4	m_flag	string	False	
5	q_flag	string	False	
6	s_flag	string	False	
7	obs_time	string	False	

**Reading with ctas\_approach=False**

```
[7]: %%time

wr.athena.read_sql_query("SELECT * FROM noaa", database="awsdatawrangler_test", ctas_
    ↳approach=False)
```

```
CPU times: user 8min 45s, sys: 6.52 s, total: 8min 51s
Wall time: 11min 3s
```

```
[7]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time
0	AGE00135039	1890-01-01	TMAX	160	<NA>	<NA>	E	<NA>
1	AGE00135039	1890-01-01	TMIN	30	<NA>	<NA>	E	<NA>
2	AGE00135039	1890-01-01	PRCP	45	<NA>	<NA>	E	<NA>
3	AGE00147705	1890-01-01	TMAX	140	<NA>	<NA>	E	<NA>
4	AGE00147705	1890-01-01	TMIN	74	<NA>	<NA>	E	<NA>
...	...	...	...	...	...	...	...	...
29240014	UZM00038457	1899-12-31	PRCP	16	<NA>	<NA>	r	<NA>
29240015	UZM00038457	1899-12-31	TAVG	-73	<NA>	<NA>	r	<NA>
29240016	UZM00038618	1899-12-31	TMIN	-76	<NA>	<NA>	r	<NA>
29240017	UZM00038618	1899-12-31	PRCP	0	<NA>	<NA>	r	<NA>
29240018	UZM00038618	1899-12-31	TAVG	-60	<NA>	<NA>	r	<NA>

```
[29240019 rows x 8 columns]
```

**Default with ctas\_approach=True - 13x faster (default)**

```
[8]: %%time

wr.athena.read_sql_query("SELECT * FROM noaa", database="awsdatawrangler_test")
```

```
CPU times: user 28 s, sys: 6.07 s, total: 34.1 s
Wall time: 50.5 s
```

```
[8]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time
0	ASN00017088	1890-06-11	PRCP	0	<NA>	<NA>	a	<NA>
1	ASN00017087	1890-06-11	PRCP	0	<NA>	<NA>	a	<NA>
2	ASN00017089	1890-06-11	PRCP	71	<NA>	<NA>	a	<NA>
3	ASN00017095	1890-06-11	PRCP	0	<NA>	<NA>	a	<NA>
4	ASN00017094	1890-06-11	PRCP	0	<NA>	<NA>	a	<NA>
...	...	...	...	...	...	...	...	...
29240014	USC00461260	1899-12-31	SNOW	0	<NA>	<NA>	6	<NA>
29240015	USC00461515	1899-12-31	TMAX	-89	<NA>	<NA>	6	<NA>
29240016	USC00461515	1899-12-31	TMIN	-189	<NA>	<NA>	6	<NA>
29240017	USC00461515	1899-12-31	PRCP	0	<NA>	<NA>	6	<NA>
29240018	USC00461515	1899-12-31	SNOW	0	<NA>	<NA>	6	<NA>

```
[29240019 rows x 8 columns]
```

## Using categories to speed up and save memory - 24x faster

```
[9]: %%time

wr.athena.read_sql_query("SELECT * FROM noaa", database="awsdatawrangler_test",
categories=["id", "dt", "element", "value", "m_flag", "q_flag", "s_flag", "obs_time"])

CPU times: user 6.89 s, sys: 2.27 s, total: 9.16 s
Wall time: 27.3 s
```

```
[9]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time
0	GME00102348	1890-08-03	TMAX	172	NaN	NaN	E	NaN
1	GME00102348	1890-08-03	TMIN	117	NaN	NaN	E	NaN
2	GME00102348	1890-08-03	PRCP	63	NaN	NaN	E	NaN
3	GME00102348	1890-08-03	SNWD	0	NaN	NaN	E	NaN
4	GME00121126	1890-08-03	PRCP	32	NaN	NaN	E	NaN
...	...	...	...	...	...	...	...	...
29240014	USC00461260	1899-12-31	SNOW	0	NaN	NaN	6	NaN
29240015	USC00461515	1899-12-31	TMAX	-89	NaN	NaN	6	NaN
29240016	USC00461515	1899-12-31	TMIN	-189	NaN	NaN	6	NaN
29240017	USC00461515	1899-12-31	PRCP	0	NaN	NaN	6	NaN
29240018	USC00461515	1899-12-31	SNOW	0	NaN	NaN	6	NaN

```
[29240019 rows x 8 columns]
```

## Batching (Good for restricted memory environments)

```
[10]: %%time

dfs = wr.athena.read_sql_query(
    "SELECT * FROM noaa",
    database="awsdatawrangler_test",
    chunksize=True # Chunksize calculated automatically for ctas_approach.
)

for df in dfs: # Batching
    print(len(df.index))

1024
8086528
1024
1024
1024
1024
1024
15360
1024
10090496
2153472
8886995
CPU times: user 22.7 s, sys: 5.41 s, total: 28.1 s
Wall time: 48 s
```

```
[11]: %%time

dfs = wr.athena.read_sql_query(
```

(continues on next page)



(continued from previous page)

```

"SELECT * FROM noaa",
database="awswrangler_test",
chunksize=100_000_000
)

for df in dfs: # Batching
    print(len(df.index))

29240019
CPU times: user 34.8 s, sys: 8.54 s, total: 43.4 s
Wall time: 1min 1s

```

### Cleaning Up S3

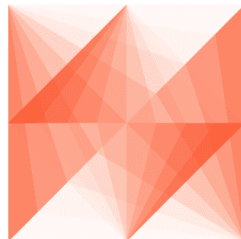
```
[12]: wr.s3.delete_objects(path)
```

### Delete table

```
[13]: wr.catalog.delete_table_if_exists(database="awswrangler_test", table="noaa");
```

### Delete Database

```
[14]: wr.catalog.delete_database('awswrangler_test')
```



## AWS Data Wrangler

### 1.3.7 7 - Redshift, MySQL, PostgreSQL and SQL Server

Wrangler's Redshift, MySQL and PostgreSQL have two basic function in common that tries to follow the Pandas conventions, but add more data type consistency.

- `wr.redshift.to_sql()`
- `wr.redshift.read_sql_query()`
- `wr.mysql.to_sql()`
- `wr.mysql.read_sql_query()`
- `wr.postgresql.to_sql()`

- `wr.postgresql.read_sql_query()`
- `wr.sqlserver.to_sql()`
- `wr.sqlserver.read_sql_query()`

```
[1]: import awswrangler as wr
import pandas as pd

df = pd.DataFrame({
    "id": [1, 2],
    "name": ["foo", "boo"]
})
```

## Connect using the Glue Catalog Connections

- `wr.redshift.connect()`
- `wr.mysql.connect()`
- `wr.postgresql.connect()`
- `wr.sqlserver.connect()`

```
[2]: con_redshift = wr.redshift.connect("aws-data-wrangler-redshift")
con_mysql = wr.mysql.connect("aws-data-wrangler-mysql")
con_postgresql = wr.postgresql.connect("aws-data-wrangler-postgresql")
con_sqlserver = wr.sqlserver.connect("aws-data-wrangler-sqlserver")
```

## Raw SQL queries (No Pandas)

```
[3]: with con_redshift.cursor() as cursor:
    for row in cursor.execute("SELECT 1"):
        print(row)
```

```
[1]
```

## Loading data to Database

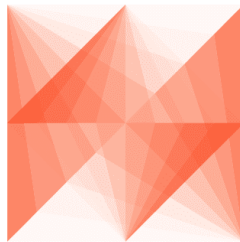
```
[4]: wr.redshift.to_sql(df, con_redshift, schema="public", table="tutorial", mode=
    ↳ "overwrite")
wr.mysql.to_sql(df, con_mysql, schema="test", table="tutorial", mode="overwrite")
wr.postgresql.to_sql(df, con_postgresql, schema="public", table="tutorial", mode=
    ↳ "overwrite")
wr.sqlserver.to_sql(df, con_sqlserver, schema="dbo", table="tutorial", mode="overwrite
    ↳ ")
```

## Unloading data from Database

```
[5]: wr.redshift.read_sql_query("SELECT * FROM public.tutorial", con=con_redshift)
wr.mysql.read_sql_query("SELECT * FROM test.tutorial", con=con_mysql)
wr.postgresql.read_sql_query("SELECT * FROM public.tutorial", con=con_postgresql)
wr.sqlserver.read_sql_query("SELECT * FROM dbo.tutorial", con=con_sqlserver)
```

```
[5]:      id name
0      1  foo
1      2  boo
```

```
[6]: con_redshift.close()
con_mysql.close()
con_postgresql.close()
con_sqlserver.close()
```



**AWS Data Wrangler**

### 1.3.8 8 - Redshift - COPY & UNLOAD

Amazon Redshift has two SQL command that help to load and unload large amount of data staging it on Amazon S3:

1 - COPY

2 - UNLOAD

Let's take a look and how Wrangler can use it.

```
[1]: import awswrangler as wr

con = wr.redshift.connect("aws-data-wrangler-redshift")
```

**Enter your bucket name:**

```
[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/stage/"
```

```
.....
```

**Enter your IAM ROLE ARN:**

```
[3]: iam_role = getpass.getpass()
```

```
.....
```

**Creating a Dataframe from the NOAA's CSV files**

## Reference

```
[4]: cols = ["id", "dt", "element", "value", "m_flag", "q_flag", "s_flag", "obs_time"]
```

```
df = wr.s3.read_csv(
    path="s3://noaa-ghcn-pds/csv/1897.csv",
    names=cols,
    parse_dates=["dt", "obs_time"]) # ~127MB, ~4MM rows
```

```
df
```

```
[4]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time
0	AG000060590	1897-01-01	TMAX	170	NaN	NaN	E	NaN
1	AG000060590	1897-01-01	TMIN	-14	NaN	NaN	E	NaN
2	AG000060590	1897-01-01	PRCP	0	NaN	NaN	E	NaN
3	AGE00135039	1897-01-01	TMAX	140	NaN	NaN	E	NaN
4	AGE00135039	1897-01-01	TMIN	40	NaN	NaN	E	NaN
...	...	...	...	...	...	...	...	...
3923594	UZM00038457	1897-12-31	TMIN	-145	NaN	NaN	r	NaN
3923595	UZM00038457	1897-12-31	PRCP	4	NaN	NaN	r	NaN
3923596	UZM00038457	1897-12-31	TAVG	-95	NaN	NaN	r	NaN
3923597	UZM00038618	1897-12-31	PRCP	66	NaN	NaN	r	NaN
3923598	UZM00038618	1897-12-31	TAVG	-45	NaN	NaN	r	NaN

```
[3923599 rows x 8 columns]
```

**Load and Unload with COPY and UNLOAD commands**

Note: Please use a empty S3 path for the COPY command.

```
[5]: %%time
```

```
wr.redshift.copy(
    df=df,
    path=path,
    con=con,
    schema="public",
    table="commands",
    mode="overwrite",
    iam_role=iam_role,
)
```

```
CPU times: user 2.78 s, sys: 293 ms, total: 3.08 s
Wall time: 20.7 s
```

```
[6]: %%time
```

(continues on next page)

(continued from previous page)

```
wr.redshift.unload(
    sql="SELECT * FROM public.commands",
    con=con,
    iam_role=iam_role,
    path=path,
    keep_files=True,
)
```

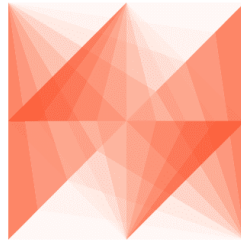
```
CPU times: user 10 s, sys: 1.14 s, total: 11.2 s
Wall time: 27.5 s
```

```
[6]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time
0	AG000060590	1897-01-01	TMAX	170	<NA>	<NA>	E	<NA>
1	AG000060590	1897-01-01	PRCP	0	<NA>	<NA>	E	<NA>
2	AGE00135039	1897-01-01	TMIN	40	<NA>	<NA>	E	<NA>
3	AGE00147705	1897-01-01	TMAX	164	<NA>	<NA>	E	<NA>
4	AGE00147705	1897-01-01	PRCP	0	<NA>	<NA>	E	<NA>
...	...	...	...	...	...	...	...	...
3923594	USW00094967	1897-12-31	TMAX	-144	<NA>	<NA>	6	<NA>
3923595	USW00094967	1897-12-31	PRCP	0	P	<NA>	6	<NA>
3923596	UZM00038457	1897-12-31	TMAX	-49	<NA>	<NA>	r	<NA>
3923597	UZM00038457	1897-12-31	PRCP	4	<NA>	<NA>	r	<NA>
3923598	UZM00038618	1897-12-31	PRCP	66	<NA>	<NA>	r	<NA>

```
[7847198 rows x 8 columns]
```

```
[7]: con.close()
```



## AWS Data Wrangler

### 1.3.9 9 - Redshift - Append, Overwrite and Upsert

Wrangler's `copy/to_sql` function has three different mode options for Redshift.

- 1 - append
- 2 - overwrite
- 3 - upsert

```
[2]: import awswrangler as wr
import pandas as pd
from datetime import date

con = wr.redshift.connect("aws-data-wrangler-redshift")
```

**Enter your bucket name:**

```
[3]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/stage/"
.....
```

**Enter your IAM ROLE ARN:**

```
[4]: iam_role = getpass.getpass()
.....
```

**Creating the table (Overwriting if it exists)**

```
[10]: df = pd.DataFrame({
    "id": [1, 2],
    "value": ["foo", "boo"],
    "date": [date(2020, 1, 1), date(2020, 1, 2)]
})

wr.redshift.copy(
    df=df,
    path=path,
    con=con,
    schema="public",
    table="my_table",
    mode="overwrite",
    iam_role=iam_role,
    primary_keys=["id"]
)

wr.redshift.read_sql_table(table="my_table", schema="public", con=con)
```

```
[10]:   id value      date
0    2   boo 2020-01-02
1    1   foo 2020-01-01
```

**Appending**

```
[11]: df = pd.DataFrame({
    "id": [3],
    "value": ["bar"],
    "date": [date(2020, 1, 3)]
})

wr.redshift.copy(
    df=df,
    path=path,
    con=con,
    schema="public",
    table="my_table",
```

(continues on next page)

(continued from previous page)

```

    mode="append",
    iam_role=iam_role,
    primary_keys=["id"]
)

wr.redshift.read_sql_table(table="my_table", schema="public", con=con)

```

```

[11]:      id value      date
0     1   foo  2020-01-01
1     2   boo  2020-01-02
2     3   bar  2020-01-03

```

## Upserting

```

[12]: df = pd.DataFrame({
        "id": [2, 3],
        "value": ["xoo", "bar"],
        "date": [date(2020, 1, 2), date(2020, 1, 3)]
    })

wr.redshift.copy(
    df=df,
    path=path,
    con=con,
    schema="public",
    table="my_table",
    mode="upsert",
    iam_role=iam_role,
    primary_keys=["id"]
)

wr.redshift.read_sql_table(table="my_table", schema="public", con=con)

```

```

[12]:      id value      date
0     1   foo  2020-01-01
1     2   xoo  2020-01-02
2     3   bar  2020-01-03

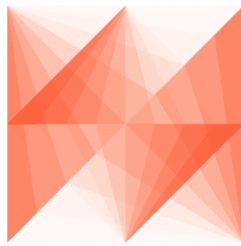
```

## Cleaning Up

```

[13]: with con.cursor() as cursor:
        cursor.execute("DROP TABLE public.my_table")
    con.close()

```



## AWS Data Wrangler

### 1.3.10 10 - Parquet Crawler

Wrangler can extract only the metadata from Parquet files and Partitions and then add it to the Glue Catalog.

```
[1]: import awswrangler as wr
```

Enter your bucket name:

```
[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/data/"
.....
```

### Creating a Parquet Table from the NOAA's CSV files

#### Reference

```
[3]: cols = ["id", "dt", "element", "value", "m_flag", "q_flag", "s_flag", "obs_time"]

df = wr.s3.read_csv(
    path="s3://noaa-ghcn-pds/csv/189",
    names=cols,
    parse_dates=["dt", "obs_time"]) # Read 10 files from the 1890 decade (~1GB)
```

```
df
```

```
[3]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time
0	AGE00135039	1890-01-01	TMAX	160	NaN	NaN	E	NaN
1	AGE00135039	1890-01-01	TMIN	30	NaN	NaN	E	NaN
2	AGE00135039	1890-01-01	PRCP	45	NaN	NaN	E	NaN
3	AGE00147705	1890-01-01	TMAX	140	NaN	NaN	E	NaN
4	AGE00147705	1890-01-01	TMIN	74	NaN	NaN	E	NaN
...	...	...	...	...	...	...	...	...
29249753	UZM00038457	1899-12-31	PRCP	16	NaN	NaN	r	NaN
29249754	UZM00038457	1899-12-31	TAVG	-73	NaN	NaN	r	NaN
29249755	UZM00038618	1899-12-31	TMIN	-76	NaN	NaN	r	NaN
29249756	UZM00038618	1899-12-31	PRCP	0	NaN	NaN	r	NaN
29249757	UZM00038618	1899-12-31	TAVG	-60	NaN	NaN	r	NaN

```
[29249758 rows x 8 columns]
```



```
[4]: df["year"] = df["dt"].dt.year
```

```
df.head(3)
```

```
[4]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time	year
0	AGE00135039	1890-01-01	TMAX	160	NaN	NaN	E	NaN	1890
1	AGE00135039	1890-01-01	TMIN	30	NaN	NaN	E	NaN	1890
2	AGE00135039	1890-01-01	PRCP	45	NaN	NaN	E	NaN	1890

```
[5]: res = wr.s3.to_parquet(
    df=df,
    path=path,
    dataset=True,
    mode="overwrite",
    partition_cols=["year"],
)
```

```
[6]: [ x.split("data/", 1)[1] for x in wr.s3.list_objects(path) ]
```

```
[6]: ['year=1890/06a519afcf8e48c9b08c8908f30adcfe.snappy.parquet',
'year=1891/5a99c28dbef54008bfc770c946099e02.snappy.parquet',
'year=1892/9b1ea5d1cfad40f78c920f93540ca8ec.snappy.parquet',
'year=1893/92259b49c134401eaf772506ee802af6.snappy.parquet',
'year=1894/c734469ffff944f69dc277c630064a16.snappy.parquet',
'year=1895/cf7ccde86aaf4d138f86c379c0817aa6.snappy.parquet',
'year=1896/ce02f4c2c554438786b766b33db451b6.snappy.parquet',
'year=1897/e04de04ad3c444deadcc9c410ab97ca1.snappy.parquet',
'year=1898/acb0e02878f04b56a6200f4b5a97be0e.snappy.parquet',
'year=1899/a269bdbb0f6a48faac55f3bcfef7df7a.snappy.parquet']
```

## Crawling!

```
[7]: %%time
```

```
res = wr.s3.store_parquet_metadata(
    path=path,
    database="aws wrangler_test",
    table="crawler",
    dataset=True,
    mode="overwrite",
    dtype={"year": "int"}
)
```

```
CPU times: user 1.81 s, sys: 528 ms, total: 2.33 s
Wall time: 3.21 s
```

## Checking

```
[8]: wr.catalog.table(database="awswrangler_test", table="crawler")
```

```
[8]:
```

	Column Name	Type	Partition	Comment
0	id	string	False	
1	dt	timestamp	False	
2	element	string	False	
3	value	bigint	False	
4	m_flag	string	False	
5	q_flag	string	False	
6	s_flag	string	False	
7	obs_time	string	False	
8	year	int	True	

```
[9]: %%time
```

```
wr.athena.read_sql_query("SELECT * FROM crawler WHERE year=1890", database=
↳ "awswrangler_test")
```

```
CPU times: user 3.52 s, sys: 811 ms, total: 4.33 s
```

```
Wall time: 9.6 s
```

```
[9]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time	\
0	USC00195145	1890-01-01	TMIN	-28	<NA>	<NA>	6	<NA>	
1	USC00196770	1890-01-01	PRCP	0	P	<NA>	6	<NA>	
2	USC00196770	1890-01-01	SNOW	0	<NA>	<NA>	6	<NA>	
3	USC00196915	1890-01-01	PRCP	0	P	<NA>	6	<NA>	
4	USC00196915	1890-01-01	SNOW	0	<NA>	<NA>	6	<NA>	
...	...	...	...	...	...	...	...	...	
6139	ASN00022006	1890-12-03	PRCP	0	<NA>	<NA>	a	<NA>	
6140	ASN00022007	1890-12-03	PRCP	0	<NA>	<NA>	a	<NA>	
6141	ASN00022008	1890-12-03	PRCP	0	<NA>	<NA>	a	<NA>	
6142	ASN00022009	1890-12-03	PRCP	0	<NA>	<NA>	a	<NA>	
6143	ASN00022011	1890-12-03	PRCP	0	<NA>	<NA>	a	<NA>	
	year								
0	1890								
1	1890								
2	1890								
3	1890								
4	1890								
...	...								
6139	1890								
6140	1890								
6141	1890								
6142	1890								
6143	1890								

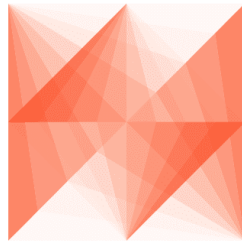
```
[1276246 rows x 9 columns]
```

## Cleaning Up S3

```
[10]: wr.s3.delete_objects(path)
```

## Cleaning Up the Database

```
[11]: for table in wr.catalog.get_tables(database="awswrangler_test"):
        wr.catalog.delete_table_if_exists(database="awswrangler_test", table=table["Name
        ↪"])
```



**AWS Data Wrangler**

### 1.3.11 11 - CSV Datasets

Wrangler has 3 different write modes to store CSV Datasets on Amazon S3.

- **append** (Default)  
Only adds new files without any delete.
- **overwrite**  
Deletes everything in the target directory and then add new files.
- **overwrite\_partitions** (Partition Upsert)  
Only deletes the paths of partitions that should be updated and then writes the new partitions files. It's like a "partition Upsert".

```
[1]: from datetime import date
import awswrangler as wr
import pandas as pd
```

**Enter your bucket name:**

```
[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/dataset/"
.....
```

## Checking/Creating Glue Catalog Databases

```
[3]: if "awswrangler_test" not in wr.catalog.databases().values:
      wr.catalog.create_database("awswrangler_test")
```

## Creating the Dataset

```
[4]: df = pd.DataFrame({
      "id": [1, 2],
      "value": ["foo", "boo"],
      "date": [date(2020, 1, 1), date(2020, 1, 2)]
    })

wr.s3.to_csv(
    df=df,
    path=path,
    index=False,
    dataset=True,
    mode="overwrite",
    database="awswrangler_test",
    table="csv_dataset"
)

wr.athena.read_sql_table(database="awswrangler_test", table="csv_dataset")
```

```
[4]:   id value      date
0    1  foo  2020-01-01
1    2  boo  2020-01-02
```

## Appending

```
[5]: df = pd.DataFrame({
      "id": [3],
      "value": ["bar"],
      "date": [date(2020, 1, 3)]
    })

wr.s3.to_csv(
    df=df,
    path=path,
    index=False,
    dataset=True,
    mode="append",
    database="awswrangler_test",
    table="csv_dataset"
)

wr.athena.read_sql_table(database="awswrangler_test", table="csv_dataset")
```

```
[5]:   id value      date
0    3  bar  2020-01-03
1    1  foo  2020-01-01
2    2  boo  2020-01-02
```

## Overwriting

```
[6]: wr.s3.to_csv(
      df=df,
      path=path,
      index=False,
      dataset=True,
      mode="overwrite",
      database="aws wrangler_test",
      table="csv_dataset"
    )

wr.athena.read_sql_table(database="aws wrangler_test", table="csv_dataset")
```

```
[6]:   id value      date
0    3   bar  2020-01-03
```

## Creating a Partitioned Dataset

```
[7]: df = pd.DataFrame({
      "id": [1, 2],
      "value": ["foo", "boo"],
      "date": [date(2020, 1, 1), date(2020, 1, 2)]
    })

wr.s3.to_csv(
    df=df,
    path=path,
    index=False,
    dataset=True,
    mode="overwrite",
    database="aws wrangler_test",
    table="csv_dataset",
    partition_cols=["date"]
)

wr.athena.read_sql_table(database="aws wrangler_test", table="csv_dataset")
```

```
[7]:   id value      date
0    2   boo  2020-01-02
1    1   foo  2020-01-01
```

## Upserting partitions (overwrite\_partitions)

```
[8]: df = pd.DataFrame({
      "id": [2, 3],
      "value": ["xoo", "bar"],
      "date": [date(2020, 1, 2), date(2020, 1, 3)]
    })

wr.s3.to_csv(
    df=df,
    path=path,
    index=False,
```

(continues on next page)

(continued from previous page)

```

dataset=True,
mode="overwrite_partitions",
database="aws wrangler_test",
table="csv_dataset",
partition_cols=["date"]
)

wr.athena.read_sql_table(database="aws wrangler_test", table="csv_dataset")

```

```

[8]:   id value      date
0    1  foo  2020-01-01
1    2  xoo  2020-01-02
0    3  bar  2020-01-03

```

### BONUS - Glue/Athena integration

```

[9]: df = pd.DataFrame({
      "id": [1, 2],
      "value": ["foo", "boo"],
      "date": [date(2020, 1, 1), date(2020, 1, 2)]
    })

wr.s3.to_csv(
    df=df,
    path=path,
    dataset=True,
    index=False,
    mode="overwrite",
    database="aws_data_wrangler",
    table="my_table",
    compression="gzip"
)

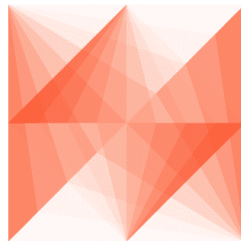
wr.athena.read_sql_query("SELECT * FROM my_table", database="aws_data_wrangler")

```

```

[9]:   id value      date
0    1  foo  2020-01-01
1    2  boo  2020-01-02

```



## AWS Data Wrangler

### 1.3.12 12 - CSV Crawler

Wrangler can extract only the metadata from a Pandas DataFrame and then add it can be added to Glue Catalog as a table.

```
[1]: import awswrangler as wr
      from datetime import datetime
      import pandas as pd
```

Enter your bucket name:

```
[2]: import getpass
      bucket = getpass.getpass()
      path = f"s3://{bucket}/csv_crawler/"
      .....
```

#### Creating a Pandas DataFrame

```
[3]: ts = lambda x: datetime.strptime(x, "%Y-%m-%d %H:%M:%S.%f") # noqa
      dt = lambda x: datetime.strptime(x, "%Y-%m-%d").date() # noqa

      df = pd.DataFrame(
          {
              "id": [1, 2, 3],
              "string": ["foo", None, "boo"],
              "float": [1.0, None, 2.0],
              "date": [dt("2020-01-01"), None, dt("2020-01-02")],
              "timestamp": [ts("2020-01-01 00:00:00.0"), None, ts("2020-01-02 00:00:01.0")],
              "bool": [True, None, False],
              "par0": [1, 1, 2],
              "par1": ["a", "b", "b"],
          }
      )

      df
```

```
[3]:   id string  float      date      timestamp  bool  par0 par1
0    1   foo    1.0 2020-01-01 2020-01-01 00:00:00   True    1    a
1    2  None   NaN      None              NaT   None    1    b
2    3   boo    2.0 2020-01-02 2020-01-02 00:00:01  False    2    b
```

#### Extracting the metadata

```
[4]: columns_types, partitions_types = wr.catalog.extract_athena_types(
      df=df,
      file_format="csv",
      index=False,
      partition_cols=["par0", "par1"]
    )
```

```
[5]: columns_types
```

```
[5]: {'id': 'bigint',  
      'string': 'string',  
      'float': 'double',  
      'date': 'date',  
      'timestamp': 'timestamp',  
      'bool': 'boolean'}
```

```
[6]: partitions_types
```

```
[6]: {'par0': 'bigint', 'par1': 'string'}
```

### Creating the table

```
[7]: wr.catalog.create_csv_table(  
      table="csv_crawler",  
      database="awswrangler_test",  
      path=path,  
      partitions_types=partitions_types,  
      columns_types=columns_types,  
  )
```

### Checking

```
[8]: wr.catalog.table(database="awswrangler_test", table="csv_crawler")
```

```
[8]:
```

	Column Name	Type	Partition	Comment
0	id	bigint	False	
1	string	string	False	
2	float	double	False	
3	date	date	False	
4	timestamp	timestamp	False	
5	bool	boolean	False	
6	par0	bigint	True	
7	par1	string	True	

### We can still using the extracted metadata to ensure all data types consistence to new data

```
[9]: df = pd.DataFrame(  
      {  
          "id": [1],  
          "string": ["1"],  
          "float": [1],  
          "date": [ts("2020-01-01 00:00:00.0")],  
          "timestamp": [dt("2020-01-02")],  
          "bool": [1],  
          "par0": [1],  
          "par1": ["a"],  
      }  
  )  
  
df
```



```
[9]:
```

	id	string	float	date	timestamp	bool	par0	par1
0	1	1	1	2020-01-01	2020-01-02	1	1	a

```
[10]: res = wr.s3.to_csv(
        df=df,
        path=path,
        index=False,
        dataset=True,
        database="awswrangler_test",
        table="csv_crawler",
        partition_cols=["par0", "par1"],
        dtype=columns_types
    )
```

You can also extract the metadata directly from the Catalog if you want

```
[11]: dtype = wr.catalog.get_table_types(database="awswrangler_test", table="csv_crawler")
```

```
[12]: res = wr.s3.to_csv(
        df=df,
        path=path,
        index=False,
        dataset=True,
        database="awswrangler_test",
        table="csv_crawler",
        partition_cols=["par0", "par1"],
        dtype=dtype
    )
```

## Checking out

```
[13]: df = wr.athena.read_sql_table(database="awswrangler_test", table="csv_crawler")
```

df

```
[13]:
```

	id	string	float	date	timestamp	bool	par0	par1
0	1	1	1.0	None	2020-01-02	True	1	a
1	1	1	1.0	None	2020-01-02	True	1	a

```
[14]: df.dtypes
```

```
[14]: id                Int64
      string          string
      float          float64
      date            object
      timestamp      datetime64[ns]
      bool            boolean
      par0            Int64
      par1            string
      dtype: object
```

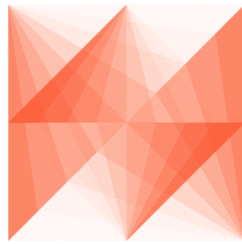
## Cleaning Up S3

```
[15]: wr.s3.delete_objects(path)
```

## Cleaning Up the Database

```
[16]: wr.catalog.delete_table_if_exists(database="awswrangler_test", table="csv_crawler")
```

```
[16]: True
```



## AWS Data Wrangler

### 1.3.13 13 - Merging Datasets on S3

Wrangler has 3 different copy modes to store Parquet Datasets on Amazon S3.

- **append** (Default)  
Only adds new files without any delete.
- **overwrite**  
Deletes everything in the target directory and then add new files.
- **overwrite\_partitions** (Partition Upsert)  
Only deletes the paths of partitions that should be updated and then writes the new partitions files. It's like a "partition Upsert".

```
[1]: from datetime import date  
import awswrangler as wr  
import pandas as pd
```

Enter your bucket name:

```
[2]: import getpass  
bucket = getpass.getpass()  
path1 = f"s3://{bucket}/dataset1/"  
path2 = f"s3://{bucket}/dataset2/"  
  
.....
```

### Creating Dataset 1

```
[3]: df = pd.DataFrame({
      "id": [1, 2],
      "value": ["foo", "boo"],
      "date": [date(2020, 1, 1), date(2020, 1, 2)]
    })

    wr.s3.to_parquet(
        df=df,
        path=path1,
        dataset=True,
        mode="overwrite",
        partition_cols=["date"]
    )

    wr.s3.read_parquet(path1, dataset=True)
```

```
[3]:   id value      date
0    1  foo  2020-01-01
1    2  boo  2020-01-02
```

### Creating Dataset 2

```
[4]: df = pd.DataFrame({
      "id": [2, 3],
      "value": ["xoo", "bar"],
      "date": [date(2020, 1, 2), date(2020, 1, 3)]
    })

    dataset2_files = wr.s3.to_parquet(
        df=df,
        path=path2,
        dataset=True,
        mode="overwrite",
        partition_cols=["date"]
    )["paths"]

    wr.s3.read_parquet(path2, dataset=True)
```

```
[4]:   id value      date
0    2  xoo  2020-01-02
1    3  bar  2020-01-03
```

### Merging (Dataset 2 -> Dataset 1) (APPEND)

```
[5]: wr.s3.merge_datasets(
      source_path=path2,
      target_path=path1,
      mode="append"
    )

    wr.s3.read_parquet(path1, dataset=True)
```

```
[5]:
```

	id	value	date
0	1	foo	2020-01-01
1	2	xoo	2020-01-02
2	2	boo	2020-01-02
3	3	bar	2020-01-03

### Merging (Dataset 2 -> Dataset 1) (OVERWRITE\_PARTITIONS)

```
[6]: wr.s3.merge_datasets(  
      source_path=path2,  
      target_path=path1,  
      mode="overwrite_partitions"  
    )  
  
wr.s3.read_parquet(path1, dataset=True)
```

```
[6]:
```

	id	value	date
0	1	foo	2020-01-01
1	2	xoo	2020-01-02
2	3	bar	2020-01-03

### Merging (Dataset 2 -> Dataset 1) (OVERWRITE)

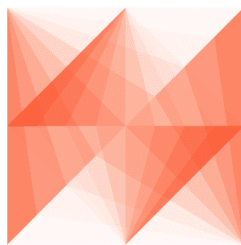
```
[7]: wr.s3.merge_datasets(  
      source_path=path2,  
      target_path=path1,  
      mode="overwrite"  
    )  
  
wr.s3.read_parquet(path1, dataset=True)
```

```
[7]:
```

	id	value	date
0	2	xoo	2020-01-02
1	3	bar	2020-01-03

### Cleaning Up

```
[8]: wr.s3.delete_objects(path1)  
wr.s3.delete_objects(path2)
```



**AWS Data Wrangler**

### 1.3.14 14 - Schema Evolution

Wrangler support new **columns** on Parquet Dataset through:

- `wr.s3.to_parquet()`
- `wr.s3.store_parquet_metadata()` i.e. “Crawler”

```
[1]: from datetime import date
import awswrangler as wr
import pandas as pd
```

Enter your bucket name:

```
[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/dataset/"
```

```
.....
```

#### Creating the Dataset

```
[3]: df = pd.DataFrame({
    "id": [1, 2],
    "value": ["foo", "boo"],
})

wr.s3.to_parquet(
    df=df,
    path=path,
    dataset=True,
    mode="overwrite",
    database="aws_data_wrangler",
    table="my_table"
)

wr.s3.read_parquet(path, dataset=True)
```

```
[3]:   id value
0    1  foo
1    2  boo
```

## Schema Version 0 on Glue Catalog (AWS Console)

Tables &gt; my\_table

[Edit table](#) [Delete table](#)

Name	my_table
Description	
Database	aws_data_wrangler
Classification	parquet
Location	s3://[REDACTED]/dataset/
Connection	
Deprecated	No
Last updated	Tue May 19 19:07:03 GMT-300 2020
Input format	org.apache.hadoop.hive.q1.io.parquet.MapredParquetInputFormat
Output format	org.apache.hadoop.hive.q1.io.parquet.MapredParquetOutputFormat
Serde serialization lib	org.apache.hadoop.hive.q1.io.parquet.serde.ParquetHiveSerDe
Serde parameters	serialization.format 1
Table properties	compressionType <b>snappy</b> typeOfData <b>file</b>

Last updated 19 May 2020 Table **Version (Current version)**

Showing: 1 - 1 < >

Version	Created:	Created by:
0	19 May 2020 7:0...	[REDACTED]

Schema

Showing: 1 - 2 of 2 &lt; &gt;

	Column name	Data type	Partition key	Comment
1	id	bigint		
2	value	string		

## Appending with NEW COLUMNS

```
[4]: df = pd.DataFrame({
    "id": [3, 4],
    "value": ["bar", None],
    "date": [date(2020, 1, 3), date(2020, 1, 4)],
    "flag": [True, False]
})

wr.s3.to_parquet(
    df=df,
    path=path,
    dataset=True,
    mode="append",
    database="aws_data_wrangler",
    table="my_table",
    catalog_versioning=True # Optional
)

wr.s3.read_parquet(path, dataset=True, validate_schema=False)
```

```
[4]:   id value      date  flag
0    3  bar  2020-01-03  True
1    4 None  2020-01-04 False
2    1  foo         NaN   NaN
3    2  boo         NaN   NaN
```

## Schema Version 1 on Glue Catalog (AWS Console)

Tables > my\_table

[Edit table](#) [Delete table](#)

**Name** my\_table  
**Description**  
**Database** aws\_data\_wrangler  
**Classification** parquet  
**Location** s3://[redacted]dataset/  
**Connection**  
**Deprecated** No  
**Last updated** Tue May 19 19:11:15 GMT-300 2020  
**Input format** org.apache.hadoop.hive.q1.io.parquet.MapredParquetInputFormat  
**Output format** org.apache.hadoop.hive.q1.io.parquet.MapredParquetOutputFormat  
**Serde serialization lib** org.apache.hadoop.hive.q1.io.parquet.serde.ParquetHiveSerDe

**Serde parameters** serialization.format 1

**Table properties** compressionType **snappy** typeOfData **file**

**Schema**

	Column name	Data type	Partition key	Comment
1	id	bigint		
2	value	string		
3	date	date		
4	flag	boolean		

Showing: 1 - 4 of 4 < >

**Version history**

Version	Created:	Created by:
1	19 May 2020 7:1...	
0	19 May 2020 7:1...	

Showing: 1 - 2 < >

## Reading from Athena

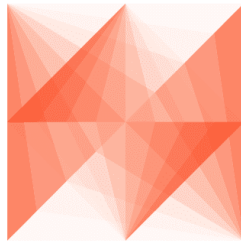
```
[5]: wr.athena.read_sql_table(table="my_table", database="aws_data_wrangler")
```

```
[5]:   id value      date  flag
0    3   bar 2020-01-03  True
1    4  None 2020-01-04  False
2    1   foo      None  <NA>
3    2   boo      None  <NA>
```

## Cleaning Up

```
[6]: wr.s3.delete_objects(path)
wr.catalog.delete_table_if_exists(table="my_table", database="aws_data_wrangler")

[6]: True
```



## AWS Data Wrangler

### 1.3.15 15 - EMR

```
[1]: import awswrangler as wr
import boto3
```

Enter your bucket name:

```
[2]: import getpass
bucket = getpass.getpass()
```

.....

Enter your Subnet ID:

```
[8]: subnet = getpass.getpass()
```

.....

## Creating EMR Cluster

```
[9]: cluster_id = wr.emr.create_cluster(subnet)
```



### Uploading our PySpark script to Amazon S3

```
[10]: script = """
from pyspark.sql import SparkSession
spark = SparkSession.builder.appName("docker-awsdatawrangler").getOrCreate()
sc = spark.sparkContext

print("Spark Initialized")
"""

_ = boto3.client("s3").put_object(
    Body=script,
    Bucket=bucket,
    Key="test.py"
)
```

### Submit PySpark step

```
[11]: step_id = wr.emr.submit_step(cluster_id, command=f"spark-submit s3://{bucket}/test.py
↪")
```

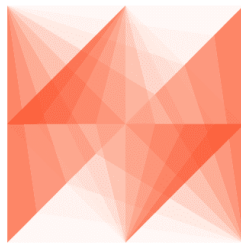
### Wait Step

```
[12]: while wr.emr.get_step_state(cluster_id, step_id) != "COMPLETED":
    pass
```

### Terminate Cluster

```
[13]: wr.emr.terminate_cluster(cluster_id)
```

```
[ ]:
```



**AWS Data Wrangler**

### 1.3.16 16 - EMR & Docker

```
[ ]: import awswrangler as wr
import boto3
import getpass
```

**Enter your bucket name:**

```
[2]: bucket = getpass.getpass()
```

```
.....
```

**Enter your Subnet ID:**

```
[3]: subnet = getpass.getpass()
```

```
.....
```

#### Build and Upload Docker Image to ECR repository

Replace the {ACCOUNT\_ID} placeholder.

```
[ ]: %%writefile Dockerfile

FROM amazoncorretto:8

RUN yum -y update
RUN yum -y install yum-utils
RUN yum -y groupinstall development

RUN yum list python3*
RUN yum -y install python3 python3-dev python3-pip python3-virtualenv

RUN python -V
RUN python3 -V

ENV PYSPARK_DRIVER_PYTHON python3
ENV PYSPARK_PYTHON python3

RUN pip3 install --upgrade pip
RUN pip3 install awswrangler

RUN python3 -c "import awswrangler as wr"
```

```
[ ]: %%bash

docker build -t 'local/emr-wrangler' .
aws ecr create-repository --repository-name emr-wrangler
docker tag local/emr-wrangler {ACCOUNT_ID}.dkr.ecr.us-east-1.amazonaws.com/emr-
↪wrangler:emr-wrangler
eval $(aws ecr get-login --region us-east-1 --no-include-email)
docker push {ACCOUNT_ID}.dkr.ecr.us-east-1.amazonaws.com/emr-wrangler:emr-wrangler
```

## Creating EMR Cluster

```
[4]: cluster_id = wr.emr.create_cluster(subnet, docker=True)
```

## Refresh ECR credentials in the cluster (expiration time: 12h )

```
[5]: wr.emr.submit_ecr_credentials_refresh(cluster_id, path=f"s3://{bucket}/")
```

```
[5]: 's-1B0045RWJL8CL'
```

## Uploading application script to Amazon S3 (PySpark)

```
[7]: script = """
from pyspark.sql import SparkSession
spark = SparkSession.builder.appName("docker-awsrangler").getOrCreate()
sc = spark.sparkContext

print("Spark Initialized")

import awswrangler as wr

print(f"Wrangler version: {wr.__version__}")
"""

boto3.client("s3").put_object(Body=script, Bucket=bucket, Key="test_docker.py");
```

## Submit PySpark step

```
[8]: DOCKER_IMAGE = f"{wr.get_account_id()}.dkr.ecr.us-east-1.amazonaws.com/emr-wrangler:
    ↪emr-wrangler"

step_id = wr.emr.submit_spark_step(
    cluster_id,
    f"s3://{bucket}/test_docker.py",
    docker_image=DOCKER_IMAGE
)
```

## Wait Step

```
[ ]: while wr.emr.get_step_state(cluster_id, step_id) != "COMPLETED":
    pass
```

## Terminate Cluster

```
[ ]: wr.emr.terminate_cluster(cluster_id)
```

## Another example with custom configurations

```
[9]: cluster_id = wr.emr.create_cluster(
    cluster_name="my-demo-cluster-v2",
    logging_s3_path=f"s3://{bucket}/emr-logs/",
    emr_release="emr-6.0.0",
    subnet_id=subnet,
    emr_ec2_role="EMR_EC2_DefaultRole",
    emr_role="EMR_DefaultRole",
    instance_type_master="m5.2xlarge",
    instance_type_core="m5.2xlarge",
    instance_ebs_size_master=50,
    instance_ebs_size_core=50,
    instance_num_on_demand_master=0,
    instance_num_on_demand_core=0,
    instance_num_spot_master=1,
    instance_num_spot_core=2,
    spot_bid_percentage_of_on_demand_master=100,
    spot_bid_percentage_of_on_demand_core=100,
    spot_provisioning_timeout_master=5,
    spot_provisioning_timeout_core=5,
    spot_timeout_to_on_demand_master=False,
    spot_timeout_to_on_demand_core=False,
    python3=True,
    docker=True,
    spark_glue_catalog=True,
    hive_glue_catalog=True,
    presto_glue_catalog=True,
    debugging=True,
    applications=["Hadoop", "Spark", "Hive", "Zeppelin", "Livy"],
    visible_to_all_users=True,
    maximize_resource_allocation=True,
    keep_cluster_alive_when_no_steps=True,
    termination_protected=False,
    spark_pyarrow=True
)

wr.emr.submit_ecr_credentials_refresh(cluster_id, path=f"s3://{bucket}/emr/")

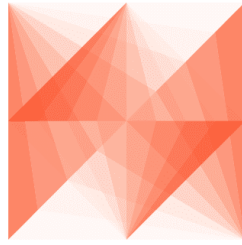
DOCKER_IMAGE = f"{wr.get_account_id()}.dkr.ecr.us-east-1.amazonaws.com/emr-wrangler:
↪emr-wrangler"

step_id = wr.emr.submit_spark_step(
    cluster_id,
    f"s3://{bucket}/test_docker.py",
    docker_image=DOCKER_IMAGE
)

[ ]: while wr.emr.get_step_state(cluster_id, step_id) != "COMPLETED":
    pass

wr.emr.terminate_cluster(cluster_id)
```

[ ]:



## AWS Data Wrangler

### 1.3.17 17 - Partition Projection

<https://docs.aws.amazon.com/athena/latest/ug/partition-projection.html>

```
[1]: import awswrangler as wr
import pandas as pd
from datetime import datetime
import getpass
```

Enter your bucket name:

```
[2]: bucket = getpass.getpass()
```

.....

#### Integer projection

```
[3]: df = pd.DataFrame({
    "value": [1, 2, 3],
    "year": [2019, 2020, 2021],
    "month": [10, 11, 12],
    "day": [25, 26, 27]
})

df
```

```
[3]:   value  year  month  day
0      1  2019     10   25
1      2  2020     11   26
2      3  2021     12   27
```

```
[4]: wr.s3.to_parquet(
    df=df,
    path=f"s3://{bucket}/table_integer/",
    dataset=True,
    partition_cols=["year", "month", "day"],
    database="default",
```

(continues on next page)

(continued from previous page)

```

    table="table_integer",
    projection_enabled=True,
    projection_types={
        "year": "integer",
        "month": "integer",
        "day": "integer"
    },
    projection_ranges={
        "year": "2000,2025",
        "month": "1,12",
        "day": "1,31"
    },
);

```

```
[5]: wr.athena.read_sql_query(f"SELECT * FROM table_integer", database="default")
```

```
[5]:
```

	value	year	month	day
0	3	2021	12	27
1	2	2020	11	26
2	1	2019	10	25

## Enum projection

```
[6]: df = pd.DataFrame({
    "value": [1, 2, 3],
    "city": ["São Paulo", "Tokio", "Seattle"],
})

df
```

```
[6]:
```

	value	city
0	1	São Paulo
1	2	Tokio
2	3	Seattle

```
[7]: wr.s3.to_parquet(
    df=df,
    path=f"s3://{bucket}/table_enum/",
    dataset=True,
    partition_cols=["city"],
    database="default",
    table="table_enum",
    projection_enabled=True,
    projection_types={
        "city": "enum",
    },
    projection_values={
        "city": "São Paulo,Tokio,Seattle"
    },
);

```

```
[8]: wr.athena.read_sql_query(f"SELECT * FROM table_enum", database="default")
```

```
[8]:
```

	value	city
0	1	São Paulo

(continues on next page)

(continued from previous page)

1	3	Seattle
2	2	Tokio

## Date projection

```
[9]: ts = lambda x: datetime.strptime(x, "%Y-%m-%d %H:%M:%S")
dt = lambda x: datetime.strptime(x, "%Y-%m-%d").date()

df = pd.DataFrame({
    "value": [1, 2, 3],
    "dt": [dt("2020-01-01"), dt("2020-01-02"), dt("2020-01-03")],
    "ts": [ts("2020-01-01 00:00:00"), ts("2020-01-01 00:00:01"), ts("2020-01-01 00:00:02")],
})

df
```

```
[9]:   value      dt      ts
0      1  2020-01-01  2020-01-01 00:00:00
1      2  2020-01-02  2020-01-01 00:00:01
2      3  2020-01-03  2020-01-01 00:00:02
```

```
[10]: wr.s3.to_parquet(
    df=df,
    path=f"s3://{bucket}/table_date/",
    dataset=True,
    partition_cols=["dt", "ts"],
    database="default",
    table="table_date",
    projection_enabled=True,
    projection_types={
        "dt": "date",
        "ts": "date",
    },
    projection_ranges={
        "dt": "2020-01-01,2020-01-03",
        "ts": "2020-01-01 00:00:00,2020-01-01 00:00:02"
    },
);
```

```
[11]: wr.athena.read_sql_query(f"SELECT * FROM table_date", database="default")
```

```
[11]:   value      dt      ts
0      1  2020-01-01  2020-01-01 00:00:00
1      2  2020-01-02  2020-01-01 00:00:01
2      3  2020-01-03  2020-01-01 00:00:02
```

## Injected projection

```
[12]: df = pd.DataFrame({
      "value": [1, 2, 3],
      "uuid": ["761e2488-a078-11ea-bb37-0242ac130002", "b89ed095-8179-4635-9537-88592c0f6bc3", "87adc586-ce88-4f0a-b1c8-bf8e00d32249"],
    })

df
```

```
[12]:      value      uuid
0      1  761e2488-a078-11ea-bb37-0242ac130002
1      2  b89ed095-8179-4635-9537-88592c0f6bc3
2      3  87adc586-ce88-4f0a-b1c8-bf8e00d32249
```

```
[13]: wr.s3.to_parquet(
      df=df,
      path=f"s3://{bucket}/table_injected/",
      dataset=True,
      partition_cols=["uuid"],
      database="default",
      table="table_injected",
      projection_enabled=True,
      projection_types={
          "uuid": "injected",
      }
    );
```

```
[14]: wr.athena.read_sql_query(
      sql=f"SELECT * FROM table_injected WHERE uuid='b89ed095-8179-4635-9537-88592c0f6bc3'",
      database="default"
    )
```

```
[14]:      value      uuid
0      2  b89ed095-8179-4635-9537-88592c0f6bc3
```

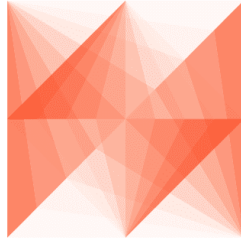
## Cleaning Up

```
[15]: wr.s3.delete_objects(f"s3://{bucket}/table_integer/")
      wr.s3.delete_objects(f"s3://{bucket}/table_enum/")
      wr.s3.delete_objects(f"s3://{bucket}/table_date/")
      wr.s3.delete_objects(f"s3://{bucket}/table_injected/")
```

```
[16]: wr.catalog.delete_table_if_exists(table="table_integer", database="default")
      wr.catalog.delete_table_if_exists(table="table_enum", database="default")
      wr.catalog.delete_table_if_exists(table="table_date", database="default")
      wr.catalog.delete_table_if_exists(table="table_injected", database="default");
```

```
[ ]:
```





## AWS Data Wrangler

### 1.3.18 18 - QuickSight

For this tutorial we will use the public AWS COVID-19 data lake.

References:

- [A public data lake for analysis of COVID-19 data](#)
- [Exploring the public AWS COVID-19 data lake](#)
- [CloudFormation template](#)

*Please, install the Cloudformation template above to have access to the public data lake.*

*P.S. To be able to access the public data lake, you must allow explicitly QuickSight to access the related external bucket.*

```
[1]: import awswrangler as wr
      from time import sleep
```

List users of QuickSight account

```
[2]: [{"username": user["UserName"], "role": user["Role"]} for user in wr.quicksight.list_
      ↪users('default')]
```

```
[2]: [{'username': 'dev', 'role': 'ADMIN'}]
```

```
[3]: wr.catalog.databases()
```

```
[3]:
```

	Database	Description
0	aws_data_wrangler	AWS Data Wrangler Test Arena - Glue Database
1	awswrangler_test	
2	covid-19	
3	default	Default Hive database

```
[4]: wr.catalog.tables(database="covid-19")
```

```
[4]:
```

	Database	Table	\
0	covid-19	alleninstitute_comprehend_medical	
1	covid-19	alleninstitute_metadata	
2	covid-19	country_codes	
3	covid-19	county_populations	
4	covid-19	covid_knowledge_graph_edges	
5	covid-19	covid_knowledge_graph_nodes_author	
6	covid-19	covid_knowledge_graph_nodes_concept	

(continues on next page)

(continued from previous page)

```

7 covid-19 covid_knowledge_graph_nodes_institution
8 covid-19 covid_knowledge_graph_nodes_paper
9 covid-19 covid_knowledge_graph_nodes_topic
10 covid-19 covid_testing_states_daily
11 covid-19 covid_testing_us_daily
12 covid-19 covid_testing_us_total
13 covid-19 covidcast_data
14 covid-19 covidcast_metadata
15 covid-19 enigma_jhu
16 covid-19 enigma_jhu_timeseries
17 covid-19 hospital_beds
18 covid-19 nytimes_counties
19 covid-19 nytimes_states
20 covid-19 prediction_models_county_predictions
21 covid-19 prediction_models_severity_index
22 covid-19 tableau_covid_datahub
23 covid-19 tableau_jhu
24 covid-19 us_state_abbreviations
25 covid-19 world_cases_deaths_testing

```

## Description \

```

0 Comprehend Medical results run against Allen I...
1 Metadata on papers pulled from the Allen Insti...
2 Lookup table for country codes
3 Lookup table for population for each county ba...
4 AWS Knowledge Graph for COVID-19 data
5 AWS Knowledge Graph for COVID-19 data
6 AWS Knowledge Graph for COVID-19 data
7 AWS Knowledge Graph for COVID-19 data
8 AWS Knowledge Graph for COVID-19 data
9 AWS Knowledge Graph for COVID-19 data
10 USA total test daily trend by state. Sourced ...
11 USA total test daily trend. Sourced from covi...
12 USA total tests. Sourced from covidtracking.c...
13 CMU Delphi's COVID-19 Surveillance Data
14 CMU Delphi's COVID-19 Surveillance Metadata
15 Johns Hopkins University Consolidated data on ...
16 Johns Hopkins University data on COVID-19 case...
17 Data on hospital beds and their utilization in...
18 Data on COVID-19 cases from NY Times at US cou...
19 Data on COVID-19 cases from NY Times at US sta...
20 County-level Predictions Data. Sourced from Yu...
21 Severity Index models. Sourced from Yu Group a...
22 COVID-19 data that has been gathered and unifi...
23 Johns Hopkins University data on COVID-19 case...
24 Lookup table for US state abbreviations
25 Data on confirmed cases, deaths, and testing. ...

```

## Columns Partitions

```

0 paper_id, date, dx_name, test_name, procedure_...
1 cord_uid, sha, source_x, title, doi, pmcid, pu...
2 country, alpha-2 code, alpha-3 code, numeric c...
3 id, id2, county, state, population estimate 2018
4 id, label, from, to, score
5 id, label, first, last, full_name
6 id, label, entity, concept
7 id, label, institution, country, settlement

```

(continues on next page)

(continued from previous page)

```

8  id, label, doi, sha_code, publish_time, source...
9      id, label, topic, topic_num
10 date, state, positive, negative, pending, hosp...
11 date, states, positive, negative, posneg, pend...
12 positive, negative, posneg, hospitalized, deat...
13 data_source, signal, geo_type, time_value, geo...
14 data_source, signal, time_type, geo_type, min_...
15 fips, admin2, province_state, country_region, ...
16 uid, fips, iso2, iso3, code3, admin2, latitude...
17 objectid, hospital_name, hospital_type, hq_add...
18     date, county, state, fips, cases, deaths
19         date, state, fips, cases, deaths
20 countyfips, countyname, statename, severity_co...
21 severity_1-day, severity_2-day, severity_3-day...
22 country_short_name, country_alpha_3_code, coun...
23 case_type, cases, difference, date, country_re...
24         state, abbreviation
25 iso_code, location, date, total_cases, new_cas...

```

Create data source of QuickSight Note: data source stores the connection information.

```

[5]: wr.quicksight.create_athena_data_source(
      name="covid-19",
      workgroup="primary",
      allowed_to_manage=["dev"]
    )

```

```

[6]: wr.catalog.tables(database="covid-19", name_contains="nyt")

```

```

[6]: Database           Table \
0 covid-19  nytimes_counties
1 covid-19  nytimes_states

Description \
0 Data on COVID-19 cases from NY Times at US cou...
1 Data on COVID-19 cases from NY Times at US sta...

Columns Partitions
0 date, county, state, fips, cases, deaths
1     date, state, fips, cases, deaths

```

```

[7]: wr.athena.read_sql_query("SELECT * FROM nytimes_counties limit 10", database="covid-19
    ↪", ctas_approach=False)

```

```

[7]:
   date      county      state  fips  cases  deaths
0  2020-01-21  Snohomish  Washington  53061      1      0
1  2020-01-22  Snohomish  Washington  53061      1      0
2  2020-01-23  Snohomish  Washington  53061      1      0
3  2020-01-24    Cook      Illinois  17031      1      0
4  2020-01-24  Snohomish  Washington  53061      1      0
5  2020-01-25    Orange  California  06059      1      0
6  2020-01-25    Cook      Illinois  17031      1      0
7  2020-01-25  Snohomish  Washington  53061      1      0
8  2020-01-26  Maricopa    Arizona  04013      1      0
9  2020-01-26 Los Angeles  California  06037      1      0

```

```
[8]: sql = """
SELECT
    j.*,
    co.Population,
    co.county AS county2,
    hb.*
FROM
    (
        SELECT
            date,
            county,
            state,
            fips,
            cases as confirmed,
            deaths
        FROM "covid-19".nytimes_counties
    ) j
LEFT OUTER JOIN (
    SELECT
        DISTINCT county,
        state,
        "population estimate 2018" AS Population
    FROM
        "covid-19".county_populations
    WHERE
        state IN (
            SELECT
                DISTINCT state
            FROM
                "covid-19".nytimes_counties
        )
        AND county IN (
            SELECT
                DISTINCT county as county
            FROM "covid-19".nytimes_counties
        )
    ) co ON co.county = j.county
AND co.state = j.state
LEFT OUTER JOIN (
    SELECT
        count(objectid) as Hospital,
        fips as hospital_fips,
        sum(num_licensed_beds) as licensed_beds,
        sum(num_staffed_beds) as staffed_beds,
        sum(num_icu_beds) as icu_beds,
        avg(bed_utilization) as bed_utilization,
        sum(
            potential_increase_in_bed_capac
        ) as potential_increase_bed_capacity
    FROM "covid-19".hospital_beds
    WHERE
        fips in (
            SELECT
                DISTINCT fips
            FROM
                "covid-19".nytimes_counties
        )
)
```

(continues on next page)

(continued from previous page)

```

GROUP BY
  2
) hb ON hb.hospital_fips = j.fips
"""

wr.athena.read_sql_query(sql, database="covid-19", ctas_approach=False)

```

[8]:

	date	county	state	fips	confirmed	deaths	population	\
0	2020-04-12	Park	Montana	30067	7	0	16736	
1	2020-04-12	Ravalli	Montana	30081	3	0	43172	
2	2020-04-12	Silver Bow	Montana	30093	11	0	34993	
3	2020-04-12	Clay	Nebraska	31035	2	0	6214	
4	2020-04-12	Cuming	Nebraska	31039	2	0	8940	
...	...	...	...	...	...	...	...	
227684	2020-06-11	Hockley	Texas	48219	28	1	22980	
227685	2020-06-11	Hudspeth	Texas	48229	11	0	4795	
227686	2020-06-11	Jones	Texas	48253	633	0	19817	
227687	2020-06-11	La Salle	Texas	48283	4	0	7531	
227688	2020-06-11	Limestone	Texas	48293	36	1	23519	

	county2	Hospital	hospital_fips	licensed_beds	staffed_beds	\
0	Park	0	30067	25	25	
1	Ravalli	0	30081	25	25	
2	Silver Bow	0	30093	98	71	
3	Clay	<NA>	<NA>	<NA>	<NA>	
4	Cuming	0	31039	25	25	
...	...	...	...	...	...	
227684	Hockley	0	48219	48	48	
227685	Hudspeth	<NA>	<NA>	<NA>	<NA>	
227686	Jones	0	48253	45	7	
227687	La Salle	<NA>	<NA>	<NA>	<NA>	
227688	Limestone	0	48293	78	69	

	icu_beds	bed_utilization	potential_increase_bed_capacity
0	4	0.432548	0
1	5	0.567781	0
2	11	0.551457	27
3	<NA>	NaN	<NA>
4	4	0.204493	0
...	...	...	...
227684	8	0.120605	0
227685	<NA>	NaN	<NA>
227686	1	0.718591	38
227687	<NA>	NaN	<NA>
227688	9	0.163940	9

[227689 rows x 15 columns]

### Create Dataset with custom SQL option

```

[9]: wr.quicksight.create_athena_dataset(
      name="covid19-nytimes-usa",
      sql=sql,
      sql_name='CustomSQL',
      data_source_name="covid-19",
      import_mode='SPICE',
      allowed_to_manage=["dev"]

```

(continues on next page)

(continued from previous page)

)

```
[10]: ingestion_id = wr.quicksight.create_ingestion("covid19-nytimes-usa")
```

Wait ingestion

```
[11]: while wr.quicksight.describe_ingestion(ingestion_id=ingestion_id, dataset_name=
      ↪ "covid19-nytimes-usa")["IngestionStatus"] not in ["COMPLETED", "FAILED"]:
      sleep(1)
```

Describe last ingestion

```
[12]: wr.quicksight.describe_ingestion(ingestion_id=ingestion_id, dataset_name="covid19-
      ↪ nytimes-usa")["RowInfo"]
```

```
[12]: {'RowsIngested': 227689, 'RowsDropped': 0}
```

List all ingestions

```
[13]: [{"time": user["CreatedTime"], "source": user["RequestSource"]} for user in wr.
      ↪ quicksight.list_ingestions("covid19-nytimes-usa")]
```

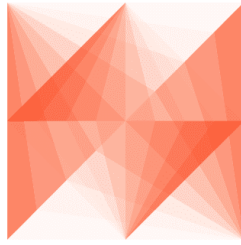
```
[13]: [{'time': datetime.datetime(2020, 6, 12, 15, 13, 46, 996000, tzinfo=tzlocal()),
      'source': 'MANUAL'},
      {'time': datetime.datetime(2020, 6, 12, 15, 13, 42, 344000, tzinfo=tzlocal()),
      'source': 'MANUAL'}]
```

Create new dataset from a table directly

```
[14]: wr.quicksight.create_athena_dataset(
      name="covid-19-tableau_jhu",
      table="tableau_jhu",
      data_source_name="covid-19",
      database="covid-19",
      import_mode='DIRECT_QUERY',
      rename_columns={
          "cases": "Count_of_Cases",
          "combined_key": "County"
      },
      cast_columns_types={
          "Count_of_Cases": "INTEGER"
      },
      allowed_to_manage=["dev"]
  )
```

Cleaning up

```
[15]: wr.quicksight.delete_data_source("covid-19")
      wr.quicksight.delete_dataset("covid19-nytimes-usa")
      wr.quicksight.delete_dataset("covid-19-tableau_jhu")
```



## AWS Data Wrangler

### 1.3.19 19 - Amazon Athena Cache

`Wrangler` has a cache strategy that is disabled by default and can be enabled passing `max_cache_seconds` bigger than 0. This cache strategy for Amazon Athena can help you to **decrease query times and costs**.

When calling `read_sql_query`, instead of just running the query, we now can verify if the query has been run before. If so, and this last run was within `max_cache_seconds` (a new parameter to `read_sql_query`), we return the same results as last time if they are still available in S3. We have seen this increase performance more than 100x, but the potential is pretty much infinite.

The detailed approach is: - When `read_sql_query` is called with `max_cache_seconds > 0` (it defaults to 0), we check for the last queries run by the same workgroup (the most we can get without pagination). - By default it will check the last 50 queries, but you can customize it through the `max_cache_query_inspections` argument. - We then sort those queries based on `CompletionDateTime`, descending - For each of those queries, we check if their `CompletionDateTime` is still within the `max_cache_seconds` window. If so, we check if the query string is the same as now (with some smart heuristics to guarantee coverage over both `ctas_approaches`). If they are the same, we check if the last one's results are still on S3, and then return them instead of re-running the query. - During the whole cache resolution phase, if there is anything wrong, the logic falls back to the usual `read_sql_query` path.

*P.S. The ``cache scope is bounded for the current workgroup``, so you will be able to reuse queries results from others colleagues running in the same environment.*

```
[1]: import awswrangler as wr
```

Enter your bucket name:

```
[2]: import getpass
      bucket = getpass.getpass()
      path = f"s3://{bucket}/data/"
```

.....

## Checking/Creating Glue Catalog Databases

```
[3]: if "awswrangler_test" not in wr.catalog.databases().values:
      wr.catalog.create_database("awswrangler_test")
```

## Creating a Parquet Table from the NOAA's CSV files

### Reference

```
[4]: cols = ["id", "dt", "element", "value", "m_flag", "q_flag", "s_flag", "obs_time"]

      df = wr.s3.read_csv(
          path="s3://noaa-ghcn-pds/csv/189",
          names=cols,
          parse_dates=["dt", "obs_time"]) # Read 10 files from the 1890 decade (~1GB)
```

df

```
[4]:
```

	id	dt	element	value	m_flag	q_flag	s_flag	obs_time
0	AGE00135039	1890-01-01	TMAX	160	NaN	NaN	E	NaN
1	AGE00135039	1890-01-01	TMIN	30	NaN	NaN	E	NaN
2	AGE00135039	1890-01-01	PRCP	45	NaN	NaN	E	NaN
3	AGE00147705	1890-01-01	TMAX	140	NaN	NaN	E	NaN
4	AGE00147705	1890-01-01	TMIN	74	NaN	NaN	E	NaN
...	...	...	...	...	...	...	...	...
29240014	UZM00038457	1899-12-31	PRCP	16	NaN	NaN	r	NaN
29240015	UZM00038457	1899-12-31	TAVG	-73	NaN	NaN	r	NaN
29240016	UZM00038618	1899-12-31	TMIN	-76	NaN	NaN	r	NaN
29240017	UZM00038618	1899-12-31	PRCP	0	NaN	NaN	r	NaN
29240018	UZM00038618	1899-12-31	TAVG	-60	NaN	NaN	r	NaN

[29240019 rows x 8 columns]

```
[5]: wr.s3.to_parquet(
      df=df,
      path=path,
      dataset=True,
      mode="overwrite",
      database="awswrangler_test",
      table="noaa"
      );
```

```
[6]: wr.catalog.table(database="awswrangler_test", table="noaa")
```

```
[6]:
```

	Column Name	Type	Partition	Comment
0	id	string	False	

(continues on next page)



(continued from previous page)

1	dt	timestamp	False
2	element	string	False
3	value	bigint	False
4	m_flag	string	False
5	q_flag	string	False
6	s_flag	string	False
7	obs_time	string	False

## The test query

The more computational resources the query needs, the more the cache will help you. That's why we're doing it using this long running query.

```
[7]: query = """
SELECT
    n1.element,
    count(1) as cnt
FROM
    noaa n1
JOIN
    noaa n2
ON
    n1.id = n2.id
GROUP BY
    n1.element
"""
```

## First execution...

```
[8]: %%time

wr.athena.read_sql_query(query, database="awsdatawrangler_test")
```

```
CPU times: user 5.31 s, sys: 232 ms, total: 5.54 s
Wall time: 6min 42s
```

```
[8]:
```

	element	cnt
0	WDMV	49755046
1	SNWD	5089486328
2	DATN	10817510
3	DAPR	102579666
4	MDTN	10817510
5	WT03	71184687
6	WT09	584412
7	TOBS	146984266
8	DASF	7764526
9	WT04	9648963
10	WT18	92635444
11	WT01	87526136
12	WT16	323354156
13	PRCP	71238907298
14	SNOW	21950890838
15	WT06	307339
16	TAVG	2340863803

(continues on next page)

(continued from previous page)

```

17  TMIN  41450979633
18  MDTX   11210687
19  WT07   4486872
20  WT10   137873
21  EVAP   970404
22  WT14   8073701
23  DATX   11210687
24  WT08   33933005
25  WT05   8211491
26  TMAX  39876132467
27  MDPR   114320989
28  WT11   22212890
29  DWPR   69005655
30  MDSF   12004843

```

### Second execution with CACHE (400x faster)

```

[9]: %%time

wr.athena.read_sql_query(query, database="awsdatawrangler_test", max_cache_seconds=900)

```

```

CPU times: user 493 ms, sys: 34.9 ms, total: 528 ms
Wall time: 975 ms

```

```

[9]:      element      cnt
0      WDMV      49755046
1      SNWD      5089486328
2      DATN      10817510
3      DAPR      102579666
4      MDTN      10817510
5      WT03      71184687
6      WT09      584412
7      TOBS      146984266
8      DASF      7764526
9      WT04      9648963
10     WT18      92635444
11     WT01      87526136
12     WT16      323354156
13     PRCP      71238907298
14     SNOW      21950890838
15     WT06      307339
16     TAVG      2340863803
17     TMIN      41450979633
18     MDTX      11210687
19     WT07      4486872
20     WT10      137873
21     EVAP      970404
22     WT14      8073701
23     DATX      11210687
24     WT08      33933005
25     WT05      8211491
26     TMAX      39876132467
27     MDPR      114320989
28     WT11      22212890
29     DWPR      69005655
30     MDSF      12004843

```

**Allowing Wrangler to inspect up to 500 historical queries to find same result to reuse.**

```
[10]: %%time

wr.athena.read_sql_query(query, database="awsdatawrangler_test", max_cache_seconds=900,
↪max_cache_query_inspections=500)
```

```
CPU times: user 504 ms, sys: 44 ms, total: 548 ms
Wall time: 1.19 s
```

```
[10]:
```

	element	cnt
0	WDMV	49755046
1	SNWD	5089486328
2	DATN	10817510
3	DAPR	102579666
4	MDTN	10817510
5	WT03	71184687
6	WT09	584412
7	TOBS	146984266
8	DASF	7764526
9	WT04	9648963
10	WT18	92635444
11	WT01	87526136
12	WT16	323354156
13	PRCP	71238907298
14	SNOW	21950890838
15	WT06	307339
16	TAVG	2340863803
17	TMIN	41450979633
18	MDTX	11210687
19	WT07	4486872
20	WT10	137873
21	EVAP	970404
22	WT14	8073701
23	DATX	11210687
24	WT08	33933005
25	WT05	8211491
26	TMAX	39876132467
27	MDPR	114320989
28	WT11	22212890
29	DWPR	69005655
30	MDSF	12004843

**Cleaning Up S3**

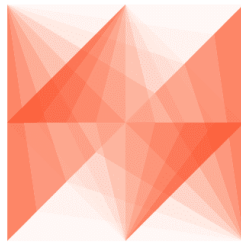
```
[11]: wr.s3.delete_objects(path)
```

### Delete table

```
[12]: wr.catalog.delete_table_if_exists(database="awsdatawrangler_test", table="noaa")
[12]: True
```

### Delete Database

```
[13]: wr.catalog.delete_database('awsdatawrangler_test')
```



**AWS Data Wrangler**

## 1.3.20 20 - Spark Table Interoperability

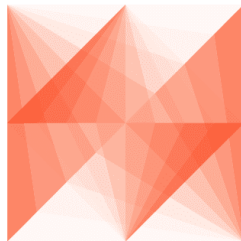
**Wrangler** has no difficulties to insert, overwrite or do any other kind of interaction with a Table created by Apache Spark.

But if you want to do the opposite (Spark interacting with a table created by Wrangler) you should be aware that Wrangler follows the Hive's format and you must be explicit when using the Spark's `saveAsTable` method:

```
[ ]: spark_df.write.format("hive").saveAsTable("database.table")
```

Or just move forward using the `insertInto` alternative:

```
[ ]: spark_df.write.insertInto("database.table")
```



**AWS Data Wrangler**

### 1.3.21 21 - Global Configurations

**Wrangler** has two ways to set global configurations that will override the regular default arguments configured in functions signatures.

- **Environment variables**
- **wr.config**

*P.S. Check the [function API doc](#) to see if your function has some argument that can be configured through Global configurations.*

*P.P.S. One exception to the above mentioned rules is the ```botocore_config``` property. It cannot be set through environment variables but only via ```wr.config```. It will be used as the ```botocore.config.Config``` for all underlying ```boto3``` calls. The default config is ```botocore.config.Config(retries={``max_attempts``: 5}, connect_timeout=10, max_pool_connections=10)```. If you only want to change the retry behavior, you can use the environment variables ```AWS_MAX_ATTEMPTS``` and ```AWS_RETRY_MODE```. (see [Boto3 documentation](#))*

#### Environment Variables

```
[1]: %env WR_DATABASE=default
      %env WR_CTAS_APPROACH=False
      %env WR_MAX_CACHE_SECONDS=900
      %env WR_MAX_CACHE_QUERY_INSPECTIONS=500
      %env WR_MAX_REMOTE_CACHE_ENTRIES=50
      %env WR_MAX_LOCAL_CACHE_ENTRIES=100
```

```
env: WR_DATABASE=default
env: WR_CTAS_APPROACH=False
env: WR_MAX_CACHE_SECONDS=900
env: WR_MAX_CACHE_QUERY_INSPECTIONS=500
env: WR_MAX_REMOTE_CACHE_ENTRIES=50
env: WR_MAX_LOCAL_CACHE_ENTRIES=100
```

```
[2]: import awswrangler as wr
      import boto3
```

```
[3]: wr.athena.read_sql_query("SELECT 1 AS FOO")
```

```
[3]:   foo
      0   1
```

#### Resetting

```
[4]: # Specific
      wr.config.reset("database")
      # All
      wr.config.reset()
```

**wr.config**

```
[5]: wr.config.database = "default"
wr.config.ctas_approach = False
wr.config.max_cache_seconds = 900
wr.config.max_cache_query_inspections = 500
wr.config.max_remote_cache_entries = 50
wr.config.max_local_cache_entries = 100
# Set botocore.config.Config that will be used for all boto3 calls
wr.config.botocore_config = botocore.config.Config(
    retries={"max_attempts": 10},
    connect_timeout=20,
    max_pool_connections=20
)
```

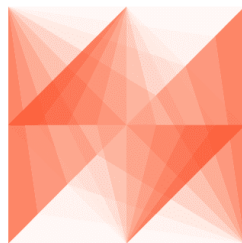
```
[6]: wr.athena.read_sql_query("SELECT 1 AS FOO")
```

```
[6]:      foo
0      1
```

**Visualizing**

```
[7]: wr.config
```

```
[7]: <aws wrangler._config._Config at 0x2d3a2c63df0>
```

**AWS Data Wrangler****1.3.22 22 - Writing Partitions Concurrently**

- `concurrent_partitioning` argument:

If True will increase the parallelism level during the partitions writing. It will decrease the writing time and increase the memory usage.

*P.S. Check the function `API docto` see it has some argument that can be configured through Global configurations.*

```
[1]: %reload_ext memory_profiler

import aws wrangler as wr
```

Enter your bucket name:

```
[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/data/"
.....
```

### Reading 4 GB of CSV from NOAA's historical data and creating a year column

```
[3]: noaa_path = "s3://noaa-ghcn-pds/csv/193"

cols = ["id", "dt", "element", "value", "m_flag", "q_flag", "s_flag", "obs_time"]
dates = ["dt", "obs_time"]
dtype = {x: "category" for x in ["element", "m_flag", "q_flag", "s_flag"]}

df = wr.s3.read_csv(noaa_path, names=cols, parse_dates=dates, dtype=dtype)

df["year"] = df["dt"].dt.year

print(f"Number of rows: {len(df.index)}")
print(f"Number of columns: {len(df.columns)}")

Number of rows: 125407761
Number of columns: 9
```

### Default Writing

```
[4]: %%time
%%memit

wr.s3.to_parquet(
    df=df,
    path=path,
    dataset=True,
    mode="overwrite",
    partition_cols=["year"],
);

peak memory: 22169.04 MiB, increment: 11119.68 MiB
CPU times: user 49 s, sys: 12.5 s, total: 1min 1s
Wall time: 1min 11s
```

### Concurrent Partitioning (Decreasing writing time, but increasing memory usage)

```
[5]: %%time
%%memit

wr.s3.to_parquet(
    df=df,
    path=path,
    dataset=True,
    mode="overwrite",
```

(continues on next page)

(continued from previous page)

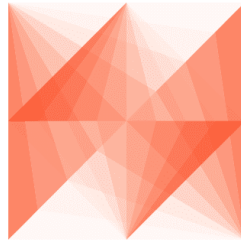
```

partition_cols=["year"],
concurrent_partitioning=True # <-----
);

peak memory: 27819.48 MiB, increment: 15743.30 MiB
CPU times: user 52.3 s, sys: 13.6 s, total: 1min 5s
Wall time: 41.6 s

```

[ ]:



## AWS Data Wrangler

### 1.3.23 23 - Flexible Partitions Filter (PUSH-DOWN)

- `partition_filter` argument:

```

- Callback Function filters to apply on PARTITION columns (PUSH-DOWN filter).
- This function MUST receive a single argument (Dict[str, str]) where keys are
  ↳ partitions names and values are partitions values.
- This function MUST return a bool, True to read the partition or False to ignore
  ↳ it.
- Ignored if `dataset=False`.

```

*P.S. Check the function API doc to see it has some argument that can be configured through Global configurations.*

```

[1]: import awswrangler as wr
import pandas as pd

```

**Enter your bucket name:**

```

[2]: import getpass
bucket = getpass.getpass()
path = f"s3://{bucket}/dataset/"

.....

```



## Creating the Dataset (PARQUET)

```
[3]: df = pd.DataFrame({
      "id": [1, 2, 3],
      "value": ["foo", "boo", "bar"],
    })

    wr.s3.to_parquet(
        df=df,
        path=path,
        dataset=True,
        mode="overwrite",
        partition_cols=["value"]
    )

    wr.s3.read_parquet(path, dataset=True)
```

```
[3]:   id value
0    3   bar
1    2   boo
2    1   foo
```

## Example 1

```
[4]: my_filter = lambda x: x["value"].endswith("oo")

    wr.s3.read_parquet(path, dataset=True, partition_filter=my_filter)
```

```
[4]:   id value
0    2   boo
1    1   foo
```

## Example 2

```
[5]: from Levenshtein import distance

    def my_filter(partitions):
        return distance("boo", partitions["value"]) <= 1

    wr.s3.read_parquet(path, dataset=True, partition_filter=my_filter)
```

```
[5]:   id value
0    2   boo
1    1   foo
```

## Creating the Dataset (CSV)

```
[6]: df = pd.DataFrame({
      "id": [1, 2, 3],
      "value": ["foo", "boo", "bar"],
    })

    wr.s3.to_csv(
        df=df,
        path=path,
        dataset=True,
        mode="overwrite",
        partition_cols=["value"],
        compression="gzip",
        index=False
    )

    wr.s3.read_csv(path, dataset=True)
```

```
[6]:   id value
0    3   bar
1    2   boo
2    1   foo
```

## Example 1

```
[7]: my_filter = lambda x: x["value"].endswith("oo")

    wr.s3.read_csv(path, dataset=True, partition_filter=my_filter)
```

```
[7]:   id value
0    2   boo
1    1   foo
```

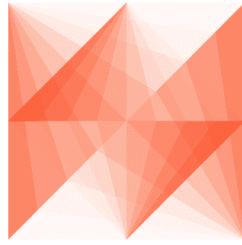
## Example 2

```
[8]: from Levenshtein import distance

    def my_filter(partitions):
        return distance("boo", partitions["value"]) <= 1

    wr.s3.read_csv(path, dataset=True, partition_filter=my_filter)
```

```
[8]:   id value
0    2   boo
1    1   foo
```



## AWS Data Wrangler

### 1.3.24 24 - Athena Query Metadata

For `wr.athena.read_sql_query()` and `wr.athena.read_sql_table()` the resulting `DataFrame` (or every `DataFrame` in the returned `Iterator` for chunked queries) have a `query_metadata` attribute, which brings the query result metadata returned by Boto3/Athena.

The expected `query_metadata` format is the same returned by:

[https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/athena.html#Athena.Client.get\\_query\\_execution](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/athena.html#Athena.Client.get_query_execution)

#### Environment Variables

```
[1]: %env WR_DATABASE=default
env: WR_DATABASE=default
```

```
[2]: import awswrangler as wr
```

```
[5]: df = wr.athena.read_sql_query("SELECT 1 AS foo")
df
```

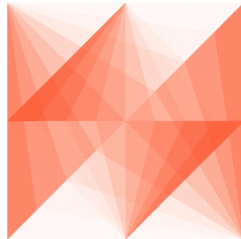
```
[5]:   foo
0     1
```

#### Getting statistics from query metadata

```
[6]: print(f'DataScannedInBytes:           {df.query_metadata["Statistics"] [
      ↪ "DataScannedInBytes"]}')
print(f'TotalExecutionTimeInMillis:       {df.query_metadata["Statistics"] [
      ↪ "TotalExecutionTimeInMillis"]}')
print(f'QueryQueueTimeInMillis:           {df.query_metadata["Statistics"] [
      ↪ "QueryQueueTimeInMillis"]}')
print(f'QueryPlanningTimeInMillis:         {df.query_metadata["Statistics"] [
      ↪ "QueryPlanningTimeInMillis"]}')
print(f'ServiceProcessingTimeInMillis:     {df.query_metadata["Statistics"] [
      ↪ "ServiceProcessingTimeInMillis"]}')

```

```
DataScannedInBytes:      0
TotalExecutionTimeInMillis: 2311
QueryQueueTimeInMillis:  121
QueryPlanningTimeInMillis: 250
ServiceProcessingTimeInMillis: 37
```



## AWS Data Wrangler

### 1.3.25 25 - Redshift - Loading Parquet files with Spectrum

Enter your bucket name:

```
[1]: import getpass
      bucket = getpass.getpass()
      PATH = f"s3://{bucket}/files/"
      .....
```

#### Mocking some Parquet Files on S3

```
[2]: import awswrangler as wr
      import pandas as pd

      df = pd.DataFrame({
          "col0": [0, 1, 2, 3, 4, 5, 6, 7, 8, 9],
          "col1": ["a", "b", "c", "d", "e", "f", "g", "h", "i", "j"],
      })

      df
```

```
[2]:   col0 col1
0      0    a
1      1    b
2      2    c
3      3    d
4      4    e
5      5    f
6      6    g
7      7    h
8      8    i
9      9    j
```

```
[3]: wr.s3.to_parquet(df, PATH, max_rows_by_file=2, dataset=True, mode="overwrite");
```

### Crawling the metadata and adding into Glue Catalog

```
[4]: wr.s3.store_parquet_metadata(
    path=PATH,
    database="aws_data_wrangler",
    table="test",
    dataset=True,
    mode="overwrite"
)
```

```
[4]: ({'col0': 'bigint', 'col1': 'string'}, None, None)
```

### Running the CTAS query to load the data into Redshift storage

```
[5]: con = wr.redshift.connect(connection="aws-data-wrangler-redshift")
```

```
[6]: query = "CREATE TABLE public.test AS (SELECT * FROM aws_data_wrangler_external.test)"
```

```
[7]: with con.cursor() as cursor:
    cursor.execute(query)
```

### Running an INSERT INTO query to load MORE data into Redshift storage

```
[8]: df = pd.DataFrame({
    "col0": [10, 11],
    "col1": ["k", "l"],
})
wr.s3.to_parquet(df, PATH, dataset=True, mode="overwrite");
```

```
[9]: query = "INSERT INTO public.test (SELECT * FROM aws_data_wrangler_external.test)"
```

```
[10]: with con.cursor() as cursor:
    cursor.execute(query)
```

### Checking the result

```
[11]: query = "SELECT * FROM public.test"
```

```
[13]: wr.redshift.read_sql_table(con=con, schema="public", table="test")
```

```
[13]:   col0  col1
0      5     f
1      1     b
2      3     d
3      6     g
4      8     i
```

(continues on next page)

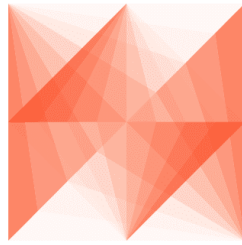
(continued from previous page)

```

5      10      k
6       4      e
7       0      a
8       2      c
9       7      h
10      9      j
11     11      l

```

```
[14]: con.close()
```



## AWS Data Wrangler

### 1.3.26 26 - Amazon Timestream

#### Creating resources

```
[10]: import awswrangler as wr
import pandas as pd
from datetime import datetime

wr.timestream.create_database("sampleDB")
wr.timestream.create_table("sampleDB", "sampleTable", memory_retention_hours=1,
↪magnetic_retention_days=1);
```

#### Write

```
[11]: df = pd.DataFrame(
    {
        "time": [datetime.now(), datetime.now(), datetime.now()],
        "dim0": ["foo", "boo", "bar"],
        "dim1": [1, 2, 3],
        "measure": [1.0, 1.1, 1.2],
    }
)

rejected_records = wr.timestream.write(
    df=df,
    database="sampleDB",
    table="sampleTable",
    time_col="time",
```

(continues on next page)

(continued from previous page)

```

    measure_col="measure",
    dimensions_cols=["dim0", "dim1"],
)

print(f"Number of rejected records: {len(rejected_records)}")

```

```
Number of rejected records: 0
```

## Query

```

[12]: wr.timestream.query(
        'SELECT time, measure_value::double, dim0, dim1 FROM "sampleDB"."sampleTable"
        ↳ORDER BY time DESC LIMIT 3'
    )

```

```

[12]:
           time  measure_value::double  dim0  dim1
0 2020-12-08 19:15:32.468             1.0  foo    1
1 2020-12-08 19:15:32.468             1.2  bar    3
2 2020-12-08 19:15:32.468             1.1  boo    2

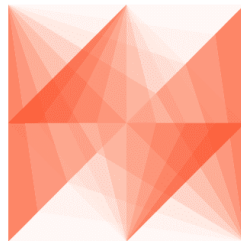
```

## Deleting resources

```

[13]: wr.timestream.delete_table("sampleDB", "sampleTable")
      wr.timestream.delete_database("sampleDB")

```



# AWS Data Wrangler

## 1.3.27 27 - Amazon Timestream - Example 2

### Reading test data

```

[1]: import awswrangler as wr
     import pandas as pd
     from datetime import datetime

     df = pd.read_csv(
         "https://raw.githubusercontent.com/aws-labs/amazon-timestream-tools/master/sample_
         ↳apps/data/sample.csv",
         names=[
             "ignore0",

```

(continues on next page)

(continued from previous page)

```

        "region",
        "ignore1",
        "az",
        "ignore2",
        "hostname",
        "measure_kind",
        "measure",
        "ignore3",
        "ignore4",
        "ignore5",
    ],
    usecols=["region", "az", "hostname", "measure_kind", "measure"],
)
df["time"] = datetime.now()
df.reset_index(inplace=True, drop=False)

df

```

```

[1]:
      index  region  az  hostname  measure_kind \
0         0  us-east-1  us-east-1a  host-fj2hx  cpu_utilization
1         1  us-east-1  us-east-1a  host-fj2hx  memory_utilization
2         2  us-east-1  us-east-1a  host-6kMPE  cpu_utilization
3         3  us-east-1  us-east-1a  host-6kMPE  memory_utilization
4         4  us-east-1  us-east-1a  host-sxj7X  cpu_utilization
...      ...      ...      ...      ...      ...
125995  125995  eu-north-1  eu-north-1c  host-De8RB  memory_utilization
125996  125996  eu-north-1  eu-north-1c  host-2z8tn  memory_utilization
125997  125997  eu-north-1  eu-north-1c  host-2z8tn  cpu_utilization
125998  125998  eu-north-1  eu-north-1c  host-9FcZW  memory_utilization
125999  125999  eu-north-1  eu-north-1c  host-9FcZW  cpu_utilization

      measure  time
0      21.394363  2020-12-08 16:18:47.599597
1      68.563420  2020-12-08 16:18:47.599597
2      17.144579  2020-12-08 16:18:47.599597
3      73.507870  2020-12-08 16:18:47.599597
4      26.584865  2020-12-08 16:18:47.599597
...      ...      ...
125995  68.063468  2020-12-08 16:18:47.599597
125996  72.203680  2020-12-08 16:18:47.599597
125997  29.212219  2020-12-08 16:18:47.599597
125998  71.746134  2020-12-08 16:18:47.599597
125999  1.677793  2020-12-08 16:18:47.599597

[126000 rows x 7 columns]

```



## Creating resources

```
[2]: wr.timestream.create_database("sampleDB")
wr.timestream.create_table("sampleDB", "sampleTable", memory_retention_hours=1,
↳magnetic_retention_days=1);
```

## Write CPU\_UTILIZATION records

```
[3]: df_cpu = df[df.measure_kind == "cpu_utilization"].copy()
df_cpu.rename(columns={"measure": "cpu_utilization"}, inplace=True)
df_cpu
```

```
[3]:
```

	index	region	az	hostname	measure_kind \
0	0	us-east-1	us-east-1a	host-fj2hx	cpu_utilization
2	2	us-east-1	us-east-1a	host-6kMPE	cpu_utilization
4	4	us-east-1	us-east-1a	host-sxj7X	cpu_utilization
6	6	us-east-1	us-east-1a	host-ExOui	cpu_utilization
8	8	us-east-1	us-east-1a	host-Bwb3j	cpu_utilization
...	...	...	...	...	...
125990	125990	eu-north-1	eu-north-1c	host-aPtc6	cpu_utilization
125992	125992	eu-north-1	eu-north-1c	host-7ZF9L	cpu_utilization
125994	125994	eu-north-1	eu-north-1c	host-De8RB	cpu_utilization
125997	125997	eu-north-1	eu-north-1c	host-2z8tn	cpu_utilization
125999	125999	eu-north-1	eu-north-1c	host-9FcZw	cpu_utilization

	cpu_utilization		time	
0	21.394363	2020-12-08 16:18:47.599597		
2	17.144579	2020-12-08 16:18:47.599597		
4	26.584865	2020-12-08 16:18:47.599597		
6	52.930970	2020-12-08 16:18:47.599597		
8	99.134110	2020-12-08 16:18:47.599597		
...	...	...		
125990	89.566125	2020-12-08 16:18:47.599597		
125992	75.510598	2020-12-08 16:18:47.599597		
125994	2.771261	2020-12-08 16:18:47.599597		
125997	29.212219	2020-12-08 16:18:47.599597		
125999	1.677793	2020-12-08 16:18:47.599597		

[63000 rows x 7 columns]

```
[4]: rejected_records = wr.timestream.write(
    df=df_cpu,
    database="sampleDB",
    table="sampleTable",
    time_col="time",
    measure_col="cpu_utilization",
    dimensions_cols=["index", "region", "az", "hostname"],
)

assert len(rejected_records) == 0
```

## Write MEMORY\_UTILIZATION records

```
[5]: df_memory = df[df.measure_kind == "memory_utilization"].copy()
df_memory.rename(columns={"measure": "memory_utilization"}, inplace=True)
```

```
df_memory
```

```
[5]:
```

	index	region	az	hostname	measure_kind	\
1	1	us-east-1	us-east-1a	host-fj2hx	memory_utilization	
3	3	us-east-1	us-east-1a	host-6kMPE	memory_utilization	
5	5	us-east-1	us-east-1a	host-sxj7X	memory_utilization	
7	7	us-east-1	us-east-1a	host-ExOui	memory_utilization	
9	9	us-east-1	us-east-1a	host-Bwb3j	memory_utilization	
...	...	...	...	...	...	
125991	125991	eu-north-1	eu-north-1c	host-aPtc6	memory_utilization	
125993	125993	eu-north-1	eu-north-1c	host-7ZF9L	memory_utilization	
125995	125995	eu-north-1	eu-north-1c	host-De8RB	memory_utilization	
125996	125996	eu-north-1	eu-north-1c	host-2z8tn	memory_utilization	
125998	125998	eu-north-1	eu-north-1c	host-9FcZw	memory_utilization	

	memory_utilization	time
1	68.563420	2020-12-08 16:18:47.599597
3	73.507870	2020-12-08 16:18:47.599597
5	22.401424	2020-12-08 16:18:47.599597
7	45.440135	2020-12-08 16:18:47.599597
9	15.042701	2020-12-08 16:18:47.599597
...	...	...
125991	75.686739	2020-12-08 16:18:47.599597
125993	18.386152	2020-12-08 16:18:47.599597
125995	68.063468	2020-12-08 16:18:47.599597
125996	72.203680	2020-12-08 16:18:47.599597
125998	71.746134	2020-12-08 16:18:47.599597

```
[63000 rows x 7 columns]
```

```
[6]: rejected_records = wr.timestream.write(
    df=df_memory,
    database="sampleDB",
    table="sampleTable",
    time_col="time",
    measure_col="memory_utilization",
    dimensions_cols=["index", "region", "az", "hostname"],
)

assert len(rejected_records) == 0
```

## Querying CPU\_UTILIZATION

```
[7]: wr.timestream.query("""
    SELECT
        hostname, region, az, measure_name, measure_value::double, time
    FROM "sampleDB"."sampleTable"
    WHERE measure_name = 'cpu_utilization'
    ORDER BY time DESC
    LIMIT 10
    """)
```

```
[7]:
```

	hostname	region	az	measure_name	\
0	host-OgvFx	us-west-1	us-west-1a	cpu_utilization	
1	host-rZUNx	eu-north-1	eu-north-1a	cpu_utilization	
2	host-t1kAB	us-east-2	us-east-2b	cpu_utilization	
3	host-RdQRf	us-east-1	us-east-1c	cpu_utilization	
4	host-4Llhu	us-east-1	us-east-1c	cpu_utilization	
5	host-2plqa	us-west-1	us-west-1a	cpu_utilization	
6	host-J3Q4z	us-east-1	us-east-1b	cpu_utilization	
7	host-VIR5T	ap-east-1	ap-east-1a	cpu_utilization	
8	host-G042D	us-east-1	us-east-1c	cpu_utilization	
9	host-8EBHm	us-west-2	us-west-2c	cpu_utilization	

	measure_value::double	time
0	39.617911	2020-12-08 19:18:47.600
1	30.793332	2020-12-08 19:18:47.600
2	74.453239	2020-12-08 19:18:47.600
3	76.984448	2020-12-08 19:18:47.600
4	41.862733	2020-12-08 19:18:47.600
5	34.864762	2020-12-08 19:18:47.600
6	71.574266	2020-12-08 19:18:47.600
7	14.017491	2020-12-08 19:18:47.600
8	60.199068	2020-12-08 19:18:47.600
9	96.631624	2020-12-08 19:18:47.600

### Querying MEMORY\_UTILIZATION

```
[8]: wr.timestream.query("""
    SELECT
        hostname, region, az, measure_name, measure_value::double, time
    FROM "sampleDB"."sampleTable"
    WHERE measure_name = 'memory_utilization'
    ORDER BY time DESC
    LIMIT 10
    """)
```

```
[8]:
```

	hostname	region	az	measure_name	\
0	host-7c897	us-west-2	us-west-2b	memory_utilization	
1	host-2z8tn	eu-north-1	eu-north-1c	memory_utilization	
2	host-J3Q4z	us-east-1	us-east-1b	memory_utilization	
3	host-mjrQb	us-east-1	us-east-1b	memory_utilization	
4	host-AyWSI	us-east-1	us-east-1c	memory_utilization	
5	host-Axf0g	us-west-2	us-west-2a	memory_utilization	
6	host-ilMBa	us-east-2	us-east-2b	memory_utilization	
7	host-CWdXX	us-west-2	us-west-2c	memory_utilization	
8	host-8EBHm	us-west-2	us-west-2c	memory_utilization	
9	host-dRIJj	us-east-1	us-east-1c	memory_utilization	

	measure_value::double	time
0	63.427726	2020-12-08 19:18:47.600
1	41.071368	2020-12-08 19:18:47.600
2	23.944388	2020-12-08 19:18:47.600
3	69.173431	2020-12-08 19:18:47.600
4	75.591467	2020-12-08 19:18:47.600
5	29.720739	2020-12-08 19:18:47.600
6	71.544134	2020-12-08 19:18:47.600
7	79.792799	2020-12-08 19:18:47.600

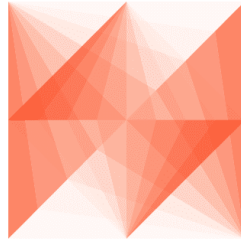
(continues on next page)

(continued from previous page)

8	66.082554	2020-12-08	19:18:47.600
9	86.748960	2020-12-08	19:18:47.600

## Deleting resources

```
[9]: wr.timestream.delete_table("sampleDB", "sampleTable")
wr.timestream.delete_database("sampleDB")
```



## AWS Data Wrangler

## 1.3.28 28 - Amazon DynamoDB

### Writing Data

```
[1]: import awswrangler as wr
import pandas as pd
from pathlib import Path
```

### Writing DataFrame

```
[2]: df = pd.DataFrame({
    "key": [1, 2],
    "value": ["foo", "boo"]
})
wr.dynamodb.put_df(df=df, table_name="table")
```

### Writing CSV file

```
[3]: filepath = Path("items.csv")
df.to_csv(filepath, index=False)
wr.dynamodb.put_csv(path=filepath, table_name="table")
filepath.unlink()
```

## Writing JSON files

```
[4]: filepath = Path("items.json")
    df.to_json(filepath, orient="records")
    wr.dynamodb.put_json(path="items.json", table_name="table")
    filepath.unlink()
```

## Writing list of items

```
[5]: items = df.to_dict(orient="records")
    wr.dynamodb.put_items(items=items, table_name="table")
```

## Deleting items

```
[6]: wr.dynamodb.delete_items(items=items, table_name="table")
```

# 1.4 API Reference

- *Amazon S3*
- *AWS Glue Catalog*
- *Amazon Athena*
- *Amazon Redshift*
- *PostgreSQL*
- *MySQL*
- *Microsoft SQL Server*
- *DynamoDB*
- *Amazon Timestream*
- *Amazon EMR*
- *Amazon CloudWatch Logs*
- *Amazon QuickSight*
- *AWS STS*
- *AWS Secrets Manager*
- *Global Configurations*

### 1.4.1 Amazon S3

<code>copy_objects(paths, source_path, target_path)</code>	Copy a list of S3 objects to another S3 directory.
<code>delete_objects(path[, use_threads, ...])</code>	Delete Amazon S3 objects from a received S3 prefix or list of S3 objects paths.
<code>describe_objects(path[, use_threads, ...])</code>	Describe Amazon S3 objects from a received S3 prefix or list of S3 objects paths.
<code>does_object_exist(path[, ...])</code>	Check if object exists on S3.
<code>download(path, local_file[, use_threads, ...])</code>	Download file from from a received S3 path to local file.
<code>get_bucket_region(bucket[, boto3_session])</code>	Get bucket region name.
<code>list_directories(path[, ...])</code>	List Amazon S3 objects from a prefix.
<code>list_objects(path[, suffix, ignore_suffix, ...])</code>	List Amazon S3 objects from a prefix.
<code>merge_datasets(source_path, target_path[, ...])</code>	Merge a source dataset into a target dataset.
<code>merge_upsert_table(delta_df, database, ...)</code>	Perform Upsert (Update else Insert) onto an existing Glue table.
<code>read_csv(path[, path_suffix, ...])</code>	Read CSV file(s) from from a received S3 prefix or list of S3 objects paths.
<code>read_excel(path[, use_threads, ...])</code>	Read EXCEL file(s) from from a received S3 path.
<code>read_fwf(path[, path_suffix, ...])</code>	Read fixed-width formatted file(s) from from a received S3 prefix or list of S3 objects paths.
<code>read_json(path[, path_suffix, ...])</code>	Read JSON file(s) from from a received S3 prefix or list of S3 objects paths.
<code>read_parquet(path[, path_suffix, ...])</code>	Read Apache Parquet file(s) from from a received S3 prefix or list of S3 objects paths.
<code>read_parquet_metadata(path[, path_suffix, ...])</code>	Read Apache Parquet file(s) metadata from from a received S3 prefix or list of S3 objects paths.
<code>read_parquet_table(table, database[, ...])</code>	Read Apache Parquet table registered on AWS Glue Catalog.
<code>size_objects(path[, use_threads, ...])</code>	Get the size (ContentLength) in bytes of Amazon S3 objects from a received S3 prefix or list of S3 objects paths.
<code>store_parquet_metadata(path, database, table)</code>	Infer and store parquet metadata on AWS Glue Catalog.
<code>to_csv(df[, path, sep, index, columns, ...])</code>	Write CSV file or dataset on Amazon S3.
<code>to_excel(df, path[, boto3_session, ...])</code>	Write EXCEL file on Amazon S3.
<code>to_json(df, path[, boto3_session, ...])</code>	Write JSON file on Amazon S3.
<code>to_parquet(df[, path, index, compression, ...])</code>	Write Parquet file or dataset on Amazon S3.
<code>upload(local_file, path[, use_threads, ...])</code>	Upload file from a local file to received S3 path.
<code>wait_objects_exist(paths[, delay, ...])</code>	Wait Amazon S3 objects exist.
<code>wait_objects_not_exist(paths[, delay, ...])</code>	Wait Amazon S3 objects not exist.

#### awsrangler.s3.copy\_objects

`awsrangler.s3.copy_objects` (*paths*: *List[str]*, *source\_path*: *str*, *target\_path*: *str*, *replace\_filenames*: *Optional[Dict[str, str]] = None*, *use\_threads*: *bool = True*, *boto3\_session*: *Optional[boto3.session.Session] = None*, *s3\_additional\_kwargs*: *Optional[Dict[str, Any]] = None*) → *List[str]*

Copy a list of S3 objects to another S3 directory.

**Note:** In case of *use\_threads=True* the number of threads that will be spawned will be gotten from `os.cpu_count()`.

**Parameters**

- **paths** (*List[str]*) – List of S3 objects paths (e.g. [s3://bucket/dir0/key0, s3://bucket/dir0/key1]).
- **source\_path** (*str*,) – S3 Path for the source directory.
- **target\_path** (*str*,) – S3 Path for the target directory.
- **replace\_filenames** (*Dict[str, str]*, *optional*) – e.g. {"old\_name.csv": "new\_name.csv", "old\_name2.csv": "new\_name2.csv"}
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled os.cpu\_count() will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests. Valid parameters: "ACL", "Metadata", "ServerSideEncryption", "StorageClass", "SSECustomerAlgorithm", "SSECustomerKey", "SSEKMSKeyId", "SSEKMSEncryptionContext", "Tagging", "RequestPayer", "ExpectedBucketOwner". e.g. s3\_additional\_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR\_KMS\_KEY\_ARN'}

**Returns** List of new objects paths.

**Return type** List[str]

**Examples****Copying**

```
>>> import awswrangler as wr
>>> wr.s3.copy_objects(
...     paths=["s3://bucket0/dir0/key0", "s3://bucket0/dir0/key1"],
...     source_path="s3://bucket0/dir0/",
...     target_path="s3://bucket1/dir1/"
... )
["s3://bucket1/dir1/key0", "s3://bucket1/dir1/key1"]
```

**Copying with a KMS key**

```
>>> import awswrangler as wr
>>> wr.s3.copy_objects(
...     paths=["s3://bucket0/dir0/key0", "s3://bucket0/dir0/key1"],
...     source_path="s3://bucket0/dir0/",
...     target_path="s3://bucket1/dir1/",
...     s3_additional_kwargs={
...         'ServerSideEncryption': 'aws:kms',
...         'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'
...     }
... )
["s3://bucket1/dir1/key0", "s3://bucket1/dir1/key1"]
```

## aws wrangler.s3.delete\_objects

```
aws wrangler.s3.delete_objects (path: Union[str, List[str]], use_threads: bool = True,
                                last_modified_begin: Optional[datetime.datetime] = None,
                                last_modified_end: Optional[datetime.datetime] = None,
                                s3_additional_kwargs: Optional[Dict[str, Any]] = None,
                                boto3_session: Optional[boto3.session.Session] = None) →
                                None
```

Delete Amazon S3 objects from a received S3 prefix or list of S3 objects paths.

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), [!seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use `glob.escape(path)` before passing the path to this function.

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---



---

**Note:** The filter by last\_modified begin last\_modified end is applied after list all S3 files

---

### Parameters

- **path** (`Union[str, List[str]]`) – S3 prefix (accepts Unix shell-style wildcards) (e.g. `s3://bucket/prefix`) or list of S3 objects paths (e.g. `[s3://bucket/key0, s3://bucket/key1]`).
- **use\_threads** (`bool`) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **last\_modified\_begin** – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **last\_modified\_end** (`datetime, optional`) – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **s3\_additional\_kwargs** (`Optional[Dict[str, Any]]`) – Forward to boto-core requests. Valid parameters: “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'RequestPayer': 'requester'}`
- **boto3\_session** (`boto3.Session(), optional`) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import aws wrangler as wr
>>> wr.s3.delete_objects(['s3://bucket/key0', 's3://bucket/key1']) # Delete both
↪objects
>>> wr.s3.delete_objects('s3://bucket/prefix') # Delete all objects under the
↪received prefix
```



## aws wrangler.s3.describe\_objects

```
aws wrangler.s3.describe_objects (path: Union[str, List[str]], use_threads: bool = True,
                                  last_modified_begin: Optional[datetime.datetime] = None,
                                  last_modified_end: Optional[datetime.datetime] = None,
                                  s3_additional_kwargs: Optional[Dict[str, Any]] = None,
                                  boto3_session: Optional[boto3.session.Session] = None) →
                                  Dict[str, Dict[str, Any]]
```

Describe Amazon S3 objects from a received S3 prefix or list of S3 objects paths.

Fetch attributes like ContentLength, DeleteMarker, last\_modified, ContentType, etc The full list of attributes can be explored under the boto3 head\_object documentation: [https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/s3.html#S3.Client.head\\_object](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/s3.html#S3.Client.head_object)

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), ![seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use `glob.escape(path)` before passing the path to this function.

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---



---

**Note:** The filter by last\_modified begin last\_modified end is applied after list all S3 files

---

### Parameters

- **path** (`Union[str, List[str]]`) – S3 prefix (accepts Unix shell-style wildcards) (e.g. `s3://bucket/prefix`) or list of S3 objects paths (e.g. `[s3://bucket/key0, s3://bucket/key1]`).
- **use\_threads** (`bool`) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **last\_modified\_begin** – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **last\_modified\_end** (`datetime, optional`) – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **s3\_additional\_kwargs** (`Optional[Dict[str, Any]]`) – Forward to boto-core requests. Valid parameters: “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'RequestPayer': 'requester'}`
- **boto3\_session** (`boto3.Session(), optional`) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** Return a dictionary of objects returned from `head_objects` where the key is the object path. The response object can be explored here: [https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/s3.html#S3.Client.head\\_object](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/s3.html#S3.Client.head_object)

**Return type** `Dict[str, Dict[str, Any]]`

## Examples

```
>>> import awswrangler as wr
>>> desc0 = wr.s3.describe_objects(['s3://bucket/key0', 's3://bucket/key1']) # Describe both objects
>>> desc1 = wr.s3.describe_objects('s3://bucket/prefix') # Describe all objects under the prefix
```

## awswrangler.s3.does\_object\_exist

`awswrangler.s3.does_object_exist` (*path*: str, *s3\_additional\_kwargs*: Optional[Dict[str, Any]] = None, *boto3\_session*: Optional[boto3.session.Session] = None) → bool

Check if object exists on S3.

### Parameters

- **path** (str) – S3 path (e.g. s3://bucket/key).
- **s3\_additional\_kwargs** (Optional[Dict[str, Any]]) – Forward to boto-core requests. Valid parameters: “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'RequestPayer': 'requester'}`
- **boto3\_session** (boto3.Session(), optional) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** True if exists, False otherwise.

**Return type** bool

## Examples

Using the default boto3 session

```
>>> import awswrangler as wr
>>> wr.s3.does_object_exist('s3://bucket/key_real')
True
>>> wr.s3.does_object_exist('s3://bucket/key_unreal')
False
```

Using a custom boto3 session

```
>>> import boto3
>>> import awswrangler as wr
>>> wr.s3.does_object_exist('s3://bucket/key_real', boto3_session=boto3.Session())
True
>>> wr.s3.does_object_exist('s3://bucket/key_unreal', boto3_session=boto3.Session())
False
```

## aws wrangler.s3.download

```
aws wrangler.s3.download(path: str, local_file: Union[str, Any], use_threads: bool =
                        True, boto3_session: Optional[boto3.session.Session] = None,
                        s3_additional_kwargs: Optional[Dict[str, Any]] = None) → None
```

Download file from from a received S3 path to local file.

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **path** (*str*) – S3 path (e.g. `s3://bucket/key0`).
- **local\_file** (*Union[str, Any]*) – A file-like object in binary mode or a path to local file (e.g. `./local/path/to/key0`).
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests, only “SSECustomerAlgorithm”, “SSECustomerKey” and “RequestPayer” arguments will be considered.

### Returns

**Return type** None

## Examples

Downloading a file using a path to local file

```
>>> import aws wrangler as wr
>>> wr.s3.download(path='s3://bucket/key', local_file='./key')
```

Downloading a file using a file-like object

```
>>> import aws wrangler as wr
>>> with open(file='./key', mode='wb') as local_f:
>>>     wr.s3.download(path='s3://bucket/key', local_file=local_f)
```

## aws wrangler.s3.get\_bucket\_region

```
aws wrangler.s3.get_bucket_region(bucket: str, boto3_session: Optional[boto3.session.Session]
                                = None) → str
```

Get bucket region name.

### Parameters

- **bucket** (*str*) – Bucket name.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** Region code (e.g. 'us-east-1').

**Return type** str

## Examples

Using the default boto3 session

```
>>> import awswrangler as wr
>>> region = wr.s3.get_bucket_region('bucket-name')
```

Using a custom boto3 session

```
>>> import boto3
>>> import awswrangler as wr
>>> region = wr.s3.get_bucket_region('bucket-name', boto3_session=boto3.Session())
```

## awswrangler.s3.list\_directories

`awswrangler.s3.list_directories` (*path*: str, *s3\_additional\_kwargs*: Optional[Dict[str, Any]] = None, *boto3\_session*: Optional[boto3.session.Session] = None) → List[str]

List Amazon S3 objects from a prefix.

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), ![seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use `glob.escape(path)` before passing the path to this function.

### Parameters

- **path** (str) – S3 path (e.g. s3://bucket/prefix).
- **s3\_additional\_kwargs** (Optional[Dict[str, Any]]) – Forward to boto-core requests. Valid parameters: “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'RequestPayer': 'requester'}`
- **boto3\_session** (boto3.Session(), optional) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** List of objects paths.

**Return type** List[str]

## Examples

Using the default boto3 session

```
>>> import awswrangler as wr
>>> wr.s3.list_directories('s3://bucket/prefix/')
['s3://bucket/prefix/dir0/', 's3://bucket/prefix/dir1/', 's3://bucket/prefix/dir2/
↪']
```

Using a custom boto3 session

```
>>> import boto3
>>> import awswrangler as wr
>>> wr.s3.list_directories('s3://bucket/prefix/', boto3_session=boto3.Session())
['s3://bucket/prefix/dir0/', 's3://bucket/prefix/dir1/', 's3://bucket/prefix/dir2/
↪']
```

## awswrangler.s3.list\_objects

`awswrangler.s3.list_objects` (*path: str, suffix: Optional[Union[str, List[str]]] = None, ignore\_suffix: Optional[Union[str, List[str]]] = None, last\_modified\_begin: Optional[datetime.datetime] = None, last\_modified\_end: Optional[datetime.datetime] = None, ignore\_empty: bool = False, s3\_additional\_kwargs: Optional[Dict[str, Any]] = None, boto3\_session: Optional[boto3.session.Session] = None*) → List[str]

List Amazon S3 objects from a prefix.

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), [!seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use `glob.escape(path)` before passing the path to this function.

---

**Note:** The filter by last\_modified begin last\_modified end is applied after list all S3 files

---

### Parameters

- **path** (*str*) – S3 path (e.g. `s3://bucket/prefix`).
- **suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for filtering S3 keys.
- **ignore\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for S3 keys to be ignored.
- **last\_modified\_begin** – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **last\_modified\_end** (*datetime, optional*) – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **ignore\_empty** (*bool*) – Ignore files with 0 bytes.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to boto-core requests. Valid parameters: “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'RequestPayer': 'requester'}`
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** List of objects paths.

**Return type** List[str]

## Examples

Using the default boto3 session

```
>>> import awswrangler as wr
>>> wr.s3.list_objects('s3://bucket/prefix')
['s3://bucket/prefix0', 's3://bucket/prefix1', 's3://bucket/prefix2']
```

Using a custom boto3 session

```
>>> import boto3
>>> import awswrangler as wr
>>> wr.s3.list_objects('s3://bucket/prefix', boto3_session=boto3.Session())
['s3://bucket/prefix0', 's3://bucket/prefix1', 's3://bucket/prefix2']
```

## awswrangler.s3.merge\_datasets

```
awswrangler.s3.merge_datasets(source_path: str, target_path: str, mode: str = 'append',
                               ignore_empty: bool = False, use_threads: bool = True,
                               boto3_session: Optional[boto3.session.Session] = None,
                               s3_additional_kwargs: Optional[Dict[str, Any]] = None) →
                               List[str]
```

Merge a source dataset into a target dataset.

This function accepts Unix shell-style wildcards in the `source_path` argument. `*` (matches everything), `?` (matches any single character), `[seq]` (matches any character in seq), `[!seq]` (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (`*`, `?`, `[]`), you can use `glob.escape(source_path)` before passing the path to this function.

---

**Note:** If you are merging tables (S3 datasets + Glue Catalog metadata), remember that you will also need to update your partitions metadata in some cases. (e.g. `wr.athena.repair_table(table='...', database='...')`)

---

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **source\_path** (*str*,) – S3 Path for the source directory.
- **target\_path** (*str*,) – S3 Path for the target directory.
- **mode** (*str*, optional) – `append` (Default), `overwrite`, `overwrite_partitions`.
- **ignore\_empty** (*bool*) – Ignore files with 0 bytes.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, optional) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests. Valid parameters: “ACL”, “Metadata”, “ServerSideEncryption”, “StorageClass”, “SSECustomerAlgorithm”, “SSECustomerKey”, “SSEKMSKeyId”,

“SSEKMSEncryptionContext”, “Tagging”, “RequestPayer”, “ExpectedBucketOwner”.  
 e.g. `s3_additional_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'}`

**Returns** List of new objects paths.

**Return type** List[str]

## Examples

### Merging

```
>>> import awswrangler as wr
>>> wr.s3.merge_datasets(
...     source_path="s3://bucket0/dir0/",
...     target_path="s3://bucket1/dir1/",
...     mode="append"
... )
["s3://bucket1/dir1/key0", "s3://bucket1/dir1/key1"]
```

### Merging with a KMS key

```
>>> import awswrangler as wr
>>> wr.s3.merge_datasets(
...     source_path="s3://bucket0/dir0/",
...     target_path="s3://bucket1/dir1/",
...     mode="append",
...     s3_additional_kwargs={
...         'ServerSideEncryption': 'aws:kms',
...         'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'
...     }
... )
["s3://bucket1/dir1/key0", "s3://bucket1/dir1/key1"]
```

## awswrangler.s3.merge\_upsert\_table

`awswrangler.s3.merge_upsert_table(delta_df: pandas.core.frame.DataFrame, database: str, table: str, primary_key: List[str], boto3_session: Optional[boto3.session.Session] = None) → None`

Perform Upsert (Update else Insert) onto an existing Glue table.

### Parameters

- **delta\_df** (*pandas.DataFrame*) – The delta dataframe has all the data which needs to be merged on the primary key
- **database** (*Str*) – An existing database name
- **table** (*Str*) – An existing table name
- **primary\_key** (*List[str]*) – Pass the primary key as a List of string columns List['column\_a', 'column\_b']
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

### Returns

**Return type** None

## Examples

```
Reading all Parquet files under a prefix >>> import awswrangler as wr >>> import pandas as pd >>>
delta_df = pd.DataFrame({"id": [1], "cchar": ["foo"], "date": [datetime.date(2021, 1, 2)]}) >>> primary_key
= ["id", "cchar"] >>> wr.s3.merge_upsert_table(delta_df=delta_df, database='database', table='table', pri-
mary_key=primary_key)
```

## awswrangler.s3.read\_csv

```
awswrangler.s3.read_csv(path: Union[str, List[str]], path_suffix: Optional[Union[str,
List[str]]] = None, path_ignore_suffix: Optional[Union[str, List[str]]]
= None, ignore_empty: bool = True, use_threads: bool =
True, last_modified_begin: Optional[datetime.datetime] = None,
last_modified_end: Optional[datetime.datetime] = None, boto3_session:
Optional[boto3.session.Session] = None, s3_additional_kwargs: Op-
tional[Dict[str, Any]] = None, chunksize: Optional[int] = None, dataset:
bool = False, partition_filter: Optional[Callable[[Dict[str, str]], bool]] =
None, **pandas_kwargs: Any) → Union[pandas.core.frame.DataFrame,
Iterator[pandas.core.frame.DataFrame]]
```

Read CSV file(s) from from a received S3 prefix or list of S3 objects paths.

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), ![seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use *glob.escape(path)* before passing the path to this function.

---

**Note:** For partial and gradual reading use the argument `chunksize` instead of `iterator`.

---

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

---

**Note:** The filter by `last_modified` begin `last_modified` end is applied after list all S3 files

---

## Parameters

- **path** (*Union[str, List[str]]*) – S3 prefix (accepts Unix shell-style wildcards) (e.g. `s3://bucket/prefix`) or list of S3 objects paths (e.g. `[s3://bucket/key0, s3://bucket/key1]`).
- **path\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes to be read (e.g. `[".csv"]`). If `None`, will try to read all files. (default)
- **path\_ignore\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for S3 keys to be ignored.(e.g. `["_SUCCESS"]`). If `None`, will try to read all files. (default)
- **ignore\_empty** (*bool*) – Ignore files with 0 bytes.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.



- **last\_modified\_begin** – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **last\_modified\_end**(*datetime*, *optional*) – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **boto3\_session**(*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **s3\_additional\_kwargs**(*Optional[Dict[str, Any]]*) – Forward to botocore requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.
- **chunksize**(*int*, *optional*) – If specified, return an generator where chunksize is the number of rows to include in each chunk.
- **dataset**(*bool*) – If *True* read a CSV dataset instead of simple file(s) loading all the related partitions as columns.
- **partition\_filter**(*Optional[Callable[[Dict[str, str]], bool]]*) – Callback Function filters to apply on PARTITION columns (PUSH-DOWN filter). This function MUST receive a single argument (Dict[str, str]) where keys are partitions names and values are partitions values. Partitions values will be always strings extracted from S3. This function MUST return a bool, True to read the partition or False to ignore it. Ignored if *dataset=False*. E.g `lambda x: True if x["year"] == "2020" and x["month"] == "1" else False` <https://aws-data-wrangler.readthedocs.io/en/2.7.0/tutorials/023%20-%20Flexible%20Partitions%20Filter.html>
- **pandas\_kwargs** – KEYWORD arguments forwarded to `pandas.read_csv()`. You can NOT pass *pandas\_kwargs* explicit, just add valid Pandas arguments in the function call and Wrangler will accept it. e.g. `wr.s3.read_csv('s3://bucket/prefix/', sep='|', na_values=['null', 'none'], skip_blank_lines=True)` [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read\\_csv.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read_csv.html)

**Returns** Pandas DataFrame or a Generator in case of *chunksize != None*.

**Return type** Union[pandas.DataFrame, Generator[pandas.DataFrame, None, None]]

## Examples

Reading all CSV files under a prefix

```
>>> import awswrangler as wr
>>> df = wr.s3.read_csv(path='s3://bucket/prefix/')
```

Reading all CSV files under a prefix and using pandas\_kwargs

```
>>> import awswrangler as wr
>>> df = wr.s3.read_csv('s3://bucket/prefix/', sep='|', na_values=['null', 'none',
↪ ], skip_blank_lines=True)
```

Reading all CSV files from a list

```
>>> import awswrangler as wr
>>> df = wr.s3.read_csv(path=['s3://bucket/filename0.csv', 's3://bucket/filename1.
↪ csv'])
```

Reading in chunks of 100 lines

```
>>> import awswrangler as wr
>>> dfs = wr.s3.read_csv(path=['s3://bucket/filename0.csv', 's3://bucket/
↳ filename1.csv'], chunksize=100)
>>> for df in dfs:
>>>     print(df) # 100 lines Pandas DataFrame
```

Reading CSV Dataset with PUSH-DOWN filter over partitions

```
>>> import awswrangler as wr
>>> my_filter = lambda x: True if x["city"].startswith("new") else False
>>> df = wr.s3.read_csv(path, dataset=True, partition_filter=my_filter)
```

## awswrangler.s3.read\_excel

`awswrangler.s3.read_excel` (*path*: str, *use\_threads*: bool = True, *boto3\_session*: Optional[boto3.session.Session] = None, *s3\_additional\_kwargs*: Optional[Dict[str, Any]] = None, *\*\*pandas\_kwargs*: Any) → pandas.core.frame.DataFrame

Read EXCEL file(s) from from a received S3 path.

---

**Note:** This function accepts any Pandas's `read_excel()` argument. [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read\\_excel.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read_excel.html)

---



---

**Note:** In case of *use\_threads=True* the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **path** (*Union[str, List[str]]*) – S3 path (e.g. `s3://bucket/key.xlsx`).
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.
- **pandas\_kwargs** – KEYWORD arguments forwarded to `pandas.read_excel()`. You can NOT pass *pandas\_kwargs* explicit, just add valid Pandas arguments in the function call and Wrangler will accept it. e.g. `wr.s3.read_excel("s3://bucket/key.xlsx", na_rep="", verbose=True)`  
[https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read\\_excel.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read_excel.html)

**Returns** Pandas DataFrame.

**Return type** pandas.DataFrame

## Examples

Reading an EXCEL file

```
>>> import awswrangler as wr
>>> df = wr.s3.read_excel('s3://bucket/key.xlsx')
```

### awswrangler.s3.read\_fwf

```
awswrangler.s3.read_fwf(path: Union[str, List[str]], path_suffix: Optional[Union[str, List[str]]] = None, path_ignore_suffix: Optional[Union[str, List[str]]] = None, ignore_empty: bool = True, use_threads: bool = True, last_modified_begin: Optional[datetime.datetime] = None, last_modified_end: Optional[datetime.datetime] = None, boto3_session: Optional[boto3.session.Session] = None, s3_additional_kwargs: Optional[Dict[str, Any]] = None, chunksize: Optional[int] = None, dataset: bool = False, partition_filter: Optional[Callable[[Dict[str, str]], bool]] = None, **pandas_kwargs: Any) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]
```

Read fixed-width formatted file(s) from from a received S3 prefix or list of S3 objects paths.

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), [!seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use `glob.escape(path)` before passing the path to this function.

---

**Note:** For partial and gradual reading use the argument `chunksize` instead of `iterator`.

---



---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---



---

**Note:** The filter by `last_modified` begin `last_modified` end is applied after list all S3 files

---

### Parameters

- **path** (`Union[str, List[str]]`) – S3 prefix (accepts Unix shell-style wildcards) (e.g. `s3://bucket/prefix`) or list of S3 objects paths (e.g. `[s3://bucket/key0, s3://bucket/key1]`).
- **path\_suffix** (`Union[str, List[str], None]`) – Suffix or List of suffixes to be read (e.g. `[".txt"]`). If `None`, will try to read all files. (default)
- **path\_ignore\_suffix** (`Union[str, List[str], None]`) – Suffix or List of suffixes for S3 keys to be ignored.(e.g. `["_SUCCESS"]`). If `None`, will try to read all files. (default)
- **ignore\_empty** (`bool`) – Ignore files with 0 bytes.
- **use\_threads** (`bool`) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.

- **last\_modified\_begin** – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **last\_modified\_end**(*datetime, optional*) – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **boto3\_session**(*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **s3\_additional\_kwargs**(*Optional[Dict[str, Any]]*) – Forward to botocore requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.
- **chunksize**(*int, optional*) – If specified, return an generator where chunksize is the number of rows to include in each chunk.
- **dataset**(*bool*) – If *True* read a FWF dataset instead of simple file(s) loading all the related partitions as columns.
- **partition\_filter**(*Optional[Callable[[Dict[str, str]], bool]]*) – Callback Function filters to apply on PARTITION columns (PUSH-DOWN filter). This function MUST receive a single argument (Dict[str, str]) where keys are partitions names and values are partitions values. Partitions values will be always strings extracted from S3. This function MUST return a bool, True to read the partition or False to ignore it. Ignored if *dataset=False*. E.g `lambda x: True if x["year"] == "2020" and x["month"] == "1" else False` <https://aws-data-wrangler.readthedocs.io/en/2.7.0/tutorials/023%20-%20Flexible%20Partitions%20Filter.html>
- **pandas\_kwargs** – KEYWORD arguments forwarded to `pandas.read_fwf()`. You can NOT pass *pandas\_kwargs* explicit, just add valid Pandas arguments in the function call and Wrangler will accept it. e.g. `wr.s3.read_fwf(path='s3://bucket/prefix/', widths=[1, 3], names=["c0", "c1"])` [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read\\_fwf.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read_fwf.html)

**Returns** Pandas DataFrame or a Generator in case of *chunksize != None*.

**Return type** Union[pandas.DataFrame, Generator[pandas.DataFrame, None, None]]

## Examples

Reading all fixed-width formatted (FWF) files under a prefix

```
>>> import awswrangler as wr
>>> df = wr.s3.read_fwf(path='s3://bucket/prefix/', widths=[1, 3], names=['c0',
↳ 'c1'])
```

Reading all fixed-width formatted (FWF) files from a list

```
>>> import awswrangler as wr
>>> df = wr.s3.read_fwf(path=['s3://bucket/0.txt', 's3://bucket/1.txt'],
↳ widths=[1, 3], names=['c0', 'c1'])
```

Reading in chunks of 100 lines

```
>>> import awswrangler as wr
>>> dfs = wr.s3.read_fwf(
...     path=['s3://bucket/0.txt', 's3://bucket/1.txt'],
...     chunksize=100,
```

(continues on next page)

(continued from previous page)

```

...     widths=[1, 3],
...     names=["c0", "c1"]
... )
>>> for df in dfs:
>>>     print(df) # 100 lines Pandas DataFrame

```

Reading FWF Dataset with PUSH-DOWN filter over partitions

```

>>> import awswrangler as wr
>>> my_filter = lambda x: True if x["city"].startswith("new") else False
>>> df = wr.s3.read_fwf(path, dataset=True, partition_filter=my_filter, widths=[1,
↪ 3], names=["c0", "c1"])

```

## awswrangler.s3.read\_json

`awswrangler.s3.read_json` (*path*: Union[str, List[str]], *path\_suffix*: Optional[Union[str, List[str]]] = None, *path\_ignore\_suffix*: Optional[Union[str, List[str]]] = None, *ignore\_empty*: bool = True, *orient*: str = 'columns', *use\_threads*: bool = True, *last\_modified\_begin*: Optional[datetime.datetime] = None, *last\_modified\_end*: Optional[datetime.datetime] = None, *boto3\_session*: Optional[boto3.session.Session] = None, *s3\_additional\_kwargs*: Optional[Dict[str, Any]] = None, *chunksize*: Optional[int] = None, *dataset*: bool = False, *partition\_filter*: Optional[Callable[[Dict[str, str]], bool]] = None, *\*\*pandas\_kwargs*: Any) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]

Read JSON file(s) from from a received S3 prefix or list of S3 objects paths.

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), ![seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use `glob.escape(path)` before passing the path to this function.

---

**Note:** For partial and gradual reading use the argument `chunksize` instead of `iterator`.

---



---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---



---

**Note:** The filter by `last_modified begin last_modified end` is applied after list all S3 files

---

### Parameters

- **path** (Union[str, List[str]]) – S3 prefix (accepts Unix shell-style wildcards) (e.g. `s3://bucket/prefix`) or list of S3 objects paths (e.g. `[s3://bucket/key0, s3://bucket/key1]`).
- **path\_suffix** (Union[str, List[str], None]) – Suffix or List of suffixes to be read (e.g. `[“.json”]`). If None, will try to read all files. (default)
- **path\_ignore\_suffix** (Union[str, List[str], None]) – Suffix or List of suffixes for S3 keys to be ignored.(e.g. `[“_SUCCESS”]`). If None, will try to read all files.

(default)

- **ignore\_empty** (*bool*) – Ignore files with 0 bytes.
- **orient** (*str*) – Same as Pandas: [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read\\_json.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read_json.html)
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **last\_modified\_begin** – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **last\_modified\_end** (*datetime, optional*) – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.
- **chunksize** (*int, optional*) – If specified, return an generator where chunksize is the number of rows to include in each chunk.
- **dataset** (*bool*) – If *True* read a JSON dataset instead of simple file(s) loading all the related partitions as columns. If *True*, the *lines=True* will be assumed by default.
- **partition\_filter** (*Optional[Callable[[Dict[str, str]], bool]]*) – Callback Function filters to apply on PARTITION columns (PUSH-DOWN filter). This function MUST receive a single argument (Dict[str, str]) where keys are partitions names and values are partitions values. Partitions values will be always strings extracted from S3. This function MUST return a bool, True to read the partition or False to ignore it. Ignored if *dataset=False*. E.g `lambda x: True if x["year"] == "2020" and x["month"] == "1" else False` <https://aws-data-wrangler.readthedocs.io/en/2.7.0/tutorials/023%20-%20Flexible%20Partitions%20Filter.html>
- **pandas\_kwargs** – KEYWORD arguments forwarded to `pandas.read_json()`. You can NOT pass *pandas\_kwargs* explicit, just add valid Pandas arguments in the function call and Wrangler will accept it. e.g. `wr.s3.read_json('s3://bucket/prefix/', lines=True, keep_default_dates=True)` [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read\\_json.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read_json.html)

**Returns** Pandas DataFrame or a Generator in case of *chunksize != None*.

**Return type** Union[pandas.DataFrame, Generator[pandas.DataFrame, None, None]]

## Examples

Reading all JSON files under a prefix

```
>>> import awswrangler as wr
>>> df = wr.s3.read_json(path='s3://bucket/prefix/')
```

Reading all CSV files under a prefix and using `pandas_kwargs`

```
>>> import awswrangler as wr
>>> df = wr.s3.read_json('s3://bucket/prefix/', lines=True, keep_default_
↪ dates=True)
```

Reading all JSON files from a list

```
>>> import awswrangler as wr
>>> df = wr.s3.read_json(path=['s3://bucket/filename0.json', 's3://bucket/
↳ filename1.json'])
```

Reading in chunks of 100 lines

```
>>> import awswrangler as wr
>>> dfs = wr.s3.read_json(path=['s3://bucket/0.json', 's3://bucket/1.json'],
↳ chunksize=100, lines=True)
>>> for df in dfs:
>>>     print(df) # 100 lines Pandas DataFrame
```

Reading JSON Dataset with PUSH-DOWN filter over partitions

```
>>> import awswrangler as wr
>>> my_filter = lambda x: True if x["city"].startswith("new") else False
>>> df = wr.s3.read_json(path, dataset=True, partition_filter=my_filter)
```

## awswrangler.s3.read\_parquet

`awswrangler.s3.read_parquet` (*path*: Union[str, List[str]], *path\_suffix*: Optional[Union[str, List[str]]] = None, *path\_ignore\_suffix*: Optional[Union[str, List[str]]] = None, *ignore\_empty*: bool = True, *ignore\_index*: Optional[bool] = None, *partition\_filter*: Optional[Callable[[Dict[str, str], bool]] = None, *columns*: Optional[List[str]] = None, *validate\_schema*: bool = False, *chunked*: Union[bool, int] = False, *dataset*: bool = False, *categories*: Optional[List[str]] = None, *safe*: bool = True, *map\_types*: bool = True, *use\_threads*: bool = True, *last\_modified\_begin*: Optional[datetime.datetime] = None, *last\_modified\_end*: Optional[datetime.datetime] = None, *boto3\_session*: Optional[boto3.session.Session] = None, *s3\_additional\_kwargs*: Optional[Dict[str, Any]] = None) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]

Read Apache Parquet file(s) from from a received S3 prefix or list of S3 objects paths.

The concept of Dataset goes beyond the simple idea of files and enable more complex features like partitioning and catalog integration (AWS Glue Catalog).

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), [!seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use `glob.escape(path)` before passing the path to this function.

---

**Note:** Batching (*chunked* argument) (Memory Friendly):

Will enable the function to return a Iterable of DataFrames instead of a regular DataFrame.

There are two batching strategies on Wrangler:

- If **chunked=True**, a new DataFrame will be returned for each file in your path/dataset.
- If **chunked=INTEGER**, Wrangler will iterate on the data by number of rows igual the received INTEGER.

*P.S. `chunked=True` if faster and uses less memory while `chunked=INTEGER` is more precise in number of rows for each Dataframe.*

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

**Note:** The filter by `last_modified` begin `last_modified` end is applied after list all S3 files

---

### Parameters

- **path** (*Union[str, List[str]]*) – S3 prefix (accepts Unix shell-style wildcards) (e.g. `s3://bucket/prefix`) or list of S3 objects paths (e.g. `[s3://bucket/key0, s3://bucket/key1]`).
- **path\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes to be read (e.g. `[“.gz.parquet”, “.snappy.parquet”]`). If `None`, will try to read all files. (default)
- **path\_ignore\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for S3 keys to be ignored.(e.g. `[“.csv”, “_SUCCESS”]`). If `None`, will try to read all files. (default)
- **ignore\_empty** (*bool*) – Ignore files with 0 bytes.
- **ignore\_index** (*Optional[bool]*) – Ignore index when combining multiple parquet files to one DataFrame.
- **partition\_filter** (*Optional[Callable[[Dict[str, str], bool]]*) – Callback Function filters to apply on PARTITION columns (PUSH-DOWN filter). This function MUST receive a single argument (`Dict[str, str]`) where keys are partitions names and values are partitions values. Partitions values will be always strings extracted from S3. This function MUST return a `bool`, `True` to read the partition or `False` to ignore it. Ignored if `dataset=False`. E.g `lambda x: True if x["year"] == "2020" and x["month"] == "1" else False`
- **columns** (*List[str], optional*) – Names of columns to read from the file(s).
- **validate\_schema** – Check that individual file schemas are all the same / compatible. Schemas within a folder prefix should all be the same. Disable if you have schemas that are different and want to disable this check.
- **chunked** (*Union[int, bool]*) – If passed will split the data in a Iterable of DataFrames (Memory friendly). If `True` wrangler will iterate on the data by files in the most efficient way without guarantee of chunksize. If an `INTEGER` is passed Wrangler will iterate on the data by number of rows igual the received `INTEGER`.
- **dataset** (*bool*) – If `True` read a parquet dataset instead of simple file(s) loading all the related partitions as columns.
- **categories** (*Optional[List[str]], optional*) – List of columns names that should be returned as `pandas.Categorical`. Recommended for memory restricted environments.
- **safe** (*bool, default True*) – For certain data types, a cast is needed in order to store the data in a pandas DataFrame or Series (e.g. timestamps are always stored as nanoseconds in pandas). This option controls whether it is a safe cast or not.



- **map\_types** (*bool*, *default True*) – True to convert pyarrow DataTypes to pandas ExtensionDtypes. It is used to override the default pandas type for conversion of built-in pyarrow types or in absence of pandas\_metadata in the Table schema.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **last\_modified\_begin** – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **last\_modified\_end** (*datetime*, *optional*) – Filter the s3 files by the Last modified date of the object. The filter is applied only after list all s3 files.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.

**Returns** Pandas DataFrame or a Generator in case of *chunked=True*.

**Return type** Union[pandas.DataFrame, Generator[pandas.DataFrame, None, None]]

## Examples

Reading all Parquet files under a prefix

```
>>> import awswrangler as wr
>>> df = wr.s3.read_parquet(path='s3://bucket/prefix/')
```

Reading all Parquet files from a list

```
>>> import awswrangler as wr
>>> df = wr.s3.read_parquet(path=['s3://bucket/filename0.parquet', 's3://bucket/
↳ filename1.parquet'])
```

Reading in chunks (Chunk by file)

```
>>> import awswrangler as wr
>>> dfs = wr.s3.read_parquet(path=['s3://bucket/filename0.csv', 's3://bucket/
↳ filename1.csv'], chunked=True)
>>> for df in dfs:
>>>     print(df) # Smaller Pandas DataFrame
```

Reading in chunks (Chunk by IMM rows)

```
>>> import awswrangler as wr
>>> dfs = wr.s3.read_parquet(path=['s3://bucket/filename0.csv', 's3://bucket/
↳ filename1.csv'], chunked=1_000_000)
>>> for df in dfs:
>>>     print(df) # IMM Pandas DataFrame
```

Reading Parquet Dataset with PUSH-DOWN filter over partitions

```
>>> import awswrangler as wr
>>> my_filter = lambda x: True if x["city"].startswith("new") else False
>>> df = wr.s3.read_parquet(path, dataset=True, partition_filter=my_filter)
```

**aws wrangler.s3.read\_parquet\_metadata**

```
aws wrangler.s3.read_parquet_metadata (path: Union[str, List[str]], path_suffix: Optional[str]
                                       = None, path_ignore_suffix: Optional[str] =
                                       None, ignore_empty: bool = True, dtype: Op-
                                       tional[Dict[str, str]] = None, sampling: float = 1.0,
                                       dataset: bool = False, use_threads: bool = True,
                                       boto3_session: Optional[boto3.session.Session] =
                                       None, s3_additional_kwargs: Optional[Dict[str, Any]]
                                       = None) → Any
```

Read Apache Parquet file(s) metadata from from a received S3 prefix or list of S3 objects paths.

The concept of Dataset goes beyond the simple idea of files and enable more complex features like partitioning and catalog integration (AWS Glue Catalog).

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), ![seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, [/]), you can use *glob.escape(path)* before passing the path to this function.

---

**Note:** In case of *use\_threads=True* the number of threads that will be spawned will be gotten from *os.cpu\_count()*.

---



---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

---

Check out the [Global Configurations Tutorial](#) for details.

**Parameters**

- **path** (*Union[str, List[str]]*) – S3 prefix (accepts Unix shell-style wildcards) (e.g. *s3://bucket/prefix*) or list of S3 objects paths (e.g. [*s3://bucket/key0*, *s3://bucket/key1*]).
- **path\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes to be read (e.g. [*“.gz.parquet”, “.snappy.parquet”*]). If None, will try to read all files. (default)
- **path\_ignore\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for S3 keys to be ignored.(e.g. [*“.csv”, “\_SUCCESS”*]). If None, will try to read all files. (default)
- **ignore\_empty** (*bool*) – Ignore files with 0 bytes.
- **dtype** (*Dict[str, str], optional*) – Dictionary of columns names and Athena/Glue types to be casted. Useful when you have columns with undetermined data types as partitions columns. (e.g. {*‘col name’: ‘bigint’, ‘col2 name’: ‘int’*})
- **sampling** (*float*) – Random sample ratio of files that will have the metadata inspected. Must be *0.0 < sampling <= 1.0*. The higher, the more accurate. The lower, the faster.
- **dataset** (*bool*) – If True read a parquet dataset instead of simple file(s) loading all the related partitions as columns.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled *os.cpu\_count()* will be used as the max number of threads.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if *boto3\_session* receive None.

- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to boto3 requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.

**Returns** `columns_types`: Dictionary with keys as column names and values as data types (e.g. `{'col0': 'bigint', 'col1': 'double'}`). / `partitions_types`: Dictionary with keys as partition names and values as data types (e.g. `{'col2': 'date'}`).

**Return type** `Tuple[Dict[str, str], Optional[Dict[str, str]]]`

## Examples

Reading all Parquet files (with partitions) metadata under a prefix

```
>>> import awswrangler as wr
>>> columns_types, partitions_types = wr.s3.read_parquet_metadata(path='s3://
↳bucket/prefix/', dataset=True)
```

Reading all Parquet files metadata from a list

```
>>> import awswrangler as wr
>>> columns_types, partitions_types = wr.s3.read_parquet_metadata(path=[
...     's3://bucket/filename0.parquet',
...     's3://bucket/filename1.parquet'
... ])
```

## awswrangler.s3.read\_parquet\_table

`awswrangler.s3.read_parquet_table` (`table: str, database: str, filename_suffix: Optional[Union[str, List[str]]] = None, filename_ignore_suffix: Optional[Union[str, List[str]]] = None, catalog_id: Optional[str] = None, partition_filter: Optional[Callable[[Dict[str, str]], bool]] = None, columns: Optional[List[str]] = None, validate_schema: bool = True, categories: Optional[List[str]] = None, safe: bool = True, map_types: bool = True, chunked: Union[bool, int] = False, use_threads: bool = True, boto3_session: Optional[boto3.session.Session] = None, s3_additional_kwargs: Optional[Dict[str, Any]] = None) → Any`

Read Apache Parquet table registered on AWS Glue Catalog.

**Note:** Batching (*chunked* argument) (Memory Friendly):

Will enable the function to return a Iterable of DataFrames instead of a regular DataFrame.

There are two batching strategies on Wrangler:

- If **chunked=True**, a new DataFrame will be returned for each file in your path/dataset.
- If **chunked=INTEGER**, Wrangler will paginate through files slicing and concatenating to return DataFrames with the number of row equal the received INTEGER.

*P.S. `chunked=True` is faster and uses less memory while `chunked=INTEGER` is more precise in number of rows for each DataFrame.*

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **table** (*str*) – AWS Glue Catalog table name.
- **database** (*str*) – AWS Glue Catalog database name.
- **filename\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes to be read (e.g. [“.gz.parquet”, “.snappy.parquet”]). If None, will try to read all files. (default)
- **filename\_ignore\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for S3 keys to be ignored.(e.g. [“.csv”, “\_SUCCESS”]). If None, will try to read all files. (default)
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **partition\_filter** (*Optional[Callable[[Dict[str, str]], bool]]*) – Callback Function filters to apply on PARTITION columns (PUSH-DOWN filter). This function MUST receive a single argument (Dict[str, str]) where keys are partitions names and values are partitions values. Partitions values will be always strings extracted from S3. This function MUST return a bool, True to read the partition or False to ignore it. Ignored if `dataset=False`. E.g `lambda x: True if x["year"] == "2020" and x["month"] == "1" else False` <https://aws-data-wrangler.readthedocs.io/en/2.7.0/tutorials/023%20-%20Flexible%20Partitions%20Filter.html>
- **columns** (*List[str], optional*) – Names of columns to read from the file(s).
- **validate\_schema** – Check that individual file schemas are all the same / compatible. Schemas within a folder prefix should all be the same. Disable if you have schemas that are different and want to disable this check.
- **categories** (*Optional[List[str]], optional*) – List of columns names that should be returned as `pandas.Categorical`. Recommended for memory restricted environments.
- **safe** (*bool, default True*) – For certain data types, a cast is needed in order to store the data in a pandas DataFrame or Series (e.g. timestamps are always stored as nanoseconds in pandas). This option controls whether it is a safe cast or not.
- **map\_types** (*bool, default True*) – True to convert pyarrow DataTypes to pandas ExtensionDtypes. It is used to override the default pandas type for conversion of built-in pyarrow types or in absence of pandas\_metadata in the Table schema.
- **chunked** (*bool*) – If True will break the data in smaller DataFrames (Non deterministic number of lines). Otherwise return a single DataFrame with the whole data.

- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.

**Returns** Pandas DataFrame or a Generator in case of *chunked=True*.

**Return type** Union[pandas.DataFrame, Generator[pandas.DataFrame, None, None]]

## Examples

### Reading Parquet Table

```
>>> import awswrangler as wr
>>> df = wr.s3.read_parquet_table(database='...', table='...')
```

### Reading Parquet Table encrypted

```
>>> import awswrangler as wr
>>> df = wr.s3.read_parquet_table(
...     database='...',
...     table='...'
...     s3_additional_kwargs={
...         'ServerSideEncryption': 'aws:kms',
...         'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'
...     }
... )
```

### Reading Parquet Table in chunks (Chunk by file)

```
>>> import awswrangler as wr
>>> dfs = wr.s3.read_parquet_table(database='...', table='...', chunked=True)
>>> for df in dfs:
>>>     print(df) # Smaller Pandas DataFrame
```

### Reading Parquet Dataset with PUSH-DOWN filter over partitions

```
>>> import awswrangler as wr
>>> my_filter = lambda x: True if x["city"].startswith("new") else False
>>> df = wr.s3.read_parquet_table(path, dataset=True, partition_filter=my_filter)
```

## awswrangler.s3.size\_objects

`awswrangler.s3.size_objects` (*path*: Union[str, List[str]], *use\_threads*: bool = True, *s3\_additional\_kwargs*: Optional[Dict[str, Any]] = None, *boto3\_session*: Optional[boto3.session.Session] = None) → Dict[str, Optional[int]]

Get the size (ContentLength) in bytes of Amazon S3 objects from a received S3 prefix or list of S3 objects paths.

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), ![seq] (matches any character not in seq). If you want to

use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use `glob.escape(path)` before passing the path to this function.

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **path** (`Union[str, List[str]]`) – S3 prefix (accepts Unix shell-style wildcards) (e.g. `s3://bucket/prefix`) or list of S3 objects paths (e.g. `[s3://bucket/key0, s3://bucket/key1]`).
- **use\_threads** (`bool`) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **s3\_additional\_kwargs** (`Optional[Dict[str, Any]]`) – Forward to boto-core requests. Valid parameters: “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'RequestPayer': 'requester'}`
- **boto3\_session** (`boto3.Session()`, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** Dictionary where the key is the object path and the value is the object size.

**Return type** `Dict[str, Optional[int]]`

### Examples

```
>>> import awswrangler as wr
>>> sizes0 = wr.s3.size_objects(['s3://bucket/key0', 's3://bucket/key1']) # Get_
↳the sizes of both objects
>>> sizes1 = wr.s3.size_objects('s3://bucket/prefix') # Get the sizes of all_
↳objects under the received prefix
```

**aws wrangler.s3.store\_parquet\_metadata**

```
aws wrangler.s3.store_parquet_metadata (path: str, database: str, table: str, catalog_id:
Optional[str] = None, path_suffix: Optional[str]
= None, path_ignore_suffix: Optional[str] =
None, ignore_empty: bool = True, dtype: Op-
tional[Dict[str, str]] = None, sampling: float = 1.0,
dataset: bool = False, use_threads: bool = True,
description: Optional[str] = None, parameters:
Optional[Dict[str, str]] = None, columns_comments:
Optional[Dict[str, str]] = None, compression:
Optional[str] = None, mode: str = 'overwrite',
catalog_versioning: bool = False, regular_partitions:
bool = True, projection_enabled: bool = False,
projection_types: Optional[Dict[str, str]] = None,
projection_ranges: Optional[Dict[str, str]] =
None, projection_values: Optional[Dict[str, str]] =
None, projection_intervals: Optional[Dict[str, str]]
= None, projection_digits: Optional[Dict[str,
str]] = None, s3_additional_kwargs: Op-
tional[Dict[str, Any]] = None, boto3_session:
Optional[boto3.session.Session] = None) → Any
```

Infer and store parquet metadata on AWS Glue Catalog.

Infer Apache Parquet file(s) metadata from from a received S3 prefix or list of S3 objects paths And then stores it on AWS Glue Catalog including all inferred partitions (No need of 'MCSK REPAIR TABLE')

The concept of Dataset goes beyond the simple idea of files and enable more complex features like partitioning and catalog integration (AWS Glue Catalog).

This function accepts Unix shell-style wildcards in the path argument. \* (matches everything), ? (matches any single character), [seq] (matches any character in seq), [!seq] (matches any character not in seq). If you want to use a path which includes Unix shell-style wildcard characters (\*, ?, []), you can use *glob.escape(path)* before passing the path to this function.

---

**Note:** On *append* mode, the *parameters* will be upsert on an existing table.

---



---

**Note:** In case of *use\_threads=True* the number of threads that will be spawned will be gotten from *os.cpu\_count()*.

---



---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- *catalog\_id*
- *database*

Check out the [Global Configurations Tutorial](#) for details.

---

**Parameters**

- **path** (*Union[str, List[str]]*) – S3 prefix (accepts Unix shell-style wildcards) (e.g. *s3://bucket/prefix*) or list of S3 objects paths (e.g. [*s3://bucket/key0*, *s3://bucket/key1*]).

- database : str Glue/Athena catalog: Database name.
- **table** (*str*) – Glue/Athena catalog: Table name.
  - **database** (*str*) – AWS Glue Catalog database name.
  - **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
  - **path\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for filtering S3 keys.
  - **path\_ignore\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for S3 keys to be ignored.
  - **ignore\_empty** (*bool*) – Ignore files with 0 bytes.
  - **dtype** (*Dict[str, str]*, *optional*) – Dictionary of columns names and Athena/Glue types to be casted. Useful when you have columns with undetermined data types as partitions columns. (e.g. {'col name': 'bigint', 'col2 name': 'int'})
  - **sampling** (*float*) – Random sample ratio of files that will have the metadata inspected. Must be  $0.0 < sampling \leq 1.0$ . The higher, the more accurate. The lower, the faster.
  - **dataset** (*bool*) – If True read a parquet dataset instead of simple file(s) loading all the related partitions as columns.
  - **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
  - **description** (*str*, *optional*) – Glue/Athena catalog: Table description
  - **parameters** (*Dict[str, str]*, *optional*) – Glue/Athena catalog: Key/value pairs to tag the table.
  - **columns\_comments** (*Dict[str, str]*, *optional*) – Glue/Athena catalog: Columns names and the related comments (e.g. {'col0': 'Column 0.', 'col1': 'Column 1.', 'col2': 'Partition.'}).
  - **compression** (*str*, *optional*) – Compression style (None, snappy, gzip, etc).
  - **mode** (*str*) – 'overwrite' to recreate any possible existing table or 'append' to keep any possible existing table.
  - **catalog\_versioning** (*bool*) – If True and *mode="overwrite"*, creates an archived version of the table catalog before updating it.
  - **regular\_partitions** (*bool*) – Create regular partitions (Non projected partitions) on Glue Catalog. Disable when you will work only with Partition Projection. Keep enabled even when working with projections is useful to keep Redshift Spectrum working with the regular partitions.
  - **projection\_enabled** (*bool*) – Enable Partition Projection on Athena (<https://docs.aws.amazon.com/athena/latest/ug/partition-projection.html>)
  - **projection\_types** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections types. Valid types: "enum", "integer", "date", "injected" <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': 'enum', 'col2\_name': 'integer'})
  - **projection\_ranges** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections ranges. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '0,10', 'col2\_name': '-1,8675309'})



- **projection\_values** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections values. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': 'A,B,Unknown', 'col2\_name': 'foo,boo,bar'})
- **projection\_intervals** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections intervals. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '1', 'col2\_name': '5'})
- **projection\_digits** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections digits. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '1', 'col2\_name': '2'})
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to boto3 requests. Valid parameters: "ACL", "Metadata", "ServerSideEncryption", "StorageClass", "SSECustomerAlgorithm", "SSECustomerKey", "SSEKMSKeyId", "SSEKMSEncryptionContext", "Tagging", "RequestPayer", "ExpectedBucketOwner". e.g. s3\_additional\_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR\_KMS\_KEY\_ARN'}
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** The metadata used to create the Glue Table. `columns_types`: Dictionary with keys as column names and values as data types (e.g. {'col0': 'bigint', 'col1': 'double'}). / `partitions_types`: Dictionary with keys as partition names and values as data types (e.g. {'col2': 'date'}). / `partitions_values`: Dictionary with keys as S3 path locations and values as a list of partitions values as str (e.g. {'s3://bucket/prefix/y=2020/m=10/': ['2020', '10']}).

**Return type** Tuple[Dict[str, str], Optional[Dict[str, str]], Optional[Dict[str, List[str]]]]

## Examples

Reading all Parquet files metadata under a prefix

```
>>> import awswrangler as wr
>>> columns_types, partitions_types, partitions_values = wr.s3.store_parquet_
↳ metadata(
...     path='s3://bucket/prefix/',
...     database='...',
...     table='...',
...     dataset=True
... )
```

**aws wrangler.s3.to\_csv**

```
aws wrangler.s3.to_csv(df: pandas.core.frame.DataFrame, path: Optional[str] = None, sep: str = ',', index: bool = True, columns: Optional[List[str]] = None, use_threads: bool = True, boto3_session: Optional[boto3.session.Session] = None, s3_additional_kwargs: Optional[Dict[str, Any]] = None, sanitize_columns: bool = False, dataset: bool = False, filename_prefix: Optional[str] = None, partition_cols: Optional[List[str]] = None, bucketing_info: Optional[Tuple[List[str], int]] = None, concurrent_partitioning: bool = False, mode: Optional[str] = None, catalog_versioning: bool = False, database: Optional[str] = None, table: Optional[str] = None, dtype: Optional[Dict[str, str]] = None, description: Optional[str] = None, parameters: Optional[Dict[str, str]] = None, columns_comments: Optional[Dict[str, str]] = None, regular_partitions: bool = True, projection_enabled: bool = False, projection_types: Optional[Dict[str, str]] = None, projection_ranges: Optional[Dict[str, str]] = None, projection_values: Optional[Dict[str, str]] = None, projection_intervals: Optional[Dict[str, str]] = None, projection_digits: Optional[Dict[str, str]] = None, catalog_id: Optional[str] = None, **pandas_kwargs: Any) → Any
```

Write CSV file or dataset on Amazon S3.

The concept of Dataset goes beyond the simple idea of ordinary files and enable more complex features like partitioning and catalog integration (Amazon Athena/AWS Glue Catalog).

---

**Note:** If `database` and `table` arguments are passed, the table name and all column names will be automatically sanitized using `wr.catalog.sanitize_table_name` and `wr.catalog.sanitize_column_name`. Please, pass `sanitize_columns=True` to enforce this behaviour always.

---

---

**Note:** If `table` and `database` arguments are passed, `pandas_kwargs` will be ignored due restrictive quoting, `date_format`, `escapechar` and encoding required by Athena/Glue Catalog.

---

---

**Note:** Compression: The minimum acceptable version to achieve it is Pandas 1.2.0 that requires Python `>= 3.7.1`.

---

---

**Note:** On `append` mode, the `parameters` will be upsert on an existing table.

---

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `concurrent_partitioning`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **df** (*pandas.DataFrame*) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **path** (*str, optional*) – Amazon S3 path (e.g. `s3://bucket/prefix/filename.csv`) (for dataset e.g. `s3://bucket/prefix`). Required if `dataset=False` or when creating a new dataset
- **sep** (*str*) – String of length 1. Field delimiter for the output file.
- **index** (*bool*) – Write row names (index).
- **columns** (*Optional[List[str]]*) – Columns to write.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 Session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests. Valid parameters: “ACL”, “Metadata”, “ServerSideEncryption”, “StorageClass”, “SSECustomerAlgorithm”, “SSECustomerKey”, “SSEKMSKeyId”, “SSEKMSEncryptionContext”, “Tagging”, “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'}`
- **sanitize\_columns** (*bool*) – True to sanitize columns names or False to keep it as is. True value is forced if `dataset=True`.
- **dataset** (*bool*) – If True store a parquet dataset instead of a ordinary file(s) If True, enable all follow arguments: `partition_cols`, `mode`, `database`, `table`, `description`, `parameters`, `columns_comments`, `concurrent_partitioning`, `catalog_versioning`, `projection_enabled`, `projection_types`, `projection_ranges`, `projection_values`, `projection_intervals`, `projection_digits`, `catalog_id`, `schema_evolution`.
- **filename\_prefix** (*str, optional*) – If `dataset=True`, add a filename prefix to the output files.
- **partition\_cols** (*List[str], optional*) – List of column names that will be used to create partitions. Only takes effect if `dataset=True`.
- **bucketing\_info** (*Tuple[List[str], int], optional*) – Tuple consisting of the column names used for bucketing as the first element and the number of buckets as the second element. Only *str*, *int* and *bool* are supported as column data types for bucketing.
- **concurrent\_partitioning** (*bool*) – If True will increase the parallelism level during the partitions writing. It will decrease the writing time and increase the memory usage. <https://aws-data-wrangler.readthedocs.io/en/2.7.0/tutorials/022%20-%20Writing%20Partitions%20Concurrently.html>
- **mode** (*str, optional*) – `append` (Default), `overwrite`, `overwrite_partitions`. Only takes effect if `dataset=True`. For details check the related tutorial: [https://aws-data-wrangler.readthedocs.io/en/2.7.0/stubs/awswrangler.s3.to\\_parquet.html#awswrangler.s3.to\\_parquet](https://aws-data-wrangler.readthedocs.io/en/2.7.0/stubs/awswrangler.s3.to_parquet.html#awswrangler.s3.to_parquet)
- **catalog\_versioning** (*bool*) – If True and `mode="overwrite"`, creates an archived version of the table catalog before updating it.

- **database** (*str, optional*) – Glue/Athena catalog: Database name.
- **table** (*str, optional*) – Glue/Athena catalog: Table name.
- **dtype** (*Dict[str, str], optional*) – Dictionary of columns names and Athena/Glue types to be casted. Useful when you have columns with undetermined or mixed data types. (e.g. {'col name': 'bigint', 'col2 name': 'int'})
- **description** (*str, optional*) – Glue/Athena catalog: Table description
- **parameters** (*Dict[str, str], optional*) – Glue/Athena catalog: Key/value pairs to tag the table.
- **columns\_comments** (*Dict[str, str], optional*) – Glue/Athena catalog: Columns names and the related comments (e.g. {'col0': 'Column 0.', 'col1': 'Column 1.', 'col2': 'Partition.'}).
- **regular\_partitions** (*bool*) – Create regular partitions (Non projected partitions) on Glue Catalog. Disable when you will work only with Partition Projection. Keep enabled even when working with projections is useful to keep Redshift Spectrum working with the regular partitions.
- **projection\_enabled** (*bool*) – Enable Partition Projection on Athena (<https://docs.aws.amazon.com/athena/latest/ug/partition-projection.html>)
- **projection\_types** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections types. Valid types: "enum", "integer", "date", "injected" <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': 'enum', 'col2\_name': 'integer'})
- **projection\_ranges** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections ranges. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '0,10', 'col2\_name': '-1,8675309'})
- **projection\_values** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections values. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': 'A,B,Unknown', 'col2\_name': 'foo,boo,bar'})
- **projection\_intervals** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections intervals. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '1', 'col2\_name': '5'})
- **projection\_digits** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections digits. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '1', 'col2\_name': '2'})
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **pandas\_kwargs** – KEYWORD arguments forwarded to `pandas.DataFrame.to_csv()`. You can NOT pass `pandas_kwargs` explicit, just add valid Pandas arguments in the function call and Wrangler will accept it. e.g. `wr.s3.to_csv(df, path, sep='|', na_rep='NULL', decimal=',')` [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.to\\_csv.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.to_csv.html)

**Returns** Dictionary with: 'paths': List of all stored files paths on S3. 'partitions\_values': Dictionary of partitions added with keys as S3 path locations and values as a list of partitions values as str.

**Return type** Dict[str, Union[List[str], Dict[str, List[str]]]]

## Examples

### Writing single file

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_csv(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path='s3://bucket/prefix/my_file.csv',
... )
{
  'paths': ['s3://bucket/prefix/my_file.csv'],
  'partitions_values': {}
}
```

### Writing single file with pandas\_kwargs

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_csv(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path='s3://bucket/prefix/my_file.csv',
...     sep='|',
...     na_rep='NULL',
...     decimal=', '
... )
{
  'paths': ['s3://bucket/prefix/my_file.csv'],
  'partitions_values': {}
}
```

### Writing single file encrypted with a KMS key

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_csv(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path='s3://bucket/prefix/my_file.csv',
...     s3_additional_kwargs={
...         'ServerSideEncryption': 'aws:kms',
...         'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'
...     }
... )
{
  'paths': ['s3://bucket/prefix/my_file.csv'],
  'partitions_values': {}
}
```

### Writing partitioned dataset

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_csv(
...     df=pd.DataFrame({
...         'col': [1, 2, 3],
...         'col2': ['A', 'A', 'B']
...     }),
...     path='s3://bucket/prefix',
```

(continues on next page)

(continued from previous page)

```

...     dataset=True,
...     partition_cols=['col2']
... )
{
  'paths': ['s3://.../col2=A/x.csv', 's3://.../col2=B/y.csv'],
  'partitions_values': {
    's3://.../col2=A/': ['A'],
    's3://.../col2=B/': ['B']
  }
}

```

### Writing bucketed dataset

```

>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_csv(
...     df=pd.DataFrame({
...         'col': [1, 2, 3],
...         'col2': ['A', 'A', 'B']
...     }),
...     path='s3://bucket/prefix',
...     dataset=True,
...     bucketing_info=(["col2"], 2)
... )
{
  'paths': ['s3://.../x_bucket-00000.csv', 's3://.../col2=B/x_bucket-00001.csv',
  ↪'],
  'partitions_values': {}
}

```

### Writing dataset to S3 with metadata on Athena/Glue Catalog.

```

>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_csv(
...     df=pd.DataFrame({
...         'col': [1, 2, 3],
...         'col2': ['A', 'A', 'B']
...     }),
...     path='s3://bucket/prefix',
...     dataset=True,
...     partition_cols=['col2'],
...     database='default', # Athena/Glue database
...     table='my_table' # Athena/Glue table
... )
{
  'paths': ['s3://.../col2=A/x.csv', 's3://.../col2=B/y.csv'],
  'partitions_values': {
    's3://.../col2=A/': ['A'],
    's3://.../col2=B/': ['B']
  }
}

```

### Writing dataset casting empty column data type

```

>>> import awswrangler as wr
>>> import pandas as pd

```

(continues on next page)

(continued from previous page)

```

>>> wr.s3.to_csv(
...     df=pd.DataFrame({
...         'col': [1, 2, 3],
...         'col2': ['A', 'A', 'B'],
...         'col3': [None, None, None]
...     }),
...     path='s3://bucket/prefix',
...     dataset=True,
...     database='default', # Athena/Glue database
...     table='my_table' # Athena/Glue table
...     dtype={'col3': 'date'}
... )
{
    'paths': ['s3://.../x.csv'],
    'partitions_values': {}
}

```

## awsrangler.s3.to\_excel

`awsrangler.s3.to_excel(df: pandas.core.frame.DataFrame, path: str, boto3_session: Optional[boto3.session.Session] = None, s3_additional_kwargs: Optional[Dict[str, Any]] = None, use_threads: bool = True, **pandas_kwargs: Any) → str`

Write EXCEL file on Amazon S3.

---

**Note:** This function accepts any Pandas's `read_excel()` argument. [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read\\_excel.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read_excel.html)

---



---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **df** (*pandas.DataFrame*) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **path** (*str*) – Amazon S3 path (e.g. `s3://bucket/filename.xlsx`).
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests. Valid parameters: “ACL”, “Metadata”, “ServerSideEncryption”, “StorageClass”, “SSECustomerAlgorithm”, “SSECustomerKey”, “SSEKMSKeyId”, “SSEKMSEncryptionContext”, “Tagging”, “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'}`
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **pandas\_kwargs** – KEYWORD arguments forwarded to `pandas.DataFrame.to_excel()`. You can NOT pass `pandas_kwargs` explicit, just add valid Pandas arguments in the function

call and Wrangler will accept it. e.g. `wr.s3.to_excel(df, path, na_rep="", index=False)` [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.to\\_excel.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.to_excel.html)

**Returns** Written S3 path.

**Return type** `str`

## Examples

Writing EXCEL file

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_excel(df, 's3://bucket/filename.xlsx')
```

## awswrangler.s3.to\_json

`awswrangler.s3.to_json` (*df*: `pandas.core.frame.DataFrame`, *path*: `str`, *boto3\_session*: *Optional*[`boto3.session.Session`] = *None*, *s3\_additional\_kwargs*: *Optional*[`Dict`[`str`, *Any*]] = *None*, *use\_threads*: *bool* = *True*, *\*\*pandas\_kwargs*: *Any*) → `List`[`str`]

Write JSON file on Amazon S3.

---

**Note:** In case of *use\_threads=True* the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

---

**Note:** Compression: The minimum acceptable version to achieve it is Pandas 1.2.0 that requires Python >= 3.7.1.

---

### Parameters

- **df** (`pandas.DataFrame`) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **path** (`str`) – Amazon S3 path (e.g. `s3://bucket/filename.csv`).
- **boto3\_session** (`boto3.Session()`, *optional*) – Boto3 Session. The default boto3 Session will be used if *boto3\_session* receive *None*.
- **s3\_additional\_kwargs** (*Optional*[`Dict`[`str`, *Any*]]) – Forward to botocore requests. Valid parameters: “ACL”, “Metadata”, “ServerSideEncryption”, “StorageClass”, “SSECustomerAlgorithm”, “SSECustomerKey”, “SSEKMSKeyId”, “SSEKMSEncryptionContext”, “Tagging”, “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'}`
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **pandas\_kwargs** – KEYWORD arguments forwarded to `pandas.DataFrame.to_json()`. You can NOT pass *pandas\_kwargs* explicit, just add valid Pandas arguments in the function call and Wrangler will accept it. e.g. `wr.s3.to_json(df, path, lines=True, date_format='iso')` [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.to\\_json.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.to_json.html)



**Returns** List of written files.

**Return type** List[str]

## Examples

Writing JSON file

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_json(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path='s3://bucket/filename.json',
... )
```

Writing JSON file using pandas\_kwargs

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_json(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path='s3://bucket/filename.json',
...     lines=True,
...     date_format='iso'
... )
```

Writing CSV file encrypted with a KMS key

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_csv(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path='s3://bucket/filename.csv',
...     s3_additional_kwargs={
...         'ServerSideEncryption': 'aws:kms',
...         'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'
...     }
... )
```

## aws wrangler.s3.to\_parquet

`aws wrangler.s3.to_parquet` (*df*: `pandas.core.frame.DataFrame`, *path*: `Optional[str]` = `None`, *index*: `bool` = `False`, *compression*: `Optional[str]` = `'snappy'`, *max\_rows\_by\_file*: `Optional[int]` = `None`, *use\_threads*: `bool` = `True`, *boto3\_session*: `Optional[boto3.session.Session]` = `None`, *s3\_additional\_kwargs*: `Optional[Dict[str, Any]]` = `None`, *sanitize\_columns*: `bool` = `False`, *dataset*: `bool` = `False`, *filename\_prefix*: `Optional[str]` = `None`, *partition\_cols*: `Optional[List[str]]` = `None`, *bucketing\_info*: `Optional[Tuple[List[str], int]]` = `None`, *concurrent\_partitioning*: `bool` = `False`, *mode*: `Optional[str]` = `None`, *catalog\_versioning*: `bool` = `False`, *schema\_evolution*: `bool` = `True`, *database*: `Optional[str]` = `None`, *table*: `Optional[str]` = `None`, *dtype*: `Optional[Dict[str, str]]` = `None`, *description*: `Optional[str]` = `None`, *parameters*: `Optional[Dict[str, str]]` = `None`, *columns\_comments*: `Optional[Dict[str, str]]` = `None`, *regular\_partitions*: `bool` = `True`, *projection\_enabled*: `bool` = `False`, *projection\_types*: `Optional[Dict[str, str]]` = `None`, *projection\_ranges*: `Optional[Dict[str, str]]` = `None`, *projection\_values*: `Optional[Dict[str, str]]` = `None`, *projection\_intervals*: `Optional[Dict[str, str]]` = `None`, *projection\_digits*: `Optional[Dict[str, str]]` = `None`, *catalog\_id*: `Optional[str]` = `None`) → `Any`

Write Parquet file or dataset on Amazon S3.

The concept of Dataset goes beyond the simple idea of ordinary files and enable more complex features like partitioning and catalog integration (Amazon Athena/AWS Glue Catalog).

---

**Note:** If *database* and *table* arguments are passed, the table name and all column names will be automatically sanitized using `wr.catalog.sanitize_table_name` and `wr.catalog.sanitize_column_name`. Please, pass `sanitize_columns=True` to enforce this behaviour always.

---

---

**Note:** On *append* mode, the *parameters* will be upsert on an existing table.

---

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `concurrent_partitioning`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **df** (`pandas.DataFrame`) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>

- **path** (*str*, *optional*) – S3 path (for file e.g. `s3://bucket/prefix/filename.parquet`) (for dataset e.g. `s3://bucket/prefix`). Required if `dataset=False` or when `dataset=True` and creating a new dataset
- **index** (*bool*) – True to store the DataFrame index in file, otherwise False to ignore it.
- **compression** (*str*, *optional*) – Compression style (None, snappy, gzip).
- **max\_rows\_by\_file** (*int*) – Max number of rows in each file. Default is None i.e. don't split the files. (e.g. 33554432, 268435456)
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (`boto3.Session()`, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to botocore requests. Valid parameters: “ACL”, “Metadata”, “ServerSideEncryption”, “StorageClass”, “SSECustomerAlgorithm”, “SSECustomerKey”, “SSEKMSKeyId”, “SSEKMSEncryptionContext”, “Tagging”, “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'}`
- **sanitize\_columns** (*bool*) – True to sanitize columns names (using `wr.catalog.sanitize_table_name` and `wr.catalog.sanitize_column_name`) or False to keep it as is. True value behaviour is enforced if `database` and `table` arguments are passed.
- **dataset** (*bool*) – If True store a parquet dataset instead of a ordinary file(s) If True, enable all follow arguments: `partition_cols`, `mode`, `database`, `table`, `description`, `parameters`, `columns_comments`, `concurrent_partitioning`, `catalog_versioning`, `projection_enabled`, `projection_types`, `projection_ranges`, `projection_values`, `projection_intervals`, `projection_digits`, `catalog_id`, `schema_evolution`.
- **filename\_prefix** (*str*, *optional*) – If `dataset=True`, add a filename prefix to the output files.
- **partition\_cols** (*List[str]*, *optional*) – List of column names that will be used to create partitions. Only takes effect if `dataset=True`.
- **bucketing\_info** (*Tuple[List[str], int]*, *optional*) – Tuple consisting of the column names used for bucketing as the first element and the number of buckets as the second element. Only *str*, *int* and *bool* are supported as column data types for bucketing.
- **concurrent\_partitioning** (*bool*) – If True will increase the parallelism level during the partitions writing. It will decrease the writing time and increase the memory usage. <https://aws-data-wrangler.readthedocs.io/en/2.7.0/tutorials/022%20-%20Writing%20Partitions%20Concurrently.html>
- **mode** (*str*, *optional*) – `append` (Default), `overwrite`, `overwrite_partitions`. Only takes effect if `dataset=True`. For details check the related tutorial: [https://aws-data-wrangler.readthedocs.io/en/2.7.0/stubs/awswrangler.s3.to\\_parquet.html#awswrangler.s3.to\\_parquet](https://aws-data-wrangler.readthedocs.io/en/2.7.0/stubs/awswrangler.s3.to_parquet.html#awswrangler.s3.to_parquet)
- **catalog\_versioning** (*bool*) – If True and `mode="overwrite"`, creates an archived version of the table catalog before updating it.
- **schema\_evolution** (*bool*) – If True allows schema evolution (new or missing columns), otherwise a exception will be raised. (Only considered if `dataset=True` and `mode` in (“append”, “overwrite\_partitions”)) Related tutorial: <https://aws-data-wrangler.readthedocs.io/en/2.7.0/tutorials/014%20-%20Schema%20Evolution.html>

- **database** (*str, optional*) – Glue/Athena catalog: Database name.
- **table** (*str, optional*) – Glue/Athena catalog: Table name.
- **dtype** (*Dict[str, str], optional*) – Dictionary of columns names and Athena/Glue types to be casted. Useful when you have columns with undetermined or mixed data types. (e.g. {'col name': 'bigint', 'col2 name': 'int'})
- **description** (*str, optional*) – Glue/Athena catalog: Table description
- **parameters** (*Dict[str, str], optional*) – Glue/Athena catalog: Key/value pairs to tag the table.
- **columns\_comments** (*Dict[str, str], optional*) – Glue/Athena catalog: Columns names and the related comments (e.g. {'col0': 'Column 0.', 'col1': 'Column 1.', 'col2': 'Partition.'}).
- **regular\_partitions** (*bool*) – Create regular partitions (Non projected partitions) on Glue Catalog. Disable when you will work only with Partition Projection. Keep enabled even when working with projections is useful to keep Redshift Spectrum working with the regular partitions.
- **projection\_enabled** (*bool*) – Enable Partition Projection on Athena (<https://docs.aws.amazon.com/athena/latest/ug/partition-projection.html>)
- **projection\_types** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections types. Valid types: "enum", "integer", "date", "injected" <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': 'enum', 'col2\_name': 'integer'})
- **projection\_ranges** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections ranges. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '0,10', 'col2\_name': '-1,8675309'})
- **projection\_values** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections values. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': 'A,B,Unknown', 'col2\_name': 'foo,boo,bar'})
- **projection\_intervals** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections intervals. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '1', 'col2\_name': '5'})
- **projection\_digits** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections digits. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '1', 'col2\_name': '2'})
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.

**Returns** Dictionary with: 'paths': List of all stored files paths on S3. 'partitions\_values': Dictionary of partitions added with keys as S3 path locations and values as a list of partitions values as str.

**Return type** Dict[str, Union[List[str], Dict[str, List[str]]]]

## Examples

### Writing single file

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_parquet(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path='s3://bucket/prefix/my_file.parquet',
... )
{
  'paths': ['s3://bucket/prefix/my_file.parquet'],
  'partitions_values': {}
}
```

### Writing single file encrypted with a KMS key

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_parquet(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path='s3://bucket/prefix/my_file.parquet',
...     s3_additional_kwargs={
...         'ServerSideEncryption': 'aws:kms',
...         'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'
...     }
... )
{
  'paths': ['s3://bucket/prefix/my_file.parquet'],
  'partitions_values': {}
}
```

### Writing partitioned dataset

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_parquet(
...     df=pd.DataFrame({
...         'col': [1, 2, 3],
...         'col2': ['A', 'A', 'B']
...     }),
...     path='s3://bucket/prefix',
...     dataset=True,
...     partition_cols=['col2']
... )
{
  'paths': ['s3://.../col2=A/x.parquet', 's3://.../col2=B/y.parquet'],
  'partitions_values': {
    's3://.../col2=A/': ['A'],
    's3://.../col2=B/': ['B']
  }
}
```

### Writing bucketed dataset

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_parquet(
```

(continues on next page)

(continued from previous page)

```

...     df=pd.DataFrame({
...         'col': [1, 2, 3],
...         'col2': ['A', 'A', 'B']
...     }),
...     path='s3://bucket/prefix',
...     dataset=True,
...     bucketing_info=(['col2'], 2)
... )
{
    'paths': ['s3://.../x_bucket-00000.csv', 's3://.../col2=B/x_bucket-00001.csv
→'],
    'partitions_values': {}
}

```

Writing dataset to S3 with metadata on Athena/Glue Catalog.

```

>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_parquet(
...     df=pd.DataFrame({
...         'col': [1, 2, 3],
...         'col2': ['A', 'A', 'B']
...     }),
...     path='s3://bucket/prefix',
...     dataset=True,
...     partition_cols=['col2'],
...     database='default', # Athena/Glue database
...     table='my_table' # Athena/Glue table
... )
{
    'paths': ['s3://.../col2=A/x.parquet', 's3://.../col2=B/y.parquet'],
    'partitions_values': {
        's3://.../col2=A/': ['A'],
        's3://.../col2=B/': ['B']
    }
}

```

Writing dataset casting empty column data type

```

>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.s3.to_parquet(
...     df=pd.DataFrame({
...         'col': [1, 2, 3],
...         'col2': ['A', 'A', 'B'],
...         'col3': [None, None, None]
...     }),
...     path='s3://bucket/prefix',
...     dataset=True,
...     database='default', # Athena/Glue database
...     table='my_table' # Athena/Glue table
...     dtype={'col3': 'date'}
... )
{
    'paths': ['s3://.../x.parquet'],
    'partitions_values': {}
}

```

## aws wrangler.s3.upload

```
aws wrangler.s3.upload(local_file: Union[str, Any], path: str, use_threads: bool =
                        True, boto3_session: Optional[boto3.session.Session] = None,
                        s3_additional_kwargs: Optional[Dict[str, Any]] = None) → None
```

Upload file from a local file to received S3 path.

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **local\_file** (`Union[str, Any]`) – A file-like object in binary mode or a path to local file (e.g. `./local/path/to/key0`).
- **path** (`str`) – S3 path (e.g. `s3://bucket/key0`).
- **use\_threads** (`bool`) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (`boto3.Session()`, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** (`Optional[Dict[str, Any]]`) – Forward to botocore requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.

### Returns

**Return type** None

## Examples

Uploading a file using a path to local file

```
>>> import aws wrangler as wr
>>> wr.s3.upload(local_file='./key', path='s3://bucket/key')
```

Uploading a file using a file-like object

```
>>> import aws wrangler as wr
>>> with open(file='./key', mode='wb') as local_f:
>>>     wr.s3.upload(local_file=local_f, path='s3://bucket/key')
```

## aws wrangler.s3.wait\_objects\_exist

```
aws wrangler.s3.wait_objects_exist(paths: List[str], delay: Optional[float] = None,
                                   max_attempts: Optional[int] = None, use_threads: bool
                                   = True, boto3_session: Optional[boto3.session.Session] =
                                   None) → None
```

Wait Amazon S3 objects exist.

Polls `S3.Client.head_object()` every 5 seconds (default) until a successful state is reached. An error is returned after 20 (default) failed checks. <https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/s3.html#S3.Waiter.ObjectExists>

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **paths** (*List[str]*) – List of S3 objects paths (e.g. [s3://bucket/key0, s3://bucket/key1]).
- **delay** (*Union[int, float]*, *optional*) – The amount of time in seconds to wait between attempts. Default: 5
- **max\_attempts** (*int*, *optional*) – The maximum number of attempts to be made. Default: 20
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.s3.wait_objects_exist(['s3://bucket/key0', 's3://bucket/key1']) # wait_
↳ both objects
```

### awswrangler.s3.wait\_objects\_not\_exist

```
awswrangler.s3.wait_objects_not_exist(paths: List[str], delay: Optional[float] =
None, max_attempts: Optional[int] = None,
use_threads: bool = True, boto3_session: Op-
tional[boto3.session.Session] = None) → None
```

Wait Amazon S3 objects not exist.

Polls `S3.Client.head_object()` every 5 seconds (default) until a successful state is reached. An error is returned after 20 (default) failed checks. <https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/s3.html#S3.Waiter.ObjectNotExists>

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **paths** (*List[str]*) – List of S3 objects paths (e.g. [s3://bucket/key0, s3://bucket/key1]).
- **delay** (*Union[int, float]*, *optional*) – The amount of time in seconds to wait between attempts. Default: 5
- **max\_attempts** (*int*, *optional*) – The maximum number of attempts to be made. Default: 20



- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (`boto3.Session()`, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.s3.wait_objects_not_exist(['s3://bucket/key0', 's3://bucket/key1']) #_
↪ wait both objects not exist
```

## 1.4.2 AWS Glue Catalog

<code>add_column(database, table, column_name[, ...])</code>	Add a column in a AWS Glue Catalog table.
<code>add_csv_partitions(database, table, ...[, ...])</code>	Add partitions (metadata) to a CSV Table in the AWS Glue Catalog.
<code>add_parquet_partitions(database, table, ...)</code>	Add partitions (metadata) to a Parquet Table in the AWS Glue Catalog.
<code>create_csv_table(database, table, path, ...)</code>	Create a CSV Table (Metadata Only) in the AWS Glue Catalog.
<code>create_database(name[, description, ...])</code>	Create a database in AWS Glue Catalog.
<code>create_parquet_table(database, table, path, ...)</code>	Create a Parquet Table (Metadata Only) in the AWS Glue Catalog.
<code>databases([limit, catalog_id, boto3_session])</code>	Get a Pandas DataFrame with all listed databases.
<code>delete_column(database, table, column_name)</code>	Delete a column in a AWS Glue Catalog table.
<code>delete_database(name[, catalog_id, ...])</code>	Create a database in AWS Glue Catalog.
<code>delete_partitions(table, database, ...[, ...])</code>	Delete specified partitions in a AWS Glue Catalog table.
<code>delete_all_partitions(table, database[, ...])</code>	Delete all partitions in a AWS Glue Catalog table.
<code>delete_table_if_exists(database, table[, ...])</code>	Delete Glue table if exists.
<code>does_table_exist(database, table[, ...])</code>	Check if the table exists.
<code>drop_duplicated_columns(df)</code>	Drop all repeated columns (duplicated names).
<code>extract_athena_types(df[, index, ...])</code>	Extract columns and partitions types (Amazon Athena) from Pandas DataFrame.
<code>get_columns_comments(database, table[, ...])</code>	Get all columns comments.
<code>get_csv_partitions(database, table[, ...])</code>	Get all partitions from a Table in the AWS Glue Catalog.
<code>get_databases([catalog_id, boto3_session])</code>	Get an iterator of databases.
<code>get_parquet_partitions(database, table[, ...])</code>	Get all partitions from a Table in the AWS Glue Catalog.
<code>get_partitions(database, table[, ...])</code>	Get all partitions from a Table in the AWS Glue Catalog.
<code>get_table_description(database, table[, ...])</code>	Get table description.
<code>get_table_location(database, table[, ...])</code>	Get table's location on Glue catalog.
<code>get_table_number_of_versions(database, table)</code>	Get total number of versions.
<code>get_table_parameters(database, table[, ...])</code>	Get all parameters.
<code>get_table_types(database, table[, boto3_session])</code>	Get all columns and types from a table.
<code>get_table_versions(database, table[, ...])</code>	Get all versions.

continues on next page

Table 2 – continued from previous page

<code>get_tables([catalog_id, database, ...])</code>	Get an iterator of tables.
<code>overwrite_table_parameters(parameters, ...)</code>	Overwrite all existing parameters.
<code>sanitize_column_name(column)</code>	Convert the column name to be compatible with Amazon Athena.
<code>sanitize_dataframe_columns_names(df)</code>	Normalize all columns names to be compatible with Amazon Athena.
<code>sanitize_table_name(table)</code>	Convert the table name to be compatible with Amazon Athena.
<code>search_tables(text[, catalog_id, boto3_session])</code>	Get Pandas DataFrame of tables filtered by a search string.
<code>table(database, table[, catalog_id, ...])</code>	Get table details as Pandas DataFrame.
<code>tables([limit, catalog_id, database, ...])</code>	Get a DataFrame with tables filtered by a search term, prefix, suffix.
<code>upsert_table_parameters(parameters, ..., ...)</code>	Insert or Update the received parameters.

### aws wrangler.catalog.add\_column

`aws wrangler.catalog.add_column` (*database: str, table: str, column\_name: str, column\_type: str = 'string', column\_comment: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None, catalog\_id: Optional[str] = None*) → Any

Add a column in a AWS Glue Catalog table.

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

#### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **column\_name** (*str*) – Column name
- **column\_type** (*str*) – Column type.
- **column\_comment** (*str*) – Column Comment
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.

**Returns** None

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.catalog.add_column(
...     database='my_db',
...     table='my_table',
...     column_name='my_col',
...     column_type='int'
... )
```

### awswrangler.catalog.add\_csv\_partitions

`awswrangler.catalog.add_csv_partitions` (*database: str, table: str, partitions\_values: Dict[str, List[str]], bucketing\_info: Optional[Tuple[List[str], int]] = None, catalog\_id: Optional[str] = None, compression: Optional[str] = None, sep: str = ',', boto3\_session: Optional[boto3.session.Session] = None, columns\_types: Optional[Dict[str, str]] = None*) → Any

Add partitions (metadata) to a CSV Table in the AWS Glue Catalog.

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **partitions\_values** (*Dict[str, List[str]]*) – Dictionary with keys as S3 path locations and values as a list of partitions values as *str* (e.g. {'s3://bucket/prefix/y=2020/m=10/': ['2020', '10']}).
- **bucketing\_info** (*Tuple[List[str], int, optional]*) – Tuple consisting of the column names used for bucketing as the first element and the number of buckets as the second element. Only *str*, *int* and *bool* are supported as column data types for bucketing.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **compression** (*str, optional*) – Compression style (None, gzip, etc).
- **sep** (*str*) – String of length 1. Field delimiter for the output file.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **columns\_types** (*Optional[Dict[str, str]]*) – Only required for Hive compatibility. Dictionary with keys as column names and values as data types (e.g. {'col0': 'bigint', 'col1': 'double'}). P.S. Only materialized columns please, not partition columns.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.catalog.add_csv_partitions(
...     database='default',
...     table='my_table',
...     partitions_values={
...         's3://bucket/prefix/y=2020/m=10/': ['2020', '10'],
...         's3://bucket/prefix/y=2020/m=11/': ['2020', '11'],
...         's3://bucket/prefix/y=2020/m=12/': ['2020', '12']
...     }
... )
```

### awswrangler.catalog.add\_parquet\_partitions

`awswrangler.catalog.add_parquet_partitions` (*database: str, table: str, partitions\_values: Dict[str, List[str]], bucketing\_info: Optional[Tuple[List[str], int]] = None, catalog\_id: Optional[str] = None, compression: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None, columns\_types: Optional[Dict[str, str]] = None*) → Any

Add partitions (metadata) to a Parquet Table in the AWS Glue Catalog.

---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

#### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **partitions\_values** (*Dict[str, List[str]]*) – Dictionary with keys as S3 path locations and values as a list of partitions values as str (e.g. {'s3://bucket/prefix/y=2020/m=10/': ['2020', '10']}).
- **bucketing\_info** (*Tuple[List[str], int, optional]*) – Tuple consisting of the column names used for bucketing as the first element and the number of buckets as the second element. Only *str*, *int* and *bool* are supported as column data types for bucketing.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **compression** (*str, optional*) – Compression style (None, snappy, gzip, etc).

- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **columns\_types** (*Optional[Dict[str, str]]*) – Only required for Hive compatibility. Dictionary with keys as column names and values as data types (e.g. {'col0': 'bigint', 'col1': 'double'}). P.S. Only materialized columns please, not partition columns.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.catalog.add_parquet_partitions(
...     database='default',
...     table='my_table',
...     partitions_values={
...         's3://bucket/prefix/y=2020/m=10/': ['2020', '10'],
...         's3://bucket/prefix/y=2020/m=11/': ['2020', '11'],
...         's3://bucket/prefix/y=2020/m=12/': ['2020', '12']
...     }
... )
```

## awswrangler.catalog.create\_csv\_table

`awswrangler.catalog.create_csv_table` (*database: str, table: str, path: str, columns\_types: Dict[str, str], partitions\_types: Optional[Dict[str, str]] = None, bucketing\_info: Optional[Tuple[List[str], int]] = None, compression: Optional[str] = None, description: Optional[str] = None, parameters: Optional[Dict[str, str]] = None, columns\_comments: Optional[Dict[str, str]] = None, mode: str = 'overwrite', catalog\_versioning: bool = False, sep: str = ',', skip\_header\_line\_count: Optional[int] = None, boto3\_session: Optional[boto3.session.Session] = None, projection\_enabled: bool = False, projection\_types: Optional[Dict[str, str]] = None, projection\_ranges: Optional[Dict[str, str]] = None, projection\_values: Optional[Dict[str, str]] = None, projection\_intervals: Optional[Dict[str, str]] = None, projection\_digits: Optional[Dict[str, str]] = None, catalog\_id: Optional[str] = None*) → Any

Create a CSV Table (Metadata Only) in the AWS Glue Catalog.

[‘https://docs.aws.amazon.com/athena/latest/ug/data-types.html’](https://docs.aws.amazon.com/athena/latest/ug/data-types.html)

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- catalog\_id
- database

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **path** (*str*) – Amazon S3 path (e.g. `s3://bucket/prefix/`).
- **columns\_types** (*Dict[str, str]*) – Dictionary with keys as column names and values as data types (e.g. `{‘col0’: ‘bigint’, ‘col1’: ‘double’}`).
- **partitions\_types** (*Dict[str, str]*, *optional*) – Dictionary with keys as partition names and values as data types (e.g. `{‘col2’: ‘date’}`).
- **bucketing\_info** (*Tuple[List[str], int]*, *optional*) – Tuple consisting of the column names used for bucketing as the first element and the number of buckets as the second element. Only *str*, *int* and *bool* are supported as column data types for bucketing.
- **compression** (*str*, *optional*) – Compression style (None, gzip, etc).
- **description** (*str*, *optional*) – Table description
- **parameters** (*Dict[str, str]*, *optional*) – Key/value pairs to tag the table.
- **columns\_comments** (*Dict[str, str]*, *optional*) – Columns names and the related comments (e.g. `{‘col0’: ‘Column 0.’, ‘col1’: ‘Column 1.’, ‘col2’: ‘Partition.’}`).
- **mode** (*str*) – ‘overwrite’ to recreate any possible existing table or ‘append’ to keep any possible existing table.
- **catalog\_versioning** (*bool*) – If True and *mode=“overwrite”*, creates an archived version of the table catalog before updating it.
- **sep** (*str*) – String of length 1. Field delimiter for the output file.
- **skip\_header\_line\_count** (*Optional[int]*) – Number of Lines to skip regarding to the header.
- **projection\_enabled** (*bool*) – Enable Partition Projection on Athena (<https://docs.aws.amazon.com/athena/latest/ug/partition-projection.html>)
- **projection\_types** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections types. Valid types: “enum”, “integer”, “date”, “injected” <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. `{‘col_name’: ‘enum’, ‘col2_name’: ‘integer’}`)
- **projection\_ranges** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections ranges. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. `{‘col_name’: ‘0,10’, ‘col2_name’: ‘-1,8675309’}`)
- **projection\_values** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections values. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. `{‘col_name’: ‘A,B,Unknown’, ‘col2_name’: ‘foo,boo,bar’}`)
- **projection\_intervals** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections intervals. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. `{‘col_name’: ‘1’, ‘col2_name’: ‘5’}`)
- **projection\_digits** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections digits. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. `{‘col_name’: ‘1’, ‘col2_name’: ‘2’}`)

- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.catalog.create_csv_table(
...     database='default',
...     table='my_table',
...     path='s3://bucket/prefix/',
...     columns_types={'col0': 'bigint', 'col1': 'double'},
...     partitions_types={'col2': 'date'},
...     compression='gzip',
...     description='My own table!',
...     parameters={'source': 'postgresql'},
...     columns_comments={'col0': 'Column 0.', 'col1': 'Column 1.', 'col2':
↪ 'Partition.'}
... )
```

## awswrangler.catalog.create\_database

awswrangler.catalog.**create\_database** (*name: str*, *description: Optional[str] = None*, *catalog\_id: Optional[str] = None*, *exist\_ok: bool = False*, *boto3\_session: Optional[boto3.session.Session] = None*) → Any

Create a database in AWS Glue Catalog.

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- **catalog\_id**

Check out the [Global Configurations Tutorial](#) for details.

## Parameters

- **name** (*str*) – Database name.
- **description** (*str*, *optional*) – A Description for the Database.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **exist\_ok** (*bool*) – If set to True will not raise an Exception if a Database with the same already exists. In this case the description will be updated if it is different from the current one.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.catalog.create_database(
...     name='awswrangler_test'
... )
```

### awswrangler.catalog.create\_parquet\_table

`awswrangler.catalog.create_parquet_table`(*database: str, table: str, path: str, columns\_types: Dict[str, str], partitions\_types: Optional[Dict[str, str]] = None, bucketing\_info: Optional[Tuple[List[str], int]] = None, catalog\_id: Optional[str] = None, compression: Optional[str] = None, description: Optional[str] = None, parameters: Optional[Dict[str, str]] = None, columns\_comments: Optional[Dict[str, str]] = None, mode: str = 'overwrite', catalog\_versioning: bool = False, projection\_enabled: bool = False, projection\_types: Optional[Dict[str, str]] = None, projection\_ranges: Optional[Dict[str, str]] = None, projection\_values: Optional[Dict[str, str]] = None, projection\_intervals: Optional[Dict[str, str]] = None, projection\_digits: Optional[Dict[str, str]] = None, boto3\_session: Optional[boto3.session.Session] = None) → Any*

Create a Parquet Table (Metadata Only) in the AWS Glue Catalog.

[‘https://docs.aws.amazon.com/athena/latest/ug/data-types.html’](https://docs.aws.amazon.com/athena/latest/ug/data-types.html)

---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **path** (*str*) – Amazon S3 path (e.g. `s3://bucket/prefix/`).
- **columns\_types** (*Dict[str, str]*) – Dictionary with keys as column names and values as data types (e.g. `{‘col0’: ‘bigint’, ‘col1’: ‘double’}`).



- **partitions\_types** (*Dict[str, str], optional*) – Dictionary with keys as partition names and values as data types (e.g. {'col2': 'date'}).
- **bucketing\_info** (*Tuple[List[str], int], optional*) – Tuple consisting of the column names used for bucketing as the first element and the number of buckets as the second element. Only *str*, *int* and *bool* are supported as column data types for bucketing.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **compression** (*str, optional*) – Compression style (None, snappy, gzip, etc).
- **description** (*str, optional*) – Table description
- **parameters** (*Dict[str, str], optional*) – Key/value pairs to tag the table.
- **columns\_comments** (*Dict[str, str], optional*) – Columns names and the related comments (e.g. {'col0': 'Column 0.', 'col1': 'Column 1.', 'col2': 'Partition.'}).
- **mode** (*str*) – 'overwrite' to recreate any possible existing table or 'append' to keep any possible existing table.
- **catalog\_versioning** (*bool*) – If True and *mode="overwrite"*, creates an archived version of the table catalog before updating it.
- **projection\_enabled** (*bool*) – Enable Partition Projection on Athena (<https://docs.aws.amazon.com/athena/latest/ug/partition-projection.html>)
- **projection\_types** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections types. Valid types: "enum", "integer", "date", "injected" <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': 'enum', 'col2\_name': 'integer'})
- **projection\_ranges** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections ranges. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '0,10', 'col2\_name': '-1,8675309'})
- **projection\_values** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections values. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': 'A,B,Unknown', 'col2\_name': 'foo,boo,bar'})
- **projection\_intervals** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections intervals. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '1', 'col2\_name': '5'})
- **projection\_digits** (*Optional[Dict[str, str]]*) – Dictionary of partitions names and Athena projections digits. <https://docs.aws.amazon.com/athena/latest/ug/partition-projection-supported-types.html> (e.g. {'col\_name': '1', 'col2\_name': '2'})
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.catalog.create_parquet_table(
...     database='default',
...     table='my_table',
...     path='s3://bucket/prefix/',
...     columns_types={'col0': 'bigint', 'col1': 'double'},
...     partitions_types={'col2': 'date'},
...     compression='snappy',
...     description='My own table!',
...     parameters={'source': 'postgresql'},
...     columns_comments={'col0': 'Column 0.', 'col1': 'Column 1.', 'col2':
↪ 'Partition.'}
... )
```

## awswrangler.catalog.databases

`awswrangler.catalog.databases` (*limit: int = 100, catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Get a Pandas DataFrame with all listed databases.

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **limit** (*int, optional*) – Max number of tables to be returned.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Pandas DataFrame filled by formatted infos.

**Return type** pandas.DataFrame

## Examples

```
>>> import awswrangler as wr
>>> df_dbs = wr.catalog.databases()
```

**awswrangler.catalog.delete\_column**

`awswrangler.catalog.delete_column` (*database: str, table: str, column\_name: str, boto3\_session: Optional[boto3.session.Session] = None, catalog\_id: Optional[str] = None*) → Any

Delete a column in a AWS Glue Catalog table.

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

**Parameters**

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **column\_name** (*str*) – Column name
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.

**Returns** None

**Return type** None

**Examples**

```
>>> import awswrangler as wr
>>> wr.catalog.delete_column(
...     database='my_db',
...     table='my_table',
...     column_name='my_col',
... )
```

**awswrangler.catalog.delete\_database**

`awswrangler.catalog.delete_database` (*name: str, catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Create a database in AWS Glue Catalog.

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `catalog_id`

Check out the [Global Configurations Tutorial](#) for details.

**Parameters**

- **name** (*str*) – Database name.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

**Examples**

```
>>> import awswrangler as wr
>>> wr.catalog.delete_database(
...     name='awswrangler_test'
... )
```

**awswrangler.catalog.delete\_partitions**

`awswrangler.catalog.delete_partitions` (*table: str, database: str, partitions\_values: List[List[str]], catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Delete specified partitions in a AWS Glue Catalog table.

---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- catalog\_id
- database

Check out the [Global Configurations Tutorial](#) for details.

---

**Parameters**

- **table** (*str*) – Table name.
- **database** (*str*) – Table name.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **partitions\_values** (*List[List[str]]*) – List of lists of partitions values as strings. (e.g. [['2020', '10', '25'], ['2020', '11', '16'], ['2020', '12', '19']]).
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.catalog.delete_partitions(
...     table='my_table',
...     database='awswrangler_test',
...     partitions_values=[['2020', '10', '25'], ['2020', '11', '16'], ['2020',
↪ '12', '19']]
... )
```

## awswrangler.catalog.delete\_all\_partitions

`awswrangler.catalog.delete_all_partitions` (*table: str, database: str, catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Delete all partitions in a AWS Glue Catalog table.

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **table** (*str*) – Table name.
- **database** (*str*) – Table name.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Partitions values.

**Return type** List[List[str]]

## Examples

```
>>> import awswrangler as wr
>>> partitions = wr.catalog.delete_all_partitions(
...     table='my_table',
...     database='awswrangler_test',
... )
```

### `awswrangler.catalog.delete_table_if_exists`

`awswrangler.catalog.delete_table_if_exists` (*database: str, table: str, catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Delete Glue table if exists.

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

#### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive `None`.

**Returns** True if deleted, otherwise False.

**Return type** bool

#### Examples

```
>>> import awswrangler as wr
>>> wr.catalog.delete_table_if_exists(database='default', table='my_table') #_
↳deleted
True
>>> wr.catalog.delete_table_if_exists(database='default', table='my_table') #_
↳Nothing to be deleted
False
```

### `awswrangler.catalog.does_table_exist`

`awswrangler.catalog.does_table_exist` (*database: str, table: str, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Check if the table exists.

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

**Parameters**

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** True if exists, otherwise False.

**Return type** bool

**Examples**

```
>>> import awswrangler as wr
>>> wr.catalog.does_table_exist(database='default', table='my_table')
```

**awswrangler.catalog.drop\_duplicated\_columns**

`awswrangler.catalog.drop_duplicated_columns(df: pandas.core.frame.DataFrame) → pandas.core.frame.DataFrame`

Drop all repeated columns (duplicated names).

---

**Note:** This transformation will run *inplace* and will make changes in the original DataFrame.

---



---

**Note:** It is different from Panda's `drop_duplicates()` function which considers the column values. `wr.catalog.drop_duplicated_columns()` will deduplicate by column name.

---

**Parameters** **df** (*pandas.DataFrame*) – Original Pandas DataFrame.

**Returns** Pandas DataFrame without duplicated columns.

**Return type** pandas.DataFrame

**Examples**

```
>>> import awswrangler as wr
>>> df = pd.DataFrame({"A": [1, 2], "B": [3, 4]})
>>> df.columns = ["A", "A"]
>>> wr.catalog.drop_duplicated_columns(df=df)
   A
0  1
1  2
```

## awswrangler.catalog.extract\_athena\_types

`awswrangler.catalog.extract_athena_types` (*df*: `pandas.core.frame.DataFrame`, *index*: `bool` = `False`, *partition\_cols*: `Optional[List[str]]` = `None`, *dtype*: `Optional[Dict[str, str]]` = `None`, *file\_format*: `str` = `'parquet'`) → `Tuple[Dict[str, str], Dict[str, str]]`

Extract columns and partitions types (Amazon Athena) from Pandas DataFrame.

<https://docs.aws.amazon.com/athena/latest/ug/data-types.html>

### Parameters

- **df** (`pandas.DataFrame`) – Pandas DataFrame.
- **index** (`bool`) – Should consider the DataFrame index as a column?.
- **partition\_cols** (`List[str]`, *optional*) – List of partitions names.
- **dtype** (`Dict[str, str]`, *optional*) – Dictionary of columns names and Athena/Glue types to be casted. Useful when you have columns with undetermined or mixed data types. (e.g. {`'col name'`: `'bigint'`, `'col2 name'`: `'int'`})
- **file\_format** (`str`, *optional*) – File format to be considered to place the index column: `"parquet"` | `"csv"`.

**Returns** `columns_types`: Dictionary with keys as column names and values as data types (e.g. {`'col0'`: `'bigint'`, `'col1'`: `'double'`}). / `partitions_types`: Dictionary with keys as partition names and values as data types (e.g. {`'col2'`: `'date'`}).

**Return type** `Tuple[Dict[str, str], Dict[str, str]]`

### Examples

```
>>> import awswrangler as wr
>>> columns_types, partitions_types = wr.catalog.extract_athena_types(
...     df=df, index=False, partition_cols=["par0", "par1"], file_format="csv"
... )
```

## awswrangler.catalog.get\_columns\_comments

`awswrangler.catalog.get_columns_comments` (*database*: `str`, *table*: `str`, *catalog\_id*: `Optional[str]` = `None`, *boto3\_session*: `Optional[boto3.session.Session]` = `None`) → `Any`

Get all columns comments.

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters



- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Columns comments. e.g. {"coll": "foo boo bar"}.

**Return type** Dict[str, str]

## Examples

```
>>> import awswrangler as wr
>>> pars = wr.catalog.get_table_parameters(database="...", table="...")
```

## awswrangler.catalog.get\_csv\_partitions

`awswrangler.catalog.get_csv_partitions` (*database: str, table: str, expression: Optional[str] = None, catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Get all partitions from a Table in the AWS Glue Catalog.

Expression argument instructions: [https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/glue.html#Glue.Client.get\\_partitions](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/glue.html#Glue.Client.get_partitions)

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- catalog\_id
- database

Check out the [Global Configurations Tutorial](#) for details.

## Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **expression** (*str*, *optional*) – An expression that filters the partitions to be returned.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** partitions\_values: Dictionary with keys as S3 path locations and values as a list of partitions values as str (e.g. {'s3://bucket/prefix/y=2020/m=10/': ['2020', '10']}).

**Return type** Dict[str, List[str]]

## Examples

Fetch all partitions

```
>>> import awswrangler as wr
>>> wr.catalog.get_csv_partitions(
...     database='default',
...     table='my_table',
... )
{
  's3://bucket/prefix/y=2020/m=10/': ['2020', '10'],
  's3://bucket/prefix/y=2020/m=11/': ['2020', '11'],
  's3://bucket/prefix/y=2020/m=12/': ['2020', '12']
}
```

Filtering partitions

```
>>> import awswrangler as wr
>>> wr.catalog.get_csv_partitions(
...     database='default',
...     table='my_table',
...     expression='m=10'
... )
{
  's3://bucket/prefix/y=2020/m=10/': ['2020', '10']
}
```

## awswrangler.catalog.get\_databases

`awswrangler.catalog.get_databases` (*catalog\_id*: *Optional[str] = None*, *boto3\_session*: *Optional[boto3.session.Session] = None*) → *Iterator[Dict[str, Any]]*

Get an iterator of databases.

### Parameters

- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Iterator of Databases.

**Return type** *Iterator[Dict[str, Any]]*

## Examples

```
>>> import awswrangler as wr
>>> dbs = wr.catalog.get_databases()
```

## awswrangler.catalog.get\_parquet\_partitions

`awswrangler.catalog.get_parquet_partitions` (*database: str, table: str, expression: Optional[str] = None, catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Get all partitions from a Table in the AWS Glue Catalog.

Expression argument instructions: [https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/glue.html#Glue.Client.get\\_partitions](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/glue.html#Glue.Client.get_partitions)

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **expression** (*str, optional*) – An expression that filters the partitions to be returned.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** `partitions_values`: Dictionary with keys as S3 path locations and values as a list of partitions values as str (e.g. {'s3://bucket/prefix/y=2020/m=10/': ['2020', '10']}).

**Return type** Dict[str, List[str]]

### Examples

Fetch all partitions

```
>>> import awswrangler as wr
>>> wr.catalog.get_parquet_partitions(
...     database='default',
...     table='my_table',
... )
{
  's3://bucket/prefix/y=2020/m=10/': ['2020', '10'],
  's3://bucket/prefix/y=2020/m=11/': ['2020', '11'],
  's3://bucket/prefix/y=2020/m=12/': ['2020', '12']
}
```

Filtering partitions

```
>>> import awswrangler as wr
>>> wr.catalog.get_parquet_partitions(
...     database='default',
...     table='my_table',
...     expression='m=10'
... )
{
  's3://bucket/prefix/y=2020/m=10/': ['2020', '10']
}
```

## awswrangler.catalog.get\_partitions

`awswrangler.catalog.get_partitions(database: str, table: str, expression: Optional[str] = None, catalog_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → Any`

Get all partitions from a Table in the AWS Glue Catalog.

Expression argument instructions: [https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/glue.html#Glue.Client.get\\_partitions](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/glue.html#Glue.Client.get_partitions)

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **expression** (*str, optional*) – An expression that filters the partitions to be returned.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** `partitions_values`: Dictionary with keys as S3 path locations and values as a list of partitions values as str (e.g. `{'s3://bucket/prefix/y=2020/m=10/': ['2020', '10']}`).

**Return type** Dict[str, List[str]]

## Examples

Fetch all partitions

```
>>> import awswrangler as wr
>>> wr.catalog.get_partitions(
...     database='default',
...     table='my_table',
... )
{
  's3://bucket/prefix/y=2020/m=10/': ['2020', '10'],
  's3://bucket/prefix/y=2020/m=11/': ['2020', '11'],
  's3://bucket/prefix/y=2020/m=12/': ['2020', '12']
}
```

Filtering partitions

```
>>> import awswrangler as wr
>>> wr.catalog.get_partitions(
...     database='default',
...     table='my_table',
...     expression='m=10'
... )
{
  's3://bucket/prefix/y=2020/m=10/': ['2020', '10']
}
```

### awswrangler.catalog.get\_table\_description

`awswrangler.catalog.get_table_description(database: str, table: str, catalog_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → Optional[str]`

Get table description.

#### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Description if exists.

**Return type** Optional[str]

## Examples

```
>>> import awswrangler as wr
>>> desc = wr.catalog.get_table_description(database="...", table="...")
```

## awswrangler.catalog.get\_table\_location

`awswrangler.catalog.get_table_location(database: str, table: str, boto3_session: Optional[boto3.session.Session] = None) → Any`

Get table's location on Glue catalog.

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive `None`.

**Returns** Table's location.

**Return type** `str`

## Examples

```
>>> import awswrangler as wr
>>> wr.catalog.get_table_location(database='default', table='my_table')
's3://bucket/prefix/'
```

## awswrangler.catalog.get\_table\_number\_of\_versions

`awswrangler.catalog.get_table_number_of_versions(database: str, table: str, catalog_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → Any`

Get total number of versions.

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

**Parameters**

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Total number of versions.

**Return type** int

**Examples**

```
>>> import awswrangler as wr
>>> num = wr.catalog.get_table_number_of_versions(database="...", table="...")
```

**awswrangler.catalog.get\_table\_parameters**

```
awswrangler.catalog.get_table_parameters(database: str, table: str, catalog_id: Op-
                                         tional[str] = None, boto3_session: Op-
                                         tional[boto3.session.Session] = None) →
                                         Dict[str, str]
```

Get all parameters.

**Parameters**

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dictionary of parameters.

**Return type** Dict[str, str]

**Examples**

```
>>> import awswrangler as wr
>>> pars = wr.catalog.get_table_parameters(database="...", table="...")
```

### aws wrangler.catalog.get\_table\_types

`aws wrangler.catalog.get_table_types` (*database: str, table: str, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Get all columns and types from a table.

---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

#### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive `None`.

**Returns** If table exists, a dictionary like { 'col name': 'col data type' }. Otherwise `None`.

**Return type** `Optional[Dict[str, str]]`

#### Examples

```
>>> import aws wrangler as wr
>>> wr.catalog.get_table_types(database='default', table='my_table')
{'col0': 'int', 'col1': double}
```

### aws wrangler.catalog.get\_table\_versions

`aws wrangler.catalog.get_table_versions` (*database: str, table: str, catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Get all versions.

---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

#### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.



- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** List of table inputs: [https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/glue.html#Glue.Client.get\\_table\\_versions](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/glue.html#Glue.Client.get_table_versions)

**Return type** List[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> tables_versions = wr.catalog.get_table_versions(database="...", table="...")
```

## awswrangler.catalog.get\_tables

```
awswrangler.catalog.get_tables(catalog_id: Optional[str] = None, database: Optional[str]
                               = None, name_contains: Optional[str] = None, name_prefix:
                               Optional[str] = None, name_suffix: Optional[str] = None,
                               boto3_session: Optional[boto3.session.Session] = None) →
                               Any
```

Get an iterator of tables.

**Note:** Please, does not filter using name\_contains and name\_prefix/name\_suffix at the same time. Only name\_prefix and name\_suffix can be combined together.

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- catalog\_id
- database

Check out the [Global Configurations Tutorial](#) for details.

## Parameters

- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **database** (*str*, *optional*) – Database name.
- **name\_contains** (*str*, *optional*) – Select by a specific string on table name
- **name\_prefix** (*str*, *optional*) – Select by a specific prefix on table name
- **name\_suffix** (*str*, *optional*) – Select by a specific suffix on table name
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Iterator of tables.

**Return type** Iterator[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> tables = wr.catalog.get_tables()
```

### awswrangler.catalog.overwrite\_table\_parameters

`awswrangler.catalog.overwrite_table_parameters` (*parameters: Dict[str, str], database: str, table: str, catalog\_versioning: bool = False, catalog\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Any

Overwrite all existing parameters.

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

#### Parameters

- **parameters** (*Dict[str, str]*) – e.g. {"source": "mysql", "destination": "datalake"}
- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_versioning** (*bool*) – If True and `mode="overwrite"`, creates an archived version of the table catalog before updating it.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** All parameters after the overwrite (The same received).

**Return type** Dict[str, str]

## Examples

```
>>> import awswrangler as wr
>>> pars = wr.catalog.overwrite_table_parameters(
...     parameters={"source": "mysql", "destination": "datalake"},
...     database="...",
...     table="...")
```

**awswrangler.catalog.sanitize\_column\_name**

`awswrangler.catalog.sanitize_column_name(column: str) → str`

Convert the column name to be compatible with Amazon Athena.

<https://docs.aws.amazon.com/athena/latest/ug/tables-databases-columns-names.html>

Possible transformations: - Strip accents - Remove non alphanumeric characters - Convert CamelCase to snake\_case

**Parameters** `column` (*str*) – Column name.

**Returns** Normalized column name.

**Return type** `str`

**Examples**

```
>>> import awswrangler as wr
>>> wr.catalog.sanitize_column_name('MyNewColumn')
'my_new_column'
```

**awswrangler.catalog.sanitize\_dataframe\_columns\_names**

`awswrangler.catalog.sanitize_dataframe_columns_names(df: pandas.core.frame.DataFrame) → pandas.core.frame.DataFrame`

Normalize all columns names to be compatible with Amazon Athena.

<https://docs.aws.amazon.com/athena/latest/ug/tables-databases-columns-names.html>

Possible transformations: - Strip accents - Remove non alphanumeric characters - Convert CamelCase to snake\_case

---

**Note:** After transformation, some column names might not be unique anymore. Example: the columns ["A", "a"] will be sanitized to ["a", "a"]

---

**Parameters** `df` (*pandas.DataFrame*) – Original Pandas DataFrame.

**Returns** Original Pandas DataFrame with columns names normalized.

**Return type** `pandas.DataFrame`

**Examples**

```
>>> import awswrangler as wr
>>> df_normalized = wr.catalog.sanitize_dataframe_columns_names(df=pd.DataFrame({
↳ 'A': [1, 2]}))
```

### `awswrangler.catalog.sanitize_table_name`

`awswrangler.catalog.sanitize_table_name(table: str) → str`

Convert the table name to be compatible with Amazon Athena.

<https://docs.aws.amazon.com/athena/latest/ug/tables-databases-columns-names.html>

Possible transformations: - Strip accents - Remove non alphanumeric characters - Convert CamelCase to snake\_case

**Parameters** `table` (*str*) – Table name.

**Returns** Normalized table name.

**Return type** `str`

#### Examples

```
>>> import awswrangler as wr
>>> wr.catalog.sanitize_table_name('MyNewTable')
'my_new_table'
```

### `awswrangler.catalog.search_tables`

`awswrangler.catalog.search_tables(text: str, catalog_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → Iterator[Dict[str, Any]]`

Get Pandas DataFrame of tables filtered by a search string.

#### Parameters

- **text** (*str*, *optional*) – Select only tables with the given string in table's properties.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Iterator of tables.

**Return type** `Iterator[Dict[str, Any]]`

#### Examples

```
>>> import awswrangler as wr
>>> df_tables = wr.catalog.search_tables(text='my_property')
```

### awswrangler.catalog.table

`awswrangler.catalog.table(database: str, table: str, catalog_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → Any`

Get table details as Pandas DataFrame.

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

#### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Pandas DataFrame filled by formatted infos.

**Return type** `pandas.DataFrame`

#### Examples

```
>>> import awswrangler as wr
>>> df_table = wr.catalog.table(database='default', table='my_table')
```

### awswrangler.catalog.tables

`awswrangler.catalog.tables(limit: int = 100, catalog_id: Optional[str] = None, database: Optional[str] = None, search_text: Optional[str] = None, name_contains: Optional[str] = None, name_prefix: Optional[str] = None, name_suffix: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → Any`

Get a DataFrame with tables filtered by a search term, prefix, suffix.

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

#### Parameters

- **limit** (*int*, *optional*) – Max number of tables to be returned.
- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **database** (*str*, *optional*) – Database name.
- **search\_text** (*str*, *optional*) – Select only tables with the given string in table's properties.
- **name\_contains** (*str*, *optional*) – Select by a specific string on table name
- **name\_prefix** (*str*, *optional*) – Select by a specific prefix on table name
- **name\_suffix** (*str*, *optional*) – Select by a specific suffix on table name
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Pandas Dataframe filled by formatted infos.

**Return type** pandas.DataFrame

### Examples

```
>>> import awswrangler as wr
>>> df_tables = wr.catalog.tables()
```

### awswrangler.catalog.upsert\_table\_parameters

`awswrangler.catalog.upsert_table_parameters` (*parameters: Dict[str, str]*, *database: str*, *table: str*, *catalog\_versioning: bool = False*, *catalog\_id: Optional[str] = None*, *boto3\_session: Optional[boto3.session.Session] = None*) → Any

Insert or Update the received parameters.

---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `catalog_id`
- `database`

Check out the [Global Configurations Tutorial](#) for details.

---

#### Parameters

- **parameters** (*Dict[str, str]*) – e.g. {"source": "mysql", "destination": "data-lake"}
- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **catalog\_versioning** (*bool*) – If True and *mode="overwrite"*, creates an archived version of the table catalog before updating it.

- **catalog\_id** (*str*, *optional*) – The ID of the Data Catalog from which to retrieve Databases. If none is provided, the AWS account ID is used by default.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** All parameters after the upsert.

**Return type** Dict[str, str]

### Examples

```
>>> import awswrangler as wr
>>> pars = wr.catalog.upsert_table_parameters(
...     parameters={"source": "mysql", "destination": "datalake"},
...     database="...",
...     table="...")
```

## 1.4.3 Amazon Athena

<code>create_athena_bucket([boto3_session])</code>	Create the default Athena bucket if it doesn't exist.
<code>get_query_columns_types(query_execution_id)</code>	Get the data type of all columns queried.
<code>get_query_execution(query_execution_id[, ...])</code>	Fetch query execution details.
<code>get_work_group(workgroup[, boto3_session])</code>	Return information about the workgroup with the specified name.
<code>read_sql_query(sql, database[, ...])</code>	Execute any SQL query on AWS Athena and return the results as a Pandas DataFrame.
<code>read_sql_table(table, database[, ...])</code>	Extract the full table AWS Athena and return the results as a Pandas DataFrame.
<code>repair_table(table[, database, s3_output, ...])</code>	Run the Hive's metastore consistency check: 'MSCK REPAIR TABLE table;'. MSCK REPAIR TABLE table;
<code>start_query_execution(sql[, database, ...])</code>	Start a SQL Query against AWS Athena.
<code>stop_query_execution(query_execution_id[, ...])</code>	Stop a query execution.
<code>wait_query(query_execution_id[, boto3_session])</code>	Wait for the query end.

### awswrangler.athena.create\_athena\_bucket

`awswrangler.athena.create_athena_bucket` (*boto3\_session: Optional[boto3.session.Session] = None*) → str

Create the default Athena bucket if it doesn't exist.

**Parameters** **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Bucket s3 path (E.g. s3://aws-athena-query-results-ACCOUNT-REGION/)

**Return type** str

## Examples

```
>>> import awswrangler as wr
>>> wr.athena.create_athena_bucket()
's3://aws-athena-query-results-ACCOUNT-REGION/'
```

### awswrangler.athena.get\_query\_columns\_types

`awswrangler.athena.get_query_columns_types(query_execution_id: str, boto3_session: Optional[boto3.session.Session] = None) → Dict[str, str]`

Get the data type of all columns queried.

<https://docs.aws.amazon.com/athena/latest/ug/data-types.html>

#### Parameters

- **query\_execution\_id** (*str*) – Athena query execution ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dictionary with all data types.

**Return type** Dict[str, str]

## Examples

```
>>> import awswrangler as wr
>>> wr.athena.get_query_columns_types('query-execution-id')
{'col0': 'int', 'col1': 'double'}
```

### awswrangler.athena.get\_query\_execution

`awswrangler.athena.get_query_execution(query_execution_id: str, boto3_session: Optional[boto3.session.Session] = None) → Dict[str, Any]`

Fetch query execution details.

[https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/athena.html#Athena.Client.get\\_query\\_execution](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/athena.html#Athena.Client.get_query_execution)

#### Parameters

- **query\_execution\_id** (*str*) – Athena query execution ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dictionary with the get\_query\_execution response.

**Return type** Dict[str, Any]



## Examples

```
>>> import awswrangler as wr
>>> res = wr.athena.get_query_execution(query_execution_id='query-execution-id')
```

## awswrangler.athena.get\_work\_group

`awswrangler.athena.get_work_group` (*workgroup*: *str*, *boto3\_session*: *Optional[boto3.session.Session] = None*) → Dict[str, Any]

Return information about the workgroup with the specified name.

### Parameters

- **workgroup** (*str*) – Work Group name.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** [https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/athena.html#Athena.Client.get\\_work\\_group](https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/athena.html#Athena.Client.get_work_group)

**Return type** Dict[str, Any]

## Examples

```
>>> import awswrangler as wr
>>> res = wr.athena.get_work_group(workgroup='workgroup_name')
```

## awswrangler.athena.read\_sql\_query

`awswrangler.athena.read_sql_query` (*sql*: *str*, *database*: *str*, *ctas\_approach*: *bool = True*, *categories*: *Optional[List[str]] = None*, *chunksize*: *Optional[Union[int, bool]] = None*, *s3\_output*: *Optional[str] = None*, *workgroup*: *Optional[str] = None*, *encryption*: *Optional[str] = None*, *kms\_key*: *Optional[str] = None*, *keep\_files*: *bool = True*, *ctas\_database\_name*: *Optional[str] = None*, *ctas\_temp\_table\_name*: *Optional[str] = None*, *use\_threads*: *bool = True*, *boto3\_session*: *Optional[boto3.session.Session] = None*, *max\_cache\_seconds*: *int = 0*, *max\_cache\_query\_inspections*: *int = 50*, *max\_remote\_cache\_entries*: *int = 50*, *max\_local\_cache\_entries*: *int = 100*, *data\_source*: *Optional[str] = None*, *params*: *Optional[Dict[str, Any]] = None*, *s3\_additional\_kwargs*: *Optional[Dict[str, Any]] = None*) → Any

Execute any SQL query on AWS Athena and return the results as a Pandas DataFrame.

### Related tutorial:

- [Amazon Athena](#)
- [Athena Cache](#)
- [Global Configurations](#)

**There are two approaches to be defined through `ctas_approach` parameter:**

**1** - `ctas_approach=True` (Default):

Wrap the query with a CTAS and then reads the table data as parquet directly from s3.

PROS:

- Faster for mid and big result sizes.
- Can handle some level of nested types.

CONS:

- Requires create/delete table permissions on Glue.
- Does not support timestamp with time zone
- Does not support columns with repeated names.
- Does not support columns with undefined data types.
- A temporary table will be created and then deleted immediately.
- Does not support custom `data_source/catalog_id`.

**2** - `ctas_approach=False`:

Does a regular query on Athena and parse the regular CSV result on s3.

PROS:

- Faster for small result sizes (less latency).
- Does not require create/delete table permissions on Glue
- Supports timestamp with time zone.
- Support custom `data_source/catalog_id`.

CONS:

- Slower for big results (But stills faster than other libraries that uses the regular Athena's API)
- Does not handle nested types at all.

---

**Note:** The resulting DataFrame (or every DataFrame in the returned Iterator for chunked queries) have a `query_metadata` attribute, which brings the query result metadata returned by [Boto3/Athena](#) .

For a practical example check out the [related tutorial](#)!

---

---

**Note:** Valid encryption modes: [None, 'SSE\_S3', 'SSE\_KMS'].

*P.S. 'CSE\_KMS' is not supported.*

---

---

**Note:** Create the default Athena bucket if it doesn't exist and `s3_output` is None.

(E.g. `s3://aws-athena-query-results-ACCOUNT-REGION/`)

---

---

**Note:** `chunksize` argument (Memory Friendly) (i.e batching):

Return an Iterable of DataFrames instead of a regular DataFrame.

---

There are two batching strategies:

- If **chunksize=True**, a new DataFrame will be returned for each file in the query result.
- If **chunksize=INTEGER**, Wrangler will iterate on the data by number of rows equal the received INTEGER.

*P.S. chunksize=True* is faster and uses less memory while *chunksize=INTEGER* is more precise in number of rows for each DataFrame.

*P.P.S. If ctas\_approach=False* and *chunksize=True*, you will always receive an iterator with a single DataFrame because regular Athena queries only produces a single output file.

---

**Note:** In case of *use\_threads=True* the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---



---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `ctas_approach`
- `database`
- `max_cache_query_inspection`
- `max_cache_seconds`
- `max_remote_cache_entries`
- `max_local_cache_entries`
- `workgroup`
- `chunksize`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **sql** (*str*) – SQL query.
- **database** (*str*) – AWS Glue/Athena database name - It is only the origin database from where the query will be launched. You can still using and mixing several databases writing the full table name within the sql (e.g. *database.table*).
- **ctas\_approach** (*bool*) – Wraps the query using a CTAS, and read the resulted parquet data on S3. If false, read the regular CSV on S3.
- **categories** (*List[str], optional*) – List of columns names that should be returned as `pandas.Categorical`. Recommended for memory restricted environments.
- **chunksize** (*Union[int, bool], optional*) – If passed will split the data in a Iterable of DataFrames (Memory friendly). If *True* wrangler will iterate on the data by files in the most efficient way without guarantee of chunksize. If an *INTEGER* is passed Wrangler will iterate on the data by number of rows equal the received INTEGER.
- **s3\_output** (*str, optional*) – Amazon S3 path.
- **workgroup** (*str, optional*) – Athena workgroup.

- **encryption** (*str*, *optional*) – Valid values: [None, 'SSE\_S3', 'SSE\_KMS']. Notice: 'CSE\_KMS' is not supported.
- **kms\_key** (*str*, *optional*) – For SSE-KMS, this is the KMS key ARN or ID.
- **keep\_files** (*bool*) – Should Wrangler delete or keep the staging files produced by Athena?
- **ctas\_database\_name** (*str*, *optional*) – The name of the alternative database where the CTAS temporary table is stored. If None, the default *database* is used.
- **ctas\_temp\_table\_name** (*str*, *optional*) – The name of the temporary table and also the directory name on S3 where the CTAS result is stored. If None, it will use the follow random pattern: *f"temp\_table\_{uuid.uuid4().hex()}"*. On S3 this directory will be under under the pattern: *f"{s3\_output}/{ctas\_temp\_table\_name}/"*.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled *os.cpu\_count()* will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if *boto3\_session* receive None.
- **max\_cache\_seconds** (*int*) – Wrangler can look up in Athena's history if this query has been run before. If so, and its completion time is less than *max\_cache\_seconds* before now, wrangler skips query execution and just returns the same results as last time. If cached results are valid, wrangler ignores the *ctas\_approach*, *s3\_output*, *encryption*, *kms\_key*, *keep\_files* and *ctas\_temp\_table\_name* params. If reading cached data fails for any reason, execution falls back to the usual query run path.
- **max\_cache\_query\_inspections** (*int*) – Max number of queries that will be inspected from the history to try to find some result to reuse. The bigger the number of inspection, the bigger will be the latency for not cached queries. Only takes effect if *max\_cache\_seconds* > 0.
- **max\_remote\_cache\_entries** (*int*) – Max number of queries that will be retrieved from AWS for cache inspection. The bigger the number of inspection, the bigger will be the latency for not cached queries. Only takes effect if *max\_cache\_seconds* > 0 and default value is 50.
- **max\_local\_cache\_entries** (*int*) – Max number of queries for which metadata will be cached locally. This will reduce the latency and also enables keeping more than *max\_remote\_cache\_entries* available for the cache. This value should not be smaller than *max\_remote\_cache\_entries*. Only takes effect if *max\_cache\_seconds* > 0 and default value is 100.
- **data\_source** (*str*, *optional*) – Data Source / Catalog name. If None, 'AwsDataCatalog' will be used by default.
- **params** (*Dict[str, any]*, *optional*) – Dict of parameters that will be used for constructing the SQL query. Only named parameters are supported. The dict needs to contain the information in the form {'name': 'value'} and the SQL query needs to contain *:name;*. Note that for varchar columns and similar, you must surround the value in single quotes.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to boto-core requests. Valid parameters: "RequestPayer", "ExpectedBucketOwner". e.g. *s3\_additional\_kwargs={'RequestPayer': 'requester'}*

**Returns** Pandas DataFrame or Generator of Pandas DataFrames if chunksize is passed.

**Return type** Union[pd.DataFrame, Iterator[pd.DataFrame]]

## Examples

```
>>> import awswrangler as wr
>>> df = wr.athena.read_sql_query(sql="...", database="...")
>>> scanned_bytes = df.query_metadata["Statistics"]["DataScannedInBytes"]
```

```
>>> import awswrangler as wr
>>> df = wr.athena.read_sql_query(
...     sql="SELECT * FROM my_table WHERE name=:name; AND city=:city;",
...     params={"name": "'filtered_name'", "city": "'filtered_city'"}
... )
```

### awswrangler.athena.read\_sql\_table

`awswrangler.athena.read_sql_table`(*table: str, database: str, ctas\_approach: bool = True, categories: Optional[List[str]] = None, chunksize: Optional[Union[int, bool]] = None, s3\_output: Optional[str] = None, workgroup: Optional[str] = None, encryption: Optional[str] = None, kms\_key: Optional[str] = None, keep\_files: bool = True, ctas\_database\_name: Optional[str] = None, ctas\_temp\_table\_name: Optional[str] = None, use\_threads: bool = True, boto3\_session: Optional[boto3.session.Session] = None, max\_cache\_seconds: int = 0, max\_cache\_query\_inspections: int = 50, max\_remote\_cache\_entries: int = 50, max\_local\_cache\_entries: int = 100, data\_source: Optional[str] = None, s3\_additional\_kwargs: Optional[Dict[str, Any]] = None*) → Any

Extract the full table AWS Athena and return the results as a Pandas DataFrame.

#### Related tutorial:

- [Amazon Athena](#)
- [Athena Cache](#)
- [Global Configurations](#)

**There are two approaches to be defined through `ctas_approach` parameter:**

**1 - `ctas_approach=True` (Default):**

Wrap the query with a CTAS and then reads the table data as parquet directly from s3.

**PROS:**

- Faster for mid and big result sizes.
- Can handle some level of nested types.

**CONS:**

- Requires create/delete table permissions on Glue.
- Does not support timestamp with time zone
- Does not support columns with repeated names.
- Does not support columns with undefined data types.
- A temporary table will be created and then deleted immediately.

**2** - `ctas_approach=False`:

Does a regular query on Athena and parse the regular CSV result on s3.

PROS:

- Faster for small result sizes (less latency).
- Does not require create/delete table permissions on Glue
- Supports timestamp with time zone.

CONS:

- Slower for big results (But stills faster than other libraries that uses the regular Athena's API)
- Does not handle nested types at all.

---

**Note:** The resulting DataFrame (or every DataFrame in the returned Iterator for chunked queries) have a `query_metadata` attribute, which brings the query result metadata returned by [Boto3/Athena](#) .

For a practical example check out the [related tutorial](#)!

---

---

**Note:** Valid encryption modes: [None, 'SSE\_S3', 'SSE\_KMS'].

*P.S. 'CSE\_KMS' is not supported.*

---

---

**Note:** Create the default Athena bucket if it doesn't exist and `s3_output` is None.

(E.g. `s3://aws-athena-query-results-ACCOUNT-REGION/`)

---

---

**Note:** `chunksize` argument (Memory Friendly) (i.e batching):

Return an Iterable of DataFrames instead of a regular DataFrame.

There are two batching strategies:

- If **`chunksize=True`**, a new DataFrame will be returned for each file in the query result.
- If **`chunksize=INTEGER`**, Wrangler will iterate on the data by number of rows igual the received INTEGER.

*P.S. `chunksize=True` is faster and uses less memory while `chunksize=INTEGER` is more precise in number of rows for each Dataframe.*

*P.P.S. If `ctas_approach=False` and `chunksize=True`, you will always receive an interador with a single DataFrame because regular Athena queries only produces a single output file.*

---

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `ctas_approach`

- database
- max\_cache\_query\_inspections
- max\_cache\_seconds
- max\_remote\_cache\_entries
- max\_local\_cache\_entries
- workgroup
- chunksize

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **table** (*str*) – Table name.
- **database** (*str*) – AWS Glue/Athena database name.
- **ctas\_approach** (*bool*) – Wraps the query using a CTAS, and read the resulted parquet data on S3. If false, read the regular CSV on S3.
- **categories** (*List[str], optional*) – List of columns names that should be returned as pandas.Categorical. Recommended for memory restricted environments.
- **chunksize** (*Union[int, bool], optional*) – If passed will split the data in a Iterable of DataFrames (Memory friendly). If *True* wrangler will iterate on the data by files in the most efficient way without guarantee of chunksize. If an *INTEGER* is passed Wrangler will iterate on the data by number of rows igual the received INTEGER.
- **s3\_output** (*str, optional*) – AWS S3 path.
- **workgroup** (*str, optional*) – Athena workgroup.
- **encryption** (*str, optional*) – Valid values: [None, 'SSE\_S3', 'SSE\_KMS']. Notice: 'CSE\_KMS' is not supported.
- **kms\_key** (*str, optional*) – For SSE-KMS, this is the KMS key ARN or ID.
- **keep\_files** (*bool*) – Should Wrangler delete or keep the staging files produced by Athena?
- **ctas\_database\_name** (*str, optional*) – The name of the alternative database where the CTAS temporary table is stored. If None, the default *database* is used.
- **ctas\_temp\_table\_name** (*str, optional*) – The name of the temporary table and also the directory name on S3 where the CTAS result is stored. If None, it will use the follow random pattern: *f"temp\_table\_{uuid.uuid4().hex}"*. On S3 this directory will be under under the pattern: *f"{s3\_output}/{ctas\_temp\_table\_name}/"*.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled *os.cpu\_count()* will be used as the max number of threads.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if *boto3\_session* receive None.
- **max\_cache\_seconds** (*int*) – Wrangler can look up in Athena's history if this table has been read before. If so, and its completion time is less than *max\_cache\_seconds* before now, wrangler skips query execution and just returns the same results as last time. If cached results are valid, wrangler ignores the *ctas\_approach*, *s3\_output*, *encryption*,

*kms\_key*, *keep\_files* and *ctas\_temp\_table\_name* params. If reading cached data fails for any reason, execution falls back to the usual query run path.

- **max\_cache\_query\_inspections** (*int*) – Max number of queries that will be inspected from the history to try to find some result to reuse. The bigger the number of inspection, the bigger will be the latency for not cached queries. Only takes effect if *max\_cache\_seconds* > 0.
- **max\_remote\_cache\_entries** (*int*) – Max number of queries that will be retrieved from AWS for cache inspection. The bigger the number of inspection, the bigger will be the latency for not cached queries. Only takes effect if *max\_cache\_seconds* > 0 and default value is 50.
- **max\_local\_cache\_entries** (*int*) – Max number of queries for which metadata will be cached locally. This will reduce the latency and also enables keeping more than *max\_remote\_cache\_entries* available for the cache. This value should not be smaller than *max\_remote\_cache\_entries*. Only takes effect if *max\_cache\_seconds* > 0 and default value is 100.
- **data\_source** (*str*, *optional*) – Data Source / Catalog name. If None, 'AwsDataCatalog' will be used by default.
- **s3\_additional\_kwargs** (*Optional[Dict[str, Any]]*) – Forward to boto-core requests. Valid parameters: "RequestPayer", "ExpectedBucketOwner". e.g. *s3\_additional\_kwargs*={'RequestPayer': 'requester'}

**Returns** Pandas DataFrame or Generator of Pandas DataFrames if chunksize is passed.

**Return type** Union[pd.DataFrame, Iterator[pd.DataFrame]]

## Examples

```
>>> import awswrangler as wr
>>> df = wr.athena.read_sql_table(table="...", database="...")
>>> scanned_bytes = df.query_metadata["Statistics"]["DataScannedInBytes"]
```

## awswrangler.athena.repair\_table

*awswrangler.athena.repair\_table* (*table: str*, *database: Optional[str] = None*, *s3\_output: Optional[str] = None*, *workgroup: Optional[str] = None*, *encryption: Optional[str] = None*, *kms\_key: Optional[str] = None*, *boto3\_session: Optional[boto3.session.Session] = None*) → Any

Run the Hive's metastore consistency check: 'MSCK REPAIR TABLE table;'.

Recovers partitions and data associated with partitions. Use this statement when you add partitions to the catalog. It is possible it will take some time to add all partitions. If this operation times out, it will be in an incomplete state where only a few partitions are added to the catalog.

---

**Note:** Create the default Athena bucket if it doesn't exist and *s3\_output* is None. (E.g. *s3://aws-athena-query-results-ACCOUNT-REGION/*)

---



---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

---



- database
- workgroup

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **table** (*str*) – Table name.
- **database** (*str*, *optional*) – AWS Glue/Athena database name.
- **s3\_output** (*str*, *optional*) – AWS S3 path.
- **workgroup** (*str*, *optional*) – Athena workgroup.
- **encryption** (*str*, *optional*) – None, 'SSE\_S3', 'SSE\_KMS', 'CSE\_KMS'.
- **kms\_key** (*str*, *optional*) – For SSE-KMS and CSE-KMS, this is the KMS key ARN or ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Query final state ('SUCCEEDED', 'FAILED', 'CANCELLED').

**Return type** str

### Examples

```
>>> import awswrangler as wr
>>> query_final_state = wr.athena.repair_table(table='...', database='...')
```

### awswrangler.athena.start\_query\_execution

```
awswrangler.athena.start_query_execution(sql: str, database: Optional[str] = None,
                                         s3_output: Optional[str] = None, workgroup:
                                         Optional[str] = None, encryption: Optional[str]
                                         = None, kms_key: Optional[str] = None,
                                         boto3_session: Optional[boto3.session.Session]
                                         = None, data_source: Optional[str] = None) →
                                         Any
```

Start a SQL Query against AWS Athena.

**Note:** Create the default Athena bucket if it doesn't exist and s3\_output is None. (E.g. s3://aws-athena-query-results-ACCOUNT-REGION/)

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- database
- workgroup

Check out the [Global Configurations Tutorial](#) for details.

**Parameters**

- **sql** (*str*) – SQL query.
- **database** (*str*, *optional*) – AWS Glue/Athena database name.
- **s3\_output** (*str*, *optional*) – AWS S3 path.
- **workgroup** (*str*, *optional*) – Athena workgroup.
- **encryption** (*str*, *optional*) – None, 'SSE\_S3', 'SSE\_KMS', 'CSE\_KMS'.
- **kms\_key** (*str*, *optional*) – For SSE-KMS and CSE-KMS, this is the KMS key ARN or ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **data\_source** (*str*, *optional*) – Data Source / Catalog name. If None, 'AwsDataCatalog' will be used by default.

**Returns** Query execution ID

**Return type** str

**Examples**

Querying into the default data source (Amazon s3 - 'AwsDataCatalog')

```
>>> import awswrangler as wr
>>> query_exec_id = wr.athena.start_query_execution(sql='...', database='...')
```

Querying into another data source (PostgreSQL, Redshift, etc)

```
>>> import awswrangler as wr
>>> query_exec_id = wr.athena.start_query_execution(sql='...', database='...',
↳data_source='...')
```

**awswrangler.athena.stop\_query\_execution**

**awswrangler.athena.stop\_query\_execution** (*query\_execution\_id*: str, *boto3\_session*: *Optional[boto3.session.Session]* = None) → None

Stop a query execution.

Requires you to have access to the workgroup in which the query ran.

**Parameters**

- **query\_execution\_id** (*str*) – Athena query execution ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.athena.stop_query_execution(query_execution_id='query-execution-id')
```

### awswrangler.athena.wait\_query

`awswrangler.athena.wait_query(query_execution_id: str, boto3_session: Optional[boto3.session.Session] = None) → Dict[str, Any]`

Wait for the query end.

#### Parameters

- **query\_execution\_id** (*str*) – Athena query execution ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dictionary with the get\_query\_execution response.

**Return type** Dict[str, Any]

## Examples

```
>>> import awswrangler as wr
>>> res = wr.athena.wait_query(query_execution_id='query-execution-id')
```

## 1.4.4 Amazon Redshift

<code>connect([connection, secret_id, catalog_id, ...])</code>	Return a redshift_connector connection from a Glue Catalog or Secret Manager.
<code>connect_temp(cluster_identifier, user[, ...])</code>	Return a redshift_connector temporary connection (No password required).
<code>copy(df, path, con, table, schema[, ...])</code>	Load Pandas DataFrame as a Table on Amazon Redshift using parquet files on S3 as stage.
<code>copy_from_files(path, con, table, schema[, ...])</code>	Load Parquet files from S3 to a Table on Amazon Redshift (Through COPY command).
<code>read_sql_query(sql, con[, index_col, ...])</code>	Return a DataFrame corresponding to the result set of the query string.
<code>read_sql_table(table, con[, schema, ...])</code>	Return a DataFrame corresponding the table.
<code>to_sql(df, con, table, schema[, mode, ...])</code>	Write records stored in a DataFrame into Redshift.
<code>unload(sql, path, con[, iam_role, ...])</code>	Load Pandas DataFrame from a Amazon Redshift query result using Parquet files on s3 as stage.
<code>unload_to_files(sql, path, con[, iam_role, ...])</code>	Unload Parquet files on s3 from a Redshift query result (Through the UNLOAD command).

**awswrangler.redshift.connect**

```
awswrangler.redshift.connect(connection: Optional[str] = None, secret_id: Optional[str]
                             = None, catalog_id: Optional[str] = None, dbname: Op-
                             tional[str] = None, boto3_session: Optional[boto3.session.Session]
                             = None, ssl: bool = True, timeout: Optional[int] = None,
                             max_prepared_statements: int = 1000, tcp_keepalive: bool = True)
                             → redshift_connector.core.Connection
```

Return a redshift\_connector connection from a Glue Catalog or Secret Manager.

---

**Note:** You MUST pass a *connection* OR *secret\_id*

---

<https://github.com/aws/amazon-redshift-python-driver>

**Parameters**

- **connection** (*Optional[str]*) – Glue Catalog Connection name.
- **secret\_id** (*Optional[str]*: ) – Specifies the secret containing the version that you want to retrieve. You can specify either the Amazon Resource Name (ARN) or the friendly name of the secret.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog. If none is provided, the AWS account ID is used by default.
- **dbname** (*Optional[str]*) – Optional database name to overwrite the stored one.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **ssl** (*bool*) – This governs SSL encryption for TCP/IP sockets. This parameter is forward to redshift\_connector. <https://github.com/aws/amazon-redshift-python-driver>
- **timeout** (*Optional[int]*) – This is the time in seconds before the connection to the server will time out. The default is None which means no timeout. This parameter is forward to redshift\_connector. <https://github.com/aws/amazon-redshift-python-driver>
- **max\_prepared\_statements** (*int*) – This parameter is forward to redshift\_connector. <https://github.com/aws/amazon-redshift-python-driver>
- **tcp\_keepalive** (*bool*) – If True then use TCP keepalive. The default is True. This parameter is forward to redshift\_connector. <https://github.com/aws/amazon-redshift-python-driver>

**Returns** redshift\_connector connection.

**Return type** redshift\_connector.Connection

**Examples**

Fetching Redshift connection from Glue Catalog

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> with con.cursor() as cursor:
>>>     cursor.execute("SELECT 1")
>>>     print(cursor.fetchall())
>>> con.close()
```

Fetching Redshift connection from Secrets Manager

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect(secret_id="MY_SECRET")
>>> with con.cursor() as cursor:
>>>     cursor.execute("SELECT 1")
>>>     print(cursor.fetchall())
>>> con.close()
```

## awswrangler.redshift.connect\_temp

`awswrangler.redshift.connect_temp` (*cluster\_identifier: str, user: str, database: Optional[str] = None, duration: int = 900, auto\_create: bool = True, db\_groups: Optional[List[str]] = None, boto3\_session: Optional[boto3.session.Session] = None, ssl: bool = True, timeout: Optional[int] = None, max\_prepared\_statements: int = 1000, tcp\_keepalive: bool = True*) → `redshift_connector.core.Connection`

Return a redshift\_connector temporary connection (No password required).

<https://github.com/aws/amazon-redshift-python-driver>

### Parameters

- **cluster\_identifier** (*str*) – The unique identifier of a cluster. This parameter is case sensitive.
- **user** (*str, optional*) – The name of a database user.
- **database** (*str, optional*) – Database name. If None, the default Database is used.
- **duration** (*int, optional*) – The number of seconds until the returned temporary password expires. Constraint: minimum 900, maximum 3600. Default: 900
- **auto\_create** (*bool*) – Create a database user with the name specified for the user named in user if one does not exist.
- **db\_groups** (*List[str], optional*) – A list of the names of existing database groups that the user named in user will join for the current session, in addition to any group memberships for an existing user. If not specified, a new user is added only to PUBLIC.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **ssl** (*bool*) – This governs SSL encryption for TCP/IP sockets. This parameter is forward to redshift\_connector. <https://github.com/aws/amazon-redshift-python-driver>
- **timeout** (*Optional[int]*) – This is the time in seconds before the connection to the server will time out. The default is None which means no timeout. This parameter is forward to redshift\_connector. <https://github.com/aws/amazon-redshift-python-driver>
- **max\_prepared\_statements** (*int*) – This parameter is forward to redshift\_connector. <https://github.com/aws/amazon-redshift-python-driver>
- **tcp\_keepalive** (*bool*) – If True then use TCP keepalive. The default is True. This parameter is forward to redshift\_connector. <https://github.com/aws/amazon-redshift-python-driver>

**Returns** redshift\_connector connection.

**Return type** redshift\_connector.Connection

## Examples

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> with con.cursor() as cursor:
>>>     cursor.execute("SELECT 1")
>>>     print(cursor.fetchall())
>>> con.close()
```

## awswrangler.redshift.copy

`awswrangler.redshift.copy` (*df*: *pandas.core.frame.DataFrame*, *path*: *str*, *con*: *redshift\_connector.core.Connection*, *table*: *str*, *schema*: *str*, *iam\_role*: *Optional[str]* = *None*, *aws\_access\_key\_id*: *Optional[str]* = *None*, *aws\_secret\_access\_key*: *Optional[str]* = *None*, *aws\_session\_token*: *Optional[str]* = *None*, *index*: *bool* = *False*, *dtype*: *Optional[Dict[str, str]]* = *None*, *mode*: *str* = 'append', *diststyle*: *str* = 'AUTO', *distkey*: *Optional[str]* = *None*, *sortstyle*: *str* = 'COMPOUND', *sortkey*: *Optional[List[str]]* = *None*, *primary\_keys*: *Optional[List[str]]* = *None*, *varchar\_lengths\_default*: *int* = 256, *varchar\_lengths*: *Optional[Dict[str, int]]* = *None*, *serialize\_to\_json*: *bool* = *False*, *keep\_files*: *bool* = *False*, *use\_threads*: *bool* = *True*, *boto3\_session*: *Optional[boto3.session.Session]* = *None*, *s3\_additional\_kwargs*: *Optional[Dict[str, str]]* = *None*, *max\_rows\_by\_file*: *Optional[int]* = 10000000) → *None*

Load Pandas DataFrame as a Table on Amazon Redshift using parquet files on S3 as stage.

This is a **HIGH** latency and **HIGH** throughput alternative to `wr.redshift.to_sql()` to load large DataFrames into Amazon Redshift through the **\*\* SQL COPY command\*\***.

This strategy has more overhead and requires more IAM privileges than the regular `wr.redshift.to_sql()` function, so it is only recommended to inserting +1K rows at once.

[https://docs.aws.amazon.com/redshift/latest/dg/r\\_COPY.html](https://docs.aws.amazon.com/redshift/latest/dg/r_COPY.html)

---

**Note:** If the table does not exist yet, it will be automatically created for you using the Parquet metadata to infer the columns data types.

---



---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

### Parameters

- **df** (*pandas.DataFrame*) – Pandas DataFrame.
- **path** (*str*) – S3 path to write stage files (e.g. `s3://bucket_name/any_name/`). Note: This path must be empty.
- **con** (*redshift\_connector.Connection*) – Use `redshift_connector.connect()` to use "credentials directly or `wr.redshift.connect()` to fetch it from the Glue Catalog.
- **table** (*str*) – Table name
- **schema** (*str*) – Schema name

- **iam\_role**(*str*, *optional*) – AWS IAM role with the related permissions.
- **aws\_access\_key\_id**(*str*, *optional*) – The access key for your AWS account.
- **aws\_secret\_access\_key**(*str*, *optional*) – The secret key for your AWS account.
- **aws\_session\_token**(*str*, *optional*) – The session key for your AWS account. This is only needed when you are using temporary credentials.
- **index**(*bool*) – True to store the DataFrame index in file, otherwise False to ignore it.
- **dtype**(*Dict[str, str]*, *optional*) – Dictionary of columns names and Athena/Glue types to be casted. Useful when you have columns with undetermined or mixed data types. Only takes effect if dataset=True. (e.g. {'col name': 'bigint', 'col2 name': 'int'})
- **mode**(*str*) – Append, overwrite or upsert.
- **diststyle**(*str*) – Redshift distribution styles. Must be in ["AUTO", "EVEN", "ALL", "KEY"]. [https://docs.aws.amazon.com/redshift/latest/dg/t\\_Distributing\\_data.html](https://docs.aws.amazon.com/redshift/latest/dg/t_Distributing_data.html)
- **distkey**(*str*, *optional*) – Specifies a column name or positional number for the distribution key.
- **sortstyle**(*str*) – Sorting can be "COMPOUND" or "INTERLEAVED". [https://docs.aws.amazon.com/redshift/latest/dg/t\\_Sorting\\_data.html](https://docs.aws.amazon.com/redshift/latest/dg/t_Sorting_data.html)
- **sortkey**(*List[str]*, *optional*) – List of columns to be sorted.
- **primary\_keys**(*List[str]*, *optional*) – Primary keys.
- **varchar\_lengths\_default**(*int*) – The size that will be set for all VARCHAR columns not specified with varchar\_lengths.
- **varchar\_lengths**(*Dict[str, int]*, *optional*) – Dict of VARCHAR length by columns. (e.g. {"col1": 10, "col5": 200}).
- **keep\_files**(*bool*) – Should keep stage files?
- **use\_threads**(*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled os.cpu\_count() will be used as the max number of threads.
- **boto3\_session**(*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **s3\_additional\_kwargs** – Forward to botocore requests. Valid parameters: "ACL", "Metadata", "ServerSideEncryption", "StorageClass", "SSECustomerAlgorithm", "SSECustomerKey", "SSEKMSKeyId", "SSEKMSEncryptionContext", "Tagging", "RequestPayer", "ExpectedBucketOwner". e.g. s3\_additional\_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR\_KMS\_KEY\_ARN'}
- **max\_rows\_by\_file**(*int*) – Max number of rows in each file. Default is None i.e. dont split the files. (e.g. 33554432, 268435456)

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> wr.db.copy(
...     df=pd.DataFrame({'col': [1, 2, 3]}),
...     path="s3://bucket/my_parquet_files/",
...     con=con,
...     table="my_table",
...     schema="public"
...     iam_role="arn:aws:iam::XXX:role/XXX"
... )
>>> con.close()
```

## awswrangler.redshift.copy\_from\_files

`awswrangler.redshift.copy_from_files` (*path*: *str*, *con*: *redshift\_connector.core.Connection*, *table*: *str*, *schema*: *str*, *iam\_role*: *Optional[str]* = *None*, *aws\_access\_key\_id*: *Optional[str]* = *None*, *aws\_secret\_access\_key*: *Optional[str]* = *None*, *aws\_session\_token*: *Optional[str]* = *None*, *parquet\_infer\_sampling*: *float* = 1.0, *mode*: *str* = 'append', *diststyle*: *str* = 'AUTO', *distkey*: *Optional[str]* = *None*, *sortstyle*: *str* = 'COMPOUND', *sortkey*: *Optional[List[str]]* = *None*, *primary\_keys*: *Optional[List[str]]* = *None*, *varchar\_lengths\_default*: *int* = 256, *varchar\_lengths*: *Optional[Dict[str, int]]* = *None*, *serialize\_to\_json*: *bool* = *False*, *path\_suffix*: *Optional[str]* = *None*, *path\_ignore\_suffix*: *Optional[str]* = *None*, *use\_threads*: *bool* = *True*, *boto3\_session*: *Optional[boto3.session.Session]* = *None*, *s3\_additional\_kwargs*: *Optional[Dict[str, str]]* = *None*) → *None*

Load Parquet files from S3 to a Table on Amazon Redshift (Through COPY command).

[https://docs.aws.amazon.com/redshift/latest/dg/r\\_COPY.html](https://docs.aws.amazon.com/redshift/latest/dg/r_COPY.html)

**Note:** If the table does not exist yet, it will be automatically created for you using the Parquet metadata to infer the columns data types.

**Note:** In case of *use\_threads=True* the number of threads that will be spawned will be gotten from `os.cpu_count()`.

## Parameters

- **path** (*str*) – S3 prefix (e.g. `s3://bucket/prefix/`)
- **con** (*redshift\_connector.Connection*) – Use `redshift_connector.connect()` to use "credentials directly or `wr.redshift.connect()` to fetch it from the Glue Catalog.
- **table** (*str*) – Table name



- **schema** (*str*) – Schema name
- **iam\_role** (*str*, *optional*) – AWS IAM role with the related permissions.
- **aws\_access\_key\_id** (*str*, *optional*) – The access key for your AWS account.
- **aws\_secret\_access\_key** (*str*, *optional*) – The secret key for your AWS account.
- **aws\_session\_token** (*str*, *optional*) – The session key for your AWS account. This is only needed when you are using temporary credentials.
- **parquet\_infer\_sampling** (*float*) – Random sample ratio of files that will have the metadata inspected. Must be  $0.0 < sampling \leq 1.0$ . The higher, the more accurate. The lower, the faster.
- **mode** (*str*) – Append, overwrite or upsert.
- **diststyle** (*str*) – Redshift distribution styles. Must be in [“AUTO”, “EVEN”, “ALL”, “KEY”]. [https://docs.aws.amazon.com/redshift/latest/dg/t\\_Distributing\\_data.html](https://docs.aws.amazon.com/redshift/latest/dg/t_Distributing_data.html)
- **distkey** (*str*, *optional*) – Specifies a column name or positional number for the distribution key.
- **sortstyle** (*str*) – Sorting can be “COMPOUND” or “INTERLEAVED”. [https://docs.aws.amazon.com/redshift/latest/dg/t\\_Sorting\\_data.html](https://docs.aws.amazon.com/redshift/latest/dg/t_Sorting_data.html)
- **sortkey** (*List[str]*, *optional*) – List of columns to be sorted.
- **primary\_keys** (*List[str]*, *optional*) – Primary keys.
- **varchar\_lengths\_default** (*int*) – The size that will be set for all VARCHAR columns not specified with `varchar_lengths`.
- **varchar\_lengths** (*Dict[str, int]*, *optional*) – Dict of VARCHAR length by columns. (e.g. {“col1”: 10, “col5”: 200}).
- **serialize\_to\_json** (*bool*) – Should Wrangler add SERIALIZETOJSON parameter into the COPY command? SERIALIZETOJSON is necessary to load nested data [https://docs.aws.amazon.com/redshift/latest/dg/ingest-super.html#copy\\_json](https://docs.aws.amazon.com/redshift/latest/dg/ingest-super.html#copy_json)
- **path\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes to be scanned on s3 for the schema extraction (e.g. [“.gz.parquet”, “.snappy.parquet”]). Only has effect during the table creation. If None, will try to read all files. (default)
- **path\_ignore\_suffix** (*Union[str, List[str], None]*) – Suffix or List of suffixes for S3 keys to be ignored during the schema extraction. (e.g. [“.csv”, “\_SUCCESS”]). Only has effect during the table creation. If None, will try to read all files. (default)
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** – Forward to botocore requests. Valid parameters: “ACL”, “Metadata”, “ServerSideEncryption”, “StorageClass”, “SSECustomerAlgorithm”, “SSECustomerKey”, “SSEKMSKeyId”, “SSEKMSEncryptionContext”, “Tagging”, “RequestPayer”, “ExpectedBucketOwner”. e.g. `s3_additional_kwargs={'ServerSideEncryption': 'aws:kms', 'SSEKMSKeyId': 'YOUR_KMS_KEY_ARN'}`

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> wr.db.copy_from_files(
...     path="s3://bucket/my_parquet_files/",
...     con=con,
...     table="my_table",
...     schema="public"
...     iam_role="arn:aws:iam::XXX:role/XXX"
... )
>>> con.close()
```

### awswrangler.redshift.read\_sql\_query

`awswrangler.redshift.read_sql_query` (*sql*: str, *con*: `redshift_connector.core.Connection`, *index\_col*: `Optional[Union[str, List[str]]]` = None, *params*: `Optional[Union[List[Any], Tuple[Any, ...], Dict[Any, Any]]]` = None, *chunksize*: `Optional[int]` = None, *dtype*: `Optional[Dict[str, pyarrow.lib.DataType]]` = None, *safe*: bool = True) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]

Return a DataFrame corresponding to the result set of the query string.

---

**Note:** For large extractions (1K+ rows) consider the function `wr.redshift.unload()`.

---

#### Parameters

- **sql** (str) – SQL query.
- **con** (`redshift_connector.Connection`) – Use `redshift_connector.connect()` to use "credentials directly or `wr.redshift.connect()` to fetch it from the Glue Catalog.
- **index\_col** (`Union[str, List[str]]`, optional) – Column(s) to set as index(MultiIndex).
- **params** (`Union[List, Tuple, Dict]`, optional) – List of parameters to pass to execute method. The syntax used to pass parameters is database driver dependent. Check your database driver documentation for which of the five syntax styles, described in PEP 249's paramstyle, is supported.
- **chunksize** (int, optional) – If specified, return an iterator where chunksize is the number of rows to include in each chunk.
- **dtype** (`Dict[str, pyarrow.DataType]`, optional) – Specifying the datatype for columns. The keys should be the column names and the values should be the PyArrow types.
- **safe** (bool) – Check for overflows or other unsafe data type conversions.

**Returns** Result as Pandas DataFrame(s).

**Return type** Union[pandas.DataFrame, Iterator[pandas.DataFrame]]

## Examples

### Reading from Redshift using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> df = wr.redshift.read_sql_query(
...     sql="SELECT * FROM public.my_table",
...     con=con
... )
>>> con.close()
```

### awswrangler.redshift.read\_sql\_table

`awswrangler.redshift.read_sql_table` (*table: str, con: redshift\_connector.core.Connection, schema: Optional[str] = None, index\_col: Optional[Union[str, List[str]]] = None, params: Optional[Union[List[Any], Tuple[Any, ...], Dict[Any, Any]]] = None, chunksize: Optional[int] = None, dtype: Optional[Dict[str, pyarrow.lib.DataType]] = None, safe: bool = True*) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]

Return a DataFrame corresponding the table.

---

**Note:** For large extractions (1K+ rows) consider the function `wr.redshift.unload()`.

---

#### Parameters

- **table** (*str*) – Table name.
- **con** (*redshift\_connector.Connection*) – Use `redshift_connector.connect()` to use "credentials directly or `wr.redshift.connect()` to fetch it from the Glue Catalog.
- **schema** (*str, optional*) – Name of SQL schema in database to query (if database flavor supports this). Uses default schema if None (default).
- **index\_col** (*Union[str, List[str]], optional*) – Column(s) to set as index(MultiIndex).
- **params** (*Union[List, Tuple, Dict], optional*) – List of parameters to pass to execute method. The syntax used to pass parameters is database driver dependent. Check your database driver documentation for which of the five syntax styles, described in PEP 249's paramstyle, is supported.
- **chunksize** (*int, optional*) – If specified, return an iterator where chunksize is the number of rows to include in each chunk.
- **dtype** (*Dict[str, pyarrow.DataType], optional*) – Specifying the datatype for columns. The keys should be the column names and the values should be the PyArrow types.
- **safe** (*bool*) – Check for overflows or other unsafe data type conversions.

**Returns** Result as Pandas DataFrame(s).

**Return type** Union[pandas.DataFrame, Iterator[pandas.DataFrame]]

## Examples

Reading from Redshift using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> df = wr.redshift.read_sql_table(
...     table="my_table",
...     schema="public",
...     con=con
... )
>>> con.close()
```

## awswrangler.redshift.to\_sql

`awswrangler.redshift.to_sql` (*df*: *pandas.core.frame.DataFrame*, *con*: *redshift\_connector.core.Connection*, *table*: *str*, *schema*: *str*, *mode*: *str* = 'append', *index*: *bool* = False, *dtype*: *Optional[Dict[str, str]]* = None, *diststyle*: *str* = 'AUTO', *distkey*: *Optional[str]* = None, *sortstyle*: *str* = 'COMPOUND', *sortkey*: *Optional[List[str]]* = None, *primary\_keys*: *Optional[List[str]]* = None, *varchar\_lengths\_default*: *int* = 256, *varchar\_lengths*: *Optional[Dict[str, int]]* = None, *use\_column\_names*: *bool* = False, *chunksize*: *int* = 200) → Any

Write records stored in a DataFrame into Redshift.

---

**Note:** For large DataFrames (1K+ rows) consider the function `wr.redshift.copy()`.

---

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `chunksize`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **df** (*pandas.DataFrame*) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **con** (*redshift\_connector.Connection*) – Use `redshift_connector.connect()` to use “credentials directly or `wr.redshift.connect()` to fetch it from the Glue Catalog.
- **table** (*str*) – Table name
- **schema** (*str*) – Schema name
- **mode** (*str*) – Append, overwrite or upsert.
- **index** (*bool*) – True to store the DataFrame index as a column in the table, otherwise False to ignore it.
- **dtype** (*Dict[str, str]*, *optional*) – Dictionary of columns names and Redshift types to be casted. Useful when you have columns with undetermined or mixed data types. (e.g. {'col name': 'VARCHAR(10)', 'col2 name': 'FLOAT'}) *diststyle* :

str Redshift distribution styles. Must be in ["AUTO", "EVEN", "ALL", "KEY"]. [https://docs.aws.amazon.com/redshift/latest/dg/t\\_Distributing\\_data.html](https://docs.aws.amazon.com/redshift/latest/dg/t_Distributing_data.html)

- **distkey** (*str*, *optional*) – Specifies a column name or positional number for the distribution key.
- **sortstyle** (*str*) – Sorting can be "COMPOUND" or "INTERLEAVED". [https://docs.aws.amazon.com/redshift/latest/dg/t\\_Sorting\\_data.html](https://docs.aws.amazon.com/redshift/latest/dg/t_Sorting_data.html)
- **sortkey** (*List[str]*, *optional*) – List of columns to be sorted.
- **primary\_keys** (*List[str]*, *optional*) – Primary keys.
- **varchar\_lengths\_default** (*int*) – The size that will be set for all VARCHAR columns not specified with `varchar_lengths`.
- **varchar\_lengths** (*Dict[str, int]*, *optional*) – Dict of VARCHAR length by columns. (e.g. {"col1": 10, "col5": 200}).
- **use\_column\_names** (*bool*) – If set to True, will use the column names of the DataFrame for generating the INSERT SQL Query. E.g. If the DataFrame has two columns *col1* and *col3* and *use\_column\_names* is True, data will only be inserted into the database columns *col1* and *col3*.
- **chunksize** (*int*) – Number of rows which are inserted with each SQL query. Defaults to inserting 200 rows per query.

**Returns** None.

**Return type** None

## Examples

Writing to Redshift using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> wr.redshift.to_sql(
...     df=df,
...     table="my_table",
...     schema="public",
...     con=con
... )
>>> con.close()
```

**awswrangler.redshift.unload**

```
awswrangler.redshift.unload(sql: str, path: str, con: redshift_connector.core.Connection,
                             iam_role: Optional[str] = None, aws_access_key_id: Optional[str] = None,
                             aws_secret_access_key: Optional[str] = None, aws_session_token: Optional[str] = None,
                             region: Optional[str] = None, max_file_size: Optional[float] = None, kms_key_id: Optional[str] = None,
                             categories: Optional[List[str]] = None, chunked: Union[bool, int] = False, keep_files: bool = False,
                             use_threads: bool = True, boto3_session: Optional[boto3.session.Session] = None,
                             s3_additional_kwargs: Optional[Dict[str, str]] = None) → Union[pandas.core.frame.DataFrame,
                             Iterator[pandas.core.frame.DataFrame]]
```

Load Pandas DataFrame from a Amazon Redshift query result using Parquet files on s3 as stage.

This is a **HIGH** latency and **HIGH** throughput alternative to `wr.redshift.read_sql_query()/wr.redshift.read_sql_table()` to extract large Amazon Redshift data into a Pandas DataFrames through the **UNLOAD command**.

This strategy has more overhead and requires more IAM privileges than the regular `wr.redshift.read_sql_query()/wr.redshift.read_sql_table()` function, so it is only recommended to fetch 1k+ rows at once.

[https://docs.aws.amazon.com/redshift/latest/dg/r\\_UNLOAD.html](https://docs.aws.amazon.com/redshift/latest/dg/r_UNLOAD.html)

---

**Note:** *Batching (chunked argument) (Memory Friendly):*

Will enable the function to return a Iterable of DataFrames instead of a regular DataFrame.

There are two batching strategies on Wrangler:

- If **chunked=True**, a new DataFrame will be returned for each file in your path/dataset.
- If **chunked=INTEGER**, Wrangler will iterate on the data by number of rows equal the received INTEGER.

*P.S. chunked=True if faster and uses less memory while chunked=INTEGER is more precise in number of rows for each DataFrame.*

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

**Parameters**

- **sql** (*str*) – SQL query.
- **path** (*Union[str, List[str]]*) – S3 path to write stage files (e.g. `s3://bucket_name/any_name/`)
- **con** (*redshift\_connector.Connection*) – Use `redshift_connector.connect()` to use "credentials directly or `wr.redshift.connect()` to fetch it from the Glue Catalog.
- **iam\_role** (*str, optional*) – AWS IAM role with the related permissions.
- **aws\_access\_key\_id** (*str, optional*) – The access key for your AWS account.
- **aws\_secret\_access\_key** (*str, optional*) – The secret key for your AWS account.
- **aws\_session\_token** (*str, optional*) – The session key for your AWS account. This is only needed when you are using temporary credentials.

- **region** (*str*, *optional*) – Specifies the AWS Region where the target Amazon S3 bucket is located. REGION is required for UNLOAD to an Amazon S3 bucket that isn't in the same AWS Region as the Amazon Redshift cluster. By default, UNLOAD assumes that the target Amazon S3 bucket is located in the same AWS Region as the Amazon Redshift cluster.
- **max\_file\_size** (*float*, *optional*) – Specifies the maximum size (MB) of files that UNLOAD creates in Amazon S3. Specify a decimal value between 5.0 MB and 6200.0 MB. If None, the default maximum file size is 6200.0 MB.
- **kms\_key\_id** (*str*, *optional*) – Specifies the key ID for an AWS Key Management Service (AWS KMS) key to be used to encrypt data files on Amazon S3.
- **categories** (*List[str]*, *optional*) – List of columns names that should be returned as pandas.Categorical. Recommended for memory restricted environments.
- **keep\_files** (*bool*) – Should keep stage files?
- **chunked** (*Union[int, bool]*) – If passed will split the data in a Iterable of DataFrames (Memory friendly). If *True* wrangler will iterate on the data by files in the most efficient way without guarantee of chunksize. If an *INTEGER* is passed Wrangler will iterate on the data by number of rows igual the received INTEGER.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.
- **s3\_additional\_kwargs** – Forward to botocore requests, only “SSECustomerAlgorithm” and “SSECustomerKey” arguments will be considered.

**Returns** Result as Pandas DataFrame(s).

**Return type** Union[pandas.DataFrame, Iterator[pandas.DataFrame]]

## Examples

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> df = wr.redshift.unload(
...     sql="SELECT * FROM public.mytable",
...     path="s3://bucket/extracted_parquet_files/",
...     con=con,
...     iam_role="arn:aws:iam::XXX:role/XXX"
... )
>>> con.close()
```

**awswrangler.redshift.unload\_to\_files**

```
awswrangler.redshift.unload_to_files(sql: str, path: str, con: redshift_connector.core.Connection, iam_role: Optional[str] = None, aws_access_key_id: Optional[str] = None, aws_secret_access_key: Optional[str] = None, aws_session_token: Optional[str] = None, region: Optional[str] = None, max_file_size: Optional[float] = None, kms_key_id: Optional[str] = None, manifest: bool = False, use_threads: bool = True, partition_cols: Optional[List[str]] = None, boto3_session: Optional[boto3.session.Session] = None) → None
```

Unload Parquet files on s3 from a Redshift query result (Through the UNLOAD command).

[https://docs.aws.amazon.com/redshift/latest/dg/r\\_UNLOAD.html](https://docs.aws.amazon.com/redshift/latest/dg/r_UNLOAD.html)

---

**Note:** In case of `use_threads=True` the number of threads that will be spawned will be gotten from `os.cpu_count()`.

---

**Parameters**

- **sql** (*str*) – SQL query.
- **path** (*Union[str, List[str]]*) – S3 path to write stage files (e.g. `s3://bucket_name/any_name/`)
- **con** (*redshift\_connector.Connection*) – Use `redshift_connector.connect()` to use "credentials directly or `wr.redshift.connect()` to fetch it from the Glue Catalog.
- **iam\_role** (*str, optional*) – AWS IAM role with the related permissions.
- **aws\_access\_key\_id** (*str, optional*) – The access key for your AWS account.
- **aws\_secret\_access\_key** (*str, optional*) – The secret key for your AWS account.
- **aws\_session\_token** (*str, optional*) – The session key for your AWS account. This is only needed when you are using temporary credentials.
- **region** (*str, optional*) – Specifies the AWS Region where the target Amazon S3 bucket is located. REGION is required for UNLOAD to an Amazon S3 bucket that isn't in the same AWS Region as the Amazon Redshift cluster. By default, UNLOAD assumes that the target Amazon S3 bucket is located in the same AWS Region as the Amazon Redshift cluster.
- **max\_file\_size** (*float, optional*) – Specifies the maximum size (MB) of files that UNLOAD creates in Amazon S3. Specify a decimal value between 5.0 MB and 6200.0 MB. If None, the default maximum file size is 6200.0 MB.
- **kms\_key\_id** (*str, optional*) – Specifies the key ID for an AWS Key Management Service (AWS KMS) key to be used to encrypt data files on Amazon S3.
- **use\_threads** (*bool*) – True to enable concurrent requests, False to disable multiple threads. If enabled `os.cpu_count()` will be used as the max number of threads.
- **manifest** (*bool*) – Unload a manifest file on S3.
- **partition\_cols** (*List[str], optional*) – Specifies the partition keys for the unload operation.



- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns**

**Return type** None

**Examples**

```
>>> import awswrangler as wr
>>> con = wr.redshift.connect("MY_GLUE_CONNECTION")
>>> wr.redshift.unload_to_files(
...     sql="SELECT * FROM public.mytable",
...     path="s3://bucket/extracted_parquet_files/",
...     con=con,
...     iam_role="arn:aws:iam::XXX:role/XXX"
... )
>>> con.close()
```

**1.4.5 PostgreSQL**

<code>connect</code> ([connection, secret_id, catalog_id, ...])	Return a pg8000 connection from a Glue Catalog Connection.
<code>read_sql_query</code> (sql, con[, index_col, ...])	Return a DataFrame corresponding to the result set of the query string.
<code>read_sql_table</code> (table, con[, schema, ...])	Return a DataFrame corresponding the table.
<code>to_sql</code> (df, con, table, schema[, mode, ...])	Write records stored in a DataFrame into PostgreSQL.

**awswrangler.postgresql.connect**

`awswrangler.postgresql.connect` (*connection: Optional[str] = None, secret\_id: Optional[str] = None, catalog\_id: Optional[str] = None, dbname: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None, ssl\_context: Optional[Union[bool, ssl.SSLContext]] = None, timeout: Optional[int] = None, tcp\_keepalive: bool = True*) → `pg8000.legacy.Connection`

Return a pg8000 connection from a Glue Catalog Connection.

<https://github.com/tlocke/pg8000>

**Parameters**

- **connection** (*Optional[str]*) – Glue Catalog Connection name.
- **secret\_id** (*Optional[str]*; ) – Specifies the secret containing the version that you want to retrieve. You can specify either the Amazon Resource Name (ARN) or the friendly name of the secret.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog. If none is provided, the AWS account ID is used by default.
- **dbname** (*Optional[str]*) – Optional database name to overwrite the stored one.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

- **ssl\_context** (*Optional[Union[bool, SSLContext]]*) – This governs SSL encryption for TCP/IP sockets. This parameter is forward to pg8000. <https://github.com/tlocke/pg8000#functions>
- **timeout** (*Optional[int]*) – This is the time in seconds before the connection to the server will time out. The default is None which means no timeout. This parameter is forward to pg8000. <https://github.com/tlocke/pg8000#functions>
- **tcp\_keepalive** (*bool*) – If True then use TCP keepalive. The default is True. This parameter is forward to pg8000. <https://github.com/tlocke/pg8000#functions>

**Returns** pg8000 connection.

**Return type** pg8000.Connection

## Examples

```
>>> import awswrangler as wr
>>> con = wr.postgresql.connect("MY_GLUE_CONNECTION")
>>> with con.cursor() as cursor:
>>>     cursor.execute("SELECT 1")
>>>     print(cursor.fetchall())
>>> con.close()
```

## awswrangler.postgresql.read\_sql\_query

`awswrangler.postgresql.read_sql_query` (*sql: str, con: pg8000.legacy.Connection, index\_col: Optional[Union[str, List[str]]] = None, params: Optional[Union[List[Any], Tuple[Any, ...], Dict[Any, Any]]] = None, chunksize: Optional[int] = None, dtype: Optional[Dict[str, pyarrow.lib.DataType]] = None, safe: bool = True*) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]

Return a DataFrame corresponding to the result set of the query string.

### Parameters

- **sql** (*str*) – SQL query.
- **con** (*pg8000.Connection*) – Use `pg8000.connect()` to use credentials directly or `wr.postgresql.connect()` to fetch it from the Glue Catalog.
- **index\_col** (*Union[str, List[str]], optional*) – Column(s) to set as index(MultiIndex).
- **params** (*Union[List, Tuple, Dict], optional*) – List of parameters to pass to execute method. The syntax used to pass parameters is database driver dependent. Check your database driver documentation for which of the five syntax styles, described in PEP 249's paramstyle, is supported.
- **chunksize** (*int, optional*) – If specified, return an iterator where chunksize is the number of rows to include in each chunk.
- **dtype** (*Dict[str, pyarrow.DataType], optional*) – Specifying the datatype for columns. The keys should be the column names and the values should be the PyArrow types.

- **safe** (*bool*) – Check for overflows or other unsafe data type conversions.

**Returns** Result as Pandas DataFrame(s).

**Return type** Union[pandas.DataFrame, Iterator[pandas.DataFrame]]

## Examples

Reading from PostgreSQL using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.postgresql.connect("MY_GLUE_CONNECTION")
>>> df = wr.postgresql.read_sql_query(
...     sql="SELECT * FROM public.my_table",
...     con=con
... )
>>> con.close()
```

## awswrangler.postgresql.read\_sql\_table

`awswrangler.postgresql.read_sql_table` (*table*: *str*, *con*: *pg8000.legacy.Connection*, *schema*: *Optional[str]* = *None*, *index\_col*: *Optional[Union[str, List[str]]]* = *None*, *params*: *Optional[Union[List[Any], Tuple[Any, ...], Dict[Any, Any]]]* = *None*, *chunksize*: *Optional[int]* = *None*, *dtype*: *Optional[Dict[str, pyarrow.lib.DataType]]* = *None*, *safe*: *bool* = *True*) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]

Return a DataFrame corresponding the table.

### Parameters

- **table** (*str*) – Table name.
- **con** (*pg8000.Connection*) – Use `pg8000.connect()` to use credentials directly or `wr.postgresql.connect()` to fetch it from the Glue Catalog.
- **schema** (*str*, *optional*) – Name of SQL schema in database to query (if database flavor supports this). Uses default schema if *None* (default).
- **index\_col** (*Union[str, List[str]]*, *optional*) – Column(s) to set as index(MultiIndex).
- **params** (*Union[List, Tuple, Dict]*, *optional*) – List of parameters to pass to execute method. The syntax used to pass parameters is database driver dependent. Check your database driver documentation for which of the five syntax styles, described in PEP 249's paramstyle, is supported.
- **chunksize** (*int*, *optional*) – If specified, return an iterator where chunksize is the number of rows to include in each chunk.
- **dtype** (*Dict[str, pyarrow.DataType]*, *optional*) – Specifying the datatype for columns. The keys should be the column names and the values should be the PyArrow types.
- **safe** (*bool*) – Check for overflows or other unsafe data type conversions.

**Returns** Result as Pandas DataFrame(s).

**Return type** Union[pandas.DataFrame, Iterator[pandas.DataFrame]]

## Examples

Reading from PostgreSQL using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.postgresql.connect("MY_GLUE_CONNECTION")
>>> df = wr.postgresql.read_sql_table(
...     table="my_table",
...     schema="public",
...     con=con
... )
>>> con.close()
```

## awswrangler.postgresql.to\_sql

`awswrangler.postgresql.to_sql` (*df*: *pandas.core.frame.DataFrame*, *con*: *pg8000.legacy.Connection*, *table*: *str*, *schema*: *str*, *mode*: *str* = 'append', *index*: *bool* = False, *dtype*: *Optional[Dict[str, str]]* = None, *varchar\_lengths*: *Optional[Dict[str, int]]* = None, *use\_column\_names*: *bool* = False, *chunksize*: *int* = 200) → Any

Write records stored in a DataFrame into PostgreSQL.

---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `chunksize`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **df** (*pandas.DataFrame*) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **con** (*pg8000.Connection*) – Use `pg8000.connect()` to use credentials directly or `wr.postgresql.connect()` to fetch it from the Glue Catalog.
- **table** (*str*) – Table name
- **schema** (*str*) – Schema name
- **mode** (*str*) – Append or overwrite.
- **index** (*bool*) – True to store the DataFrame index as a column in the table, otherwise False to ignore it.
- **dtype** (*Dict[str, str]*, *optional*) – Dictionary of columns names and PostgreSQL types to be casted. Useful when you have columns with undetermined or mixed data types. (e.g. {'col name': 'TEXT', 'col2 name': 'FLOAT'})
- **varchar\_lengths** (*Dict[str, int]*, *optional*) – Dict of VARCHAR length by columns. (e.g. {"col1": 10, "col5": 200}).

- **use\_column\_names** (*bool*) – If set to True, will use the column names of the DataFrame for generating the INSERT SQL Query. E.g. If the DataFrame has two columns *col1* and *col3* and *use\_column\_names* is True, data will only be inserted into the database columns *col1* and *col3*.
- **chunksize** (*int*) – Number of rows which are inserted with each SQL query. Defaults to inserting 200 rows per query.

**Returns** None.

**Return type** None

## Examples

Writing to PostgreSQL using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.postgresql.connect("MY_GLUE_CONNECTION")
>>> wr.postgresql.to_sql(
...     df=df,
...     table="my_table",
...     schema="public",
...     con=con
... )
>>> con.close()
```

## 1.4.6 MySQL

<code>connect([connection, secret_id, catalog_id, ...])</code>	Return a pymysql connection from a Glue Catalog Connection.
<code>read_sql_query(sql, con[, index_col, ...])</code>	Return a DataFrame corresponding to the result set of the query string.
<code>read_sql_table(table, con[, schema, ...])</code>	Return a DataFrame corresponding the table.
<code>to_sql(df, con, table, schema[, mode, ...])</code>	Write records stored in a DataFrame into MySQL.

### awswrangler.mysql.connect

`awswrangler.mysql.connect` (*connection: Optional[str] = None, secret\_id: Optional[str] = None, catalog\_id: Optional[str] = None, dbname: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None, read\_timeout: Optional[int] = None, write\_timeout: Optional[int] = None, connect\_timeout: int = 10*) → `pymysql.connections.Connection`

Return a pymysql connection from a Glue Catalog Connection.

<https://pymysql.readthedocs.io>

#### Parameters

- **connection** (*str*) – Glue Catalog Connection name.
- **secret\_id** (*Optional[str]*) – Specifies the secret containing the version that you want to retrieve. You can specify either the Amazon Resource Name (ARN) or the friendly name of the secret.

- **catalog\_id** (*str, optional*) – The ID of the Data Catalog. If none is provided, the AWS account ID is used by default.
- **dbname** (*Optional[str]*) – Optional database name to overwrite the stored one.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **read\_timeout** (*Optional[int]*) – The timeout for reading from the connection in seconds (default: None - no timeout). This parameter is forward to pymysql. <https://pymysql.readthedocs.io/en/latest/modules/connections.html>
- **write\_timeout** (*Optional[int]*) – The timeout for writing to the connection in seconds (default: None - no timeout) This parameter is forward to pymysql. <https://pymysql.readthedocs.io/en/latest/modules/connections.html>
- **connect\_timeout** (*int*) – Timeout before throwing an exception when connecting. (default: 10, min: 1, max: 31536000) This parameter is forward to pymysql. <https://pymysql.readthedocs.io/en/latest/modules/connections.html>

**Returns** pymysql connection.

**Return type** pymysql.connections.Connection

## Examples

```
>>> import awswrangler as wr
>>> con = wr.mysql.connect("MY_GLUE_CONNECTION")
>>> with con.cursor() as cursor:
>>>     cursor.execute("SELECT 1")
>>>     print(cursor.fetchall())
>>> con.close()
```

## awswrangler.mysql.read\_sql\_query

**awswrangler.mysql.read\_sql\_query** (*sql: str, con: pymysql.connections.Connection, index\_col: Optional[Union[str, List[str]]] = None, params: Optional[Union[List[Any], Tuple[Any, ...], Dict[Any, Any]]] = None, chunksize: Optional[int] = None, dtype: Optional[Dict[str, pyarrow.lib.DataType]] = None, safe: bool = True*) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]

Return a DataFrame corresponding to the result set of the query string.

### Parameters

- **sql** (*str*) – SQL query.
- **con** (*pymysql.connections.Connection*) – Use pymysql.connect() to use credentials directly or wr.mysql.connect() to fetch it from the Glue Catalog.
- **index\_col** (*Union[str, List[str]], optional*) – Column(s) to set as index(MultiIndex).
- **params** (*Union[List, Tuple, Dict], optional*) – List of parameters to pass to execute method. The syntax used to pass parameters is database driver dependent. Check your database driver documentation for which of the five syntax styles, described in PEP 249's paramstyle, is supported.

- **chunksize** (*int, optional*) – If specified, return an iterator where chunksize is the number of rows to include in each chunk.
- **dtype** (*Dict[str, pyarrow.DataType], optional*) – Specifying the datatype for columns. The keys should be the column names and the values should be the PyArrow types.
- **safe** (*bool*) – Check for overflows or other unsafe data type conversions.

**Returns** Result as Pandas DataFrame(s).

**Return type** Union[pandas.DataFrame, Iterator[pandas.DataFrame]]

## Examples

Reading from MySQL using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.mysql.connect("MY_GLUE_CONNECTION")
>>> df = wr.mysql.read_sql_query(
...     sql="SELECT * FROM test.my_table",
...     con=con
... )
>>> con.close()
```

## awswrangler.mysql.read\_sql\_table

`awswrangler.mysql.read_sql_table` (*table: str, con: pymysql.connections.Connection, schema: Optional[str] = None, index\_col: Optional[Union[str, List[str]]] = None, params: Optional[Union[List[Any], Tuple[Any, ...], Dict[Any, Any]]] = None, chunksize: Optional[int] = None, dtype: Optional[Dict[str, pyarrow.lib.DataType]] = None, safe: bool = True*) → Union[pandas.core.frame.DataFrame, Iterator[pandas.core.frame.DataFrame]]

Return a DataFrame corresponding the table.

### Parameters

- **table** (*str*) – Table name.
- **con** (*pymysql.connections.Connection*) – Use `pymysql.connect()` to use credentials directly or `wr.mysql.connect()` to fetch it from the Glue Catalog.
- **schema** (*str, optional*) – Name of SQL schema in database to query. Uses default schema if None.
- **index\_col** (*Union[str, List[str]], optional*) – Column(s) to set as index(MultiIndex).
- **params** (*Union[List, Tuple, Dict], optional*) – List of parameters to pass to execute method. The syntax used to pass parameters is database driver dependent. Check your database driver documentation for which of the five syntax styles, described in PEP 249's paramstyle, is supported.
- **chunksize** (*int, optional*) – If specified, return an iterator where chunksize is the number of rows to include in each chunk.

- **dtype** (*Dict[str, pyarrow.DataType], optional*) – Specifying the datatype for columns. The keys should be the column names and the values should be the PyArrow types.
- **safe** (*bool*) – Check for overflows or other unsafe data type conversions.

**Returns** Result as Pandas DataFrame(s).

**Return type** Union[pandas.DataFrame, Iterator[pandas.DataFrame]]

## Examples

Reading from MySQL using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.mysql.connect("MY_GLUE_CONNECTION")
>>> df = wr.mysql.read_sql_table(
...     table="my_table",
...     schema="test",
...     con=con
... )
>>> con.close()
```

## awswrangler.mysql.to\_sql

`awswrangler.mysql.to_sql` (*df: pandas.core.frame.DataFrame, con: pymysql.connections.Connection, table: str, schema: str, mode: str = 'append', index: bool = False, dtype: Optional[Dict[str, str]] = None, varchar\_lengths: Optional[Dict[str, int]] = None, use\_column\_names: bool = False, chunksize: int = 200*) → Any

Write records stored in a DataFrame into MySQL.

---

**Note:** This function has arguments which can be configured globally through *wr.config* or environment variables:

- `chunksize`

Check out the [Global Configurations Tutorial](#) for details.

---

### Parameters

- **df** (*pandas.DataFrame*) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **con** (*pymysql.connections.Connection*) – Use `pymysql.connect()` to use credentials directly or `wr.mysql.connect()` to fetch it from the Glue Catalog.
- **table** (*str*) – Table name
- **schema** (*str*) – Schema name
- **mode** (*str*) –

**Append, overwrite, upsert\_duplicate\_key, upsert\_replace\_into, upsert\_distinct.**

append: Inserts new records into table overwrite: Drops table and recreates upsert\_duplicate\_key: Performs an upsert using *ON DUPLICATE KEY* clause. Requires



table schema to have defined keys, otherwise duplicate records will be inserted. `upsert_replace_into`: Performs upsert using *REPLACE INTO* clause. Less efficient and still requires the table schema to have keys or else duplicate records will be inserted. `upsert_distinct`: Inserts new records, including duplicates, then recreates the table and inserts *DISTINCT* records from old table. This is the least efficient approach but handles scenarios where there are no keys on table.

- **index** (*bool*) – True to store the DataFrame index as a column in the table, otherwise False to ignore it.
- **dtype** (*Dict[str, str], optional*) – Dictionary of columns names and MySQL types to be casted. Useful when you have columns with undetermined or mixed data types. (e.g. {'col name': 'TEXT', 'col2 name': 'FLOAT'})
- **varchar\_lengths** (*Dict[str, int], optional*) – Dict of VARCHAR length by columns. (e.g. {"col1": 10, "col5": 200}).
- **use\_column\_names** (*bool*) – If set to True, will use the column names of the DataFrame for generating the INSERT SQL Query. E.g. If the DataFrame has two columns *col1* and *col3* and *use\_column\_names* is True, data will only be inserted into the database columns *col1* and *col3*.
- **chunksize** (*int*) – Number of rows which are inserted with each SQL query. Defaults to inserting 200 rows per query.

**Returns** None.

**Return type** None

## Examples

Writing to MySQL using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.mysql.connect("MY_GLUE_CONNECTION")
>>> wr.mysql.to_sql(
...     df=df,
...     table="my_table",
...     schema="test",
...     con=con
... )
>>> con.close()
```

## Microsoft SQL Server

<code>connect([connection, secret_id, catalog_id, ...])</code>	Return a pyodbc connection from a Glue Catalog Connection.
<code>read_sql_query(sql, con[, index_col, ...])</code>	Return a DataFrame corresponding to the result set of the query string.
<code>read_sql_table(table, con[, schema, ...])</code>	Return a DataFrame corresponding the table.
<code>to_sql(df, con, table, schema[, mode, ...])</code>	Write records stored in a DataFrame into Microsoft SQL Server.

**awswrangler.sqlserver.connect**

```
awswrangler.sqlserver.connect (connection: Optional[str] = None, secret_id: Optional[str] =
                                None, catalog_id: Optional[str] = None, dbname: Optional[str]
                                = None, odbc_driver_version: int = 17, boto3_session: Op-
                                tional[boto3.session.Session] = None, timeout: Optional[int] =
                                0) → Any
```

Return a pyodbc connection from a Glue Catalog Connection.

<https://github.com/mkleehammer/pyodbc>

**Parameters**

- **connection** (*Optional[str]*) – Glue Catalog Connection name.
- **secret\_id** (*Optional[str]:*) – Specifies the secret containing the version that you want to retrieve. You can specify either the Amazon Resource Name (ARN) or the friendly name of the secret.
- **catalog\_id** (*str, optional*) – The ID of the Data Catalog. If none is provided, the AWS account ID is used by default.
- **dbname** (*Optional[str]*) – Optional database name to overwrite the stored one.
- **odbc\_driver\_version** (*int*) – Major version of the ODBC Driver version that is installed and should be used.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **timeout** (*Optional[int]*) – This is the time in seconds before the connection to the server will time out. The default is None which means no timeout. This parameter is forwarded to pyodbc. <https://github.com/mkleehammer/pyodbc/wiki/The-pyodbc-Module#connect>

**Returns** pyodbc connection.

**Return type** pyodbc.Connection

**Examples**

```
>>> import awswrangler as wr
>>> con = wr.sqlserver.connect(connection="MY_GLUE_CONNECTION", odbc_driver_
    ↪version=17)
>>> with con.cursor() as cursor:
>>>     cursor.execute("SELECT 1")
>>>     print(cursor.fetchall())
>>> con.close()
```

**awswrangler.sqlserver.read\_sql\_query**

```
awswrangler.sqlserver.read_sql_query(sql: str, con: pyodbc.Connection, index_col: Optional[Union[str, List[str]]] = None, params: Optional[Union[List[Any], Tuple[Any, ...], Dict[Any, Any]]] = None, chunksize: Optional[int] = None, dtype: Optional[Dict[str, pyarrow.lib.DataType]] = None, safe: bool = True) → Any
```

Return a DataFrame corresponding to the result set of the query string.

**Parameters**

- **sql** (*str*) – SQL query.
- **con** (*pyodbc.Connection*) – Use `pyodbc.connect()` to use credentials directly or `wr.sqlserver.connect()` to fetch it from the Glue Catalog.
- **index\_col** (*Union[str, List[str]], optional*) – Column(s) to set as index(MultiIndex).
- **params** (*Union[List, Tuple, Dict], optional*) – List of parameters to pass to execute method. The syntax used to pass parameters is database driver dependent. Check your database driver documentation for which of the five syntax styles, described in PEP 249's paramstyle, is supported.
- **chunksize** (*int, optional*) – If specified, return an iterator where chunksize is the number of rows to include in each chunk.
- **dtype** (*Dict[str, pyarrow.DataType], optional*) – Specifying the datatype for columns. The keys should be the column names and the values should be the PyArrow types.
- **safe** (*bool*) – Check for overflows or other unsafe data type conversions.

**Returns** Result as Pandas DataFrame(s).

**Return type** Union[pandas.DataFrame, Iterator[pandas.DataFrame]]

**Examples**

```
Reading from Microsoft SQL Server using a Glue Catalog Connections >>> import awswrangler as wr >>>
con = wr.sqlserver.connect(connection="MY_GLUE_CONNECTION", odbc_driver_version=17) >>> df =
wr.sqlserver.read_sql_query(... sql="SELECT * FROM dbo.my_table", ... con=con ... ) >>> con.close()
```

**awswrangler.sqlserver.read\_sql\_table**

```
awswrangler.sqlserver.read_sql_table(table: str, con: pyodbc.Connection, schema: Optional[str] = None, index_col: Optional[Union[str, List[str]]] = None, params: Optional[Union[List[Any], Tuple[Any, ...], Dict[Any, Any]]] = None, chunksize: Optional[int] = None, dtype: Optional[Dict[str, pyarrow.lib.DataType]] = None, safe: bool = True) → Any
```

Return a DataFrame corresponding the table.

**Parameters**

- **table** (*str*) – Table name.

- **con** (*pyodbc.Connection*) – Use `pyodbc.connect()` to use credentials directly or `wr.sqlserver.connect()` to fetch it from the Glue Catalog.
- **schema** (*str, optional*) – Name of SQL schema in database to query (if database flavor supports this). Uses default schema if None (default).
- **index\_col** (*Union[str, List[str]], optional*) – Column(s) to set as index(`MultiIndex`).
- **params** (*Union[List, Tuple, Dict], optional*) – List of parameters to pass to execute method. The syntax used to pass parameters is database driver dependent. Check your database driver documentation for which of the five syntax styles, described in PEP 249's paramstyle, is supported.
- **chunksize** (*int, optional*) – If specified, return an iterator where chunksize is the number of rows to include in each chunk.
- **dtype** (*Dict[str, pyarrow.DataType], optional*) – Specifying the datatype for columns. The keys should be the column names and the values should be the PyArrow types.
- **safe** (*bool*) – Check for overflows or other unsafe data type conversions.

**Returns** Result as Pandas DataFrame(s).

**Return type** `Union[pandas.DataFrame, Iterator[pandas.DataFrame]]`

## Examples

Reading from Microsoft SQL Server using a Glue Catalog Connections

```
>>> import awswrangler as wr
>>> con = wr.sqlserver.connect(connection="MY_GLUE_CONNECTION", odbc_driver_
↳ version=17)
>>> df = wr.sqlserver.read_sql_table(
...     table="my_table",
...     schema="dbo",
...     con=con
... )
>>> con.close()
```

## awswrangler.sqlserver.to\_sql

`awswrangler.sqlserver.to_sql` (*df: pandas.core.frame.DataFrame, con: pyodbc.Connection, table: str, schema: str, mode: str = 'append', index: bool = False, dtype: Optional[Dict[str, str]] = None, varchar\_lengths: Optional[Dict[str, int]] = None, use\_column\_names: bool = False, chunksize: int = 200*) → Any

Write records stored in a DataFrame into Microsoft SQL Server.

**Note:** This function has arguments which can be configured globally through `wr.config` or environment variables:

- `chunksize`

Check out the [Global Configurations Tutorial](#) for details.

### Parameters

- **df** (*pandas.DataFrame*) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **con** (*pyodbc.Connection*) – Use `pyodbc.connect()` to use credentials directly or `wr.sqlserver.connect()` to fetch it from the Glue Catalog.
- **table** (*str*) – Table name
- **schema** (*str*) – Schema name
- **mode** (*str*) – Append or overwrite.
- **index** (*bool*) – True to store the DataFrame index as a column in the table, otherwise False to ignore it.
- **dtype** (*Dict[str, str], optional*) – Dictionary of columns names and Microsoft SQL Server types to be casted. Useful when you have columns with undetermined or mixed data types. (e.g. {'col name': 'TEXT', 'col2 name': 'FLOAT'})
- **varchar\_lengths** (*Dict[str, int], optional*) – Dict of VARCHAR length by columns. (e.g. {"col1": 10, "col5": 200}).
- **use\_column\_names** (*bool*) – If set to True, will use the column names of the DataFrame for generating the INSERT SQL Query. E.g. If the DataFrame has two columns *col1* and *col3* and *use\_column\_names* is True, data will only be inserted into the database columns *col1* and *col3*.
- **chunksize** (*int*) – Number of rows which are inserted with each SQL query. Defaults to inserting 200 rows per query.

**Returns** None.

**Return type** None

### Examples

Writing to Microsoft SQL Server using a Glue Catalog Connections

```

>>> import awswrangler as wr
>>> con = wr.sqlserver.connect(connection="MY_GLUE_CONNECTION", odbc_driver_
↳ version=17)
>>> wr.sqlserver.to_sql(
...     df=df,
...     table="table",
...     schema="dbo",
...     con=con
... )
>>> con.close()

```

## 1.4.7 DynamoDB

<code>delete_items(items, table_name[, boto3_session])</code>	Delete all items in the specified DynamoDB table.
<code>get_table(table_name[, boto3_session])</code>	Get DynamoDB table object for specified table name.
<code>put_csv(path, table_name[, boto3_session])</code>	Write all items from a CSV file to a DynamoDB.
<code>put_df(df, table_name[, boto3_session])</code>	Write all items from a DataFrame to a DynamoDB.
<code>put_items(items, table_name[, boto3_session])</code>	Insert all items to the specified DynamoDB table.
<code>put_json(path, table_name[, boto3_session])</code>	Write all items from JSON file to a DynamoDB.

### aws wrangler.dynamodb.delete\_items

`aws wrangler.dynamodb.delete_items` (*items: List[Dict[str, Any]], table\_name: str, boto3\_session: Optional[boto3.session.Session] = None*) → None

Delete all items in the specified DynamoDB table.

#### Parameters

- **items** (*List[Dict[str, Any]]*) – List which contains the items that will be deleted.
- **table\_name** (*str*) – Name of the Amazon DynamoDB table.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

### Examples

Writing rows of DataFrame

```
>>> import aws wrangler as wr
>>> wr.dynamodb.delete_items(
...     items=[{'key': 1}, {'key': 2, 'value': 'Hello'}],
...     table_name='table'
... )
```

### aws wrangler.dynamodb.get\_table

`aws wrangler.dynamodb.get_table` (*table\_name: str, boto3\_session: Optional[boto3.session.Session] = None*) → *boto3.resource*

Get DynamoDB table object for specified table name.

#### Parameters

- **table\_name** (*str*) – Name of the Amazon DynamoDB table.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** `dynamodb_table` – Boto3 `DynamoDB.Table` object. <https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/dynamodb.html#DynamoDB.Table>

**Return type** `boto3.resources.dynamodb.Table`

**awswrangler.dynamodb.put\_csv**

`awswrangler.dynamodb.put_csv` (*path*: `Union[str, pathlib.Path]`, *table\_name*: `str`, *boto3\_session*: `Optional[boto3.session.Session] = None`, *\*\*pandas\_kwargs*: `Any`) → `None`

Write all items from a CSV file to a DynamoDB.

**Parameters**

- **path** (`Union[str, Path]`) – Path as str or Path object to the CSV file which contains the items.
- **table\_name** (`str`) – Name of the Amazon DynamoDB table.
- **boto3\_session** (`boto3.Session()`, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.
- **pandas\_kwargs** – KEYWORD arguments forwarded to `pandas.read_csv()`. You can NOT pass *pandas\_kwargs* explicit, just add valid Pandas arguments in the function call and Wrangler will accept it. e.g. `wr.dynamodb.put_csv('items.csv', 'my_table', sep='|', na_values=['null', 'none'], skip_blank_lines=True)` [https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read\\_csv.html](https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.read_csv.html)

**Returns** `None`.

**Return type** `None`

**Examples**

Writing contents of CSV file

```
>>> import awswrangler as wr
>>> wr.dynamodb.put_csv(
...     path='items.csv',
...     table_name='table'
... )
```

Writing contents of CSV file using `pandas_kwargs`

```
>>> import awswrangler as wr
>>> wr.dynamodb.put_csv(
...     path='items.csv',
...     table_name='table',
...     sep='|',
...     na_values=['null', 'none']
... )
```

**awswrangler.dynamodb.put\_df**

`awswrangler.dynamodb.put_df` (*df*: `pandas.core.frame.DataFrame`, *table\_name*: `str`, *boto3\_session*: `Optional[boto3.session.Session] = None`) → `None`

Write all items from a DataFrame to a DynamoDB.

**Parameters**

- **df** (`pd.DataFrame`) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **table\_name** (`str`) – Name of the Amazon DynamoDB table.

- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

Writing rows of DataFrame

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> wr.dynamodb.put_df(
...     df=pd.DataFrame({'key': [1, 2, 3]}),
...     table_name='table'
... )
```

## awswrangler.dynamodb.put\_items

**awswrangler.dynamodb.put\_items** (*items: Union[List[Dict[str, Any]], List[Mapping[str, Any]]*, *table\_name: str*, *boto3\_session: Optional[boto3.session.Session]* = *None*) → None

Insert all items to the specified DynamoDB table.

### Parameters

- **items** (*Union[List[Dict[str, Any]], List[Mapping[str, Any]]*) – List which contains the items that will be inserted.
- **table\_name** (*str*) – Name of the Amazon DynamoDB table.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

Writing items

```
>>> import awswrangler as wr
>>> wr.dynamodb.put_items(
...     items=[{'key': 1}, {'key': 2, 'value': 'Hello'}],
...     table_name='table'
... )
```



**awswrangler.dynamodb.put\_json**

`awswrangler.dynamodb.put_json` (*path*: *Union[str, pathlib.Path]*, *table\_name*: *str*, *boto3\_session*: *Optional[boto3.session.Session] = None*) → *None*

Write all items from JSON file to a DynamoDB.

The JSON file can either contain a single item which will be inserted in the DynamoDB or an array of items which all be inserted.

**Parameters**

- **path** (*Union[str, Path]*) – Path as str or Path object to the JSON file which contains the items.
- **table\_name** (*str*) – Name of the Amazon DynamoDB table.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

**Examples**

Writing contents of JSON file

```
>>> import awswrangler as wr
>>> wr.dynamodb.put_json(
...     path='items.json',
...     table_name='table'
... )
```

**1.4.8 Amazon Timestream**

<code>create_database(database[, kms_key_id, ...])</code>	Create a new Timestream database.
<code>create_table(database, table, ...[, tags, ...])</code>	Create a new Timestream database.
<code>delete_database(database[, boto3_session])</code>	Delete a given Timestream database.
<code>delete_table(database, table[, boto3_session])</code>	Delete a given Timestream table.
<code>query(sql[, boto3_session])</code>	Run a query and retrieve the result as a Pandas DataFrame.
<code>write(df, database, table, time_col, ...[, ...])</code>	Store a Pandas DataFrame into a Amazon Timestream table.

**awswrangler.timestream.create\_database**

`awswrangler.timestream.create_database` (*database*: *str*, *kms\_key\_id*: *Optional[str] = None*, *tags*: *Optional[Dict[str, str]] = None*, *boto3\_session*: *Optional[boto3.session.Session] = None*) → *str*

Create a new Timestream database.

**Note:** If the KMS key is not specified, the database will be encrypted with a Timestream managed KMS key

located in your account.

---

#### Parameters

- **database** (*str*) – Database name.
- **kms\_key\_id** (*Optional[str]*) – The KMS key for the database. If the KMS key is not specified, the database will be encrypted with a Timestream managed KMS key located in your account.
- **tags** (*Optional[Dict[str, str]]*) – Key/Value dict to put on the database. Tags enable you to categorize databases and/or tables, for example, by purpose, owner, or environment. e.g. {"foo": "boo", "bar": "xoo"}
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** The Amazon Resource Name that uniquely identifies this database. (ARN)

**Return type** *str*

#### Examples

Creating a database.

```
>>> import awswrangler as wr
>>> arn = wr.timestream.create_database("MyDatabase")
```

#### awswrangler.timestream.create\_table

```
awswrangler.timestream.create_table(database: str, table: str, memory_retention_hours:
                                     int, magnetic_retention_days: int, tags: Op-
                                     tional[Dict[str, str]] = None, boto3_session: Op-
                                     tional[boto3.session.Session] = None) → str
```

Create a new Timestream database.

---

**Note:** If the KMS key is not specified, the database will be encrypted with a Timestream managed KMS key located in your account.

---

#### Parameters

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **memory\_retention\_hours** (*int*) – The duration for which data must be stored in the memory store.
- **magnetic\_retention\_days** (*int*) – The duration for which data must be stored in the magnetic store.
- **tags** (*Optional[Dict[str, str]]*) – Key/Value dict to put on the table. Tags enable you to categorize databases and/or tables, for example, by purpose, owner, or environment. e.g. {"foo": "boo", "bar": "xoo"}

- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** The Amazon Resource Name that uniquely identifies this database. (ARN)

**Return type** str

## Examples

Creating a table.

```
>>> import awswrangler as wr
>>> arn = wr.timestream.create_table(
...     database="MyDatabase",
...     table="MyTable",
...     memory_retention_hours=3,
...     magnetic_retention_days=7
... )
```

## awswrangler.timestream.delete\_database

`awswrangler.timestream.delete_database` (*database: str, boto3\_session: Optional[boto3.session.Session] = None*) → None

Delete a given Timestream database. This is an irreversible operation.

After a database is deleted, the time series data from its tables cannot be recovered.

All tables in the database must be deleted first, or a `ValidationException` error will be thrown.

Due to the nature of distributed retries, the operation can return either success or a `ResourceNotFoundException`. Clients should consider them equivalent.

### Parameters

- **database** (*str*) – Database name.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

Deleting a database

```
>>> import awswrangler as wr
>>> arn = wr.timestream.delete_database("MyDatabase")
```

### **awswrangler.timestream.delete\_table**

`awswrangler.timestream.delete_table(database: str, table: str, boto3_session: Optional[boto3.session.Session] = None) → None`

Delete a given Timestream table.

This is an irreversible operation.

After a Timestream database table is deleted, the time series data stored in the table cannot be recovered.

Due to the nature of distributed retries, the operation can return either success or a `ResourceNotFoundException`. Clients should consider them equivalent.

#### **Parameters**

- **database** (*str*) – Database name.
- **table** (*str*) – Table name.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

### **Examples**

Deleting a table

```
>>> import awswrangler as wr
>>> arn = wr.timestream.delete_table("MyDatabase", "MyTable")
```

### **awswrangler.timestream.query**

`awswrangler.timestream.query(sql: str, boto3_session: Optional[boto3.session.Session] = None) → pandas.core.frame.DataFrame`

Run a query and retrieve the result as a Pandas DataFrame.

#### **Parameters**

- **sql** (*str*) – SQL query.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>

**Return type** `pd.DataFrame`

## Examples

Running a query and storing the result as a Pandas DataFrame

```
>>> import awswrangler as wr
>>> df = wr.timestream.query('SELECT * FROM "sampleDB"."sampleTable" ORDER BY_
↳time DESC LIMIT 10')
```

## awswrangler.timestream.write

```
awswrangler.timestream.write(df: pandas.core.frame.DataFrame, database: str, table:
                             str, time_col: str, measure_col: str, dimensions_cols:
                             List[str], num_threads: int = 32, boto3_session: Op-
                             tional[boto3.session.Session] = None) → List[Dict[str, str]]
```

Store a Pandas DataFrame into a Amazon Timestream table.

### Parameters

- **df** (*pandas.DataFrame*) – Pandas DataFrame <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.html>
- **database** (*str*) – Amazon Timestream database name.
- **table** (*str*) – Amazon Timestream table name.
- **time\_col** (*str*) – DataFrame column name to be used as time. MUST be a timestamp column.
- **measure\_col** (*str*) – DataFrame column name to be used as measure.
- **dimensions\_cols** (*List[str]*) – List of DataFrame column names to be used as dimensions.
- **num\_threads** (*str*) – Number of thread to be used for concurrent writing.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 Session will be used if boto3\_session receive None.

**Returns** Rejected records.

**Return type** List[Dict[str, str]]

## Examples

Store a Pandas DataFrame into a Amazon Timestream table.

```
>>> import awswrangler as wr
>>> import pandas as pd
>>> df = pd.DataFrame(
>>>     {
>>>         "time": [datetime.now(), datetime.now(), datetime.now()],
>>>         "dim0": ["foo", "boo", "bar"],
>>>         "dim1": [1, 2, 3],
>>>         "measure": [1.0, 1.1, 1.2],
>>>     }
>>> )
>>> rejected_records = wr.timestream.write(
>>>     df=df,
>>>     database="sampleDB",
```

(continues on next page)

(continued from previous page)

```

>>> table="sampleTable",
>>> time_col="time",
>>> measure_col="measure",
>>> dimensions_cols=["dim0", "dim1"],
>>> )
>>> assert len(rejected_records) == 0

```

## 1.4.9 Amazon EMR

<code>build_spark_step(path[, deploy_mode, ...])</code>	Build the Step structure (dictionary).
<code>build_step(command[, name, ...])</code>	Build the Step structure (dictionary).
<code>create_cluster(subnet_id[, cluster_name, ...])</code>	Create a EMR cluster with instance fleets configuration.
<code>get_cluster_state(cluster_id[, boto3_session])</code>	Get the EMR cluster state.
<code>get_step_state(cluster_id, step_id[, ...])</code>	Get EMR step state.
<code>submit_ecr_credentials_refresh(cluster_id, path)</code>	Update internal ECR credentials.
<code>submit_spark_step(cluster_id, path[, ...])</code>	Submit Spark Step.
<code>submit_step(cluster_id, command[, name, ...])</code>	Submit new job in the EMR Cluster.
<code>submit_steps(cluster_id, steps[, boto3_session])</code>	Submit a list of steps.
<code>terminate_cluster(cluster_id[, boto3_session])</code>	Terminate EMR cluster.

### aws wrangler.emr.build\_spark\_step

`aws wrangler.emr.build_spark_step` (*path*: *str*, *deploy\_mode*: *str* = 'cluster', *docker\_image*: *Optional[str]* = *None*, *name*: *str* = 'my-step', *action\_on\_failure*: *str* = 'CONTINUE', *region*: *Optional[str]* = *None*, *boto3\_session*: *Optional[boto3.session.Session]* = *None*) → *Dict[str, Any]*

Build the Step structure (dictionary).

#### Parameters

- **path** (*str*) – Script path. (e.g. `s3://bucket/app.py`)
- **deploy\_mode** (*str*) – “cluster” | “client”
- **docker\_image** (*str*, *optional*) – e.g. “{ACCOUNT\_ID}.dkr.ecr.{REGION}.amazonaws.com/{IMAGE\_NAME}:{TAG}”
- **name** (*str*, *optional*) – Step name.
- **action\_on\_failure** (*str*) – ‘TERMINATE\_JOB\_FLOW’, ‘TERMINATE\_CLUSTER’, ‘CANCEL\_AND\_WAIT’, ‘CONTINUE’
- **region** (*str*, *optional*) – Region name to not get it from `boto3.Session`. (e.g. *us-east-1*)
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive *None*.

**Returns** Step structure.

**Return type** *Dict[str, Any]*

## Examples

```
>>> import awswrangler as wr
>>> step_id = wr.emr.submit_steps(
>>>     cluster_id="cluster-id",
>>>     steps=[
>>>         wr.emr.build_spark_step(path="s3://bucket/app.py")
>>>     ]
>>> )
```

## awswrangler.emr.build\_step

`awswrangler.emr.build_step`(*command: str, name: str = 'my-step', action\_on\_failure: str = 'CONTINUE', script: bool = False, region: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Dict[str, Any]

Build the Step structure (dictionary).

### Parameters

- **command** (*str*) – e.g. 'echo "Hello!"' e.g. for script 's3://.../script.sh arg1 arg2'
- **name** (*str, optional*) – Step name.
- **action\_on\_failure** (*str*) – 'TERMINATE\_JOB\_FLOW', 'TERMINATE\_CLUSTER', 'CANCEL\_AND\_WAIT', 'CONTINUE'
- **script** (*bool*) – False for raw command or True for script runner. <https://docs.aws.amazon.com/emr/latest/ReleaseGuide/emr-commandrunner.html>
- **region** (*str, optional*) – Region name to not get it from boto3.Session. (e.g. *us-east-1*)
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Step structure.

**Return type** Dict[str, Any]

## Examples

```
>>> import awswrangler as wr
>>> steps = []
>>> for cmd in ['echo "Hello"', 'ls -la']:
...     steps.append(wr.emr.build_step(name=cmd, command=cmd))
>>> wr.emr.submit_steps(cluster_id="cluster-id", steps=steps)
```

**aws wrangler.emr.create\_cluster**

```
aws wrangler.emr.create_cluster(subnet_id: str, cluster_name: str = 'my-emr-
cluster', logging_s3_path: Optional[str] = None,
emr_release: str = 'emr-6.0.0', emr_ec2_role:
str = 'EMR_EC2_DefaultRole', emr_role: str =
'EMR_DefaultRole', instance_type_master: str = 'r5.xlarge',
instance_type_core: str = 'r5.xlarge', instance_type_task:
str = 'r5.xlarge', instance_ebs_size_master: int = 64, in-
stance_ebs_size_core: int = 64, instance_ebs_size_task:
int = 64, instance_num_on_demand_master: int
= 1, instance_num_on_demand_core: int = 0,
instance_num_on_demand_task: int = 0, in-
stance_num_spot_master: int = 0, instance_num_spot_core:
int = 0, instance_num_spot_task: int = 0,
spot_bid_percentage_of_on_demand_master: int =
100, spot_bid_percentage_of_on_demand_core: int
= 100, spot_bid_percentage_of_on_demand_task:
int = 100, spot_provisioning_timeout_master:
int = 5, spot_provisioning_timeout_core: int
= 5, spot_provisioning_timeout_task: int = 5,
spot_timeout_to_on_demand_master: bool = True,
spot_timeout_to_on_demand_core: bool = True,
spot_timeout_to_on_demand_task: bool = True, python3: bool
= True, spark_glue_catalog: bool = True, hive_glue_catalog:
bool = True, presto_glue_catalog: bool = True, consistent_view:
bool = False, consistent_view_retry_seconds: int = 10, consis-
tent_view_retry_count: int = 5, consistent_view_table_name:
str = 'EmrFSMetadata', bootstraps_paths: Optional[List[str]] =
None, debugging: bool = True, applications: Optional[List[str]]
= None, visible_to_all_users: bool = True, key_pair_name:
Optional[str] = None, security_group_master: Optional[str] =
None, security_groups_master_additional: Optional[List[str]]
= None, security_group_slave: Optional[str] = None, se-
curity_groups_slave_additional: Optional[List[str]] =
None, security_group_service_access: Optional[str] =
None, docker: bool = False, extra_public_registries: Op-
tional[List[str]] = None, spark_log_level: str = 'WARN',
spark_jars_path: Optional[List[str]] = None, spark_defaults:
Optional[Dict[str, str]] = None, spark_pyarrow: bool
= False, custom_classifications: Optional[List[Dict[str,
Any]]] = None, maximize_resource_allocation: bool =
False, steps: Optional[List[Dict[str, Any]]] = None,
keep_cluster_alive_when_no_steps: bool = True, termina-
tion_protected: bool = False, tags: Optional[Dict[str, str]] =
None, boto3_session: Optional[boto3.session.Session] = None)
→ str
```

Create a EMR cluster with instance fleets configuration.

<https://docs.aws.amazon.com/emr/latest/ManagementGuide/emr-instance-fleet.html>

**Parameters**

- **subnet\_id** (*str*) – VPC subnet ID.
- **cluster\_name** (*str*) – Cluster name.



- **logging\_s3\_path** (*str*, *optional*) – Logging s3 path (e.g. `s3://BUCKET_NAME/DIRECTORY_NAME/`). If None, the default is `s3://aws-logs-{AccountId}-{RegionId}/elasticmapreduce/`
- **emr\_release** (*str*) – EMR release (e.g. `emr-5.28.0`).
- **emr\_ec2\_role** (*str*) – IAM role name.
- **emr\_role** (*str*) – IAM role name.
- **instance\_type\_master** (*str*) – EC2 instance type.
- **instance\_type\_core** (*str*) – EC2 instance type.
- **instance\_type\_task** (*str*) – EC2 instance type.
- **instance\_ebs\_size\_master** (*int*) – Size of EBS in GB.
- **instance\_ebs\_size\_core** (*int*) – Size of EBS in GB.
- **instance\_ebs\_size\_task** (*int*) – Size of EBS in GB.
- **instance\_num\_on\_demand\_master** (*int*) – Number of on demand instances.
- **instance\_num\_on\_demand\_core** (*int*) – Number of on demand instances.
- **instance\_num\_on\_demand\_task** (*int*) – Number of on demand instances.
- **instance\_num\_spot\_master** (*int*) – Number of spot instances.
- **instance\_num\_spot\_core** (*int*) – Number of spot instances.
- **instance\_num\_spot\_task** (*int*) – Number of spot instances.
- **spot\_bid\_percentage\_of\_on\_demand\_master** (*int*) – The bid price, as a percentage of On-Demand price.
- **spot\_bid\_percentage\_of\_on\_demand\_core** (*int*) – The bid price, as a percentage of On-Demand price.
- **spot\_bid\_percentage\_of\_on\_demand\_task** (*int*) – The bid price, as a percentage of On-Demand price.
- **spot\_provisioning\_timeout\_master** (*int*) – The spot provisioning timeout period in minutes. If Spot instances are not provisioned within this time period, the `TimeOutAction` is taken. Minimum value is 5 and maximum value is 1440. The timeout applies only during initial provisioning, when the cluster is first created.
- **spot\_provisioning\_timeout\_core** (*int*) – The spot provisioning timeout period in minutes. If Spot instances are not provisioned within this time period, the `TimeOutAction` is taken. Minimum value is 5 and maximum value is 1440. The timeout applies only during initial provisioning, when the cluster is first created.
- **spot\_provisioning\_timeout\_task** (*int*) – The spot provisioning timeout period in minutes. If Spot instances are not provisioned within this time period, the `TimeOutAction` is taken. Minimum value is 5 and maximum value is 1440. The timeout applies only during initial provisioning, when the cluster is first created.
- **spot\_timeout\_to\_on\_demand\_master** (*bool*) – After a provisioning timeout should the cluster switch to on demand or shutdown?
- **spot\_timeout\_to\_on\_demand\_core** (*bool*) – After a provisioning timeout should the cluster switch to on demand or shutdown?
- **spot\_timeout\_to\_on\_demand\_task** (*bool*) – After a provisioning timeout should the cluster switch to on demand or shutdown?

- **python3** (*bool*) – Python 3 Enabled?
- **spark\_glue\_catalog** (*bool*) – Spark integration with Glue Catalog?
- **hive\_glue\_catalog** (*bool*) – Hive integration with Glue Catalog?
- **presto\_glue\_catalog** (*bool*) – Presto integration with Glue Catalog?
- **consistent\_view** (*bool*) – Consistent view allows EMR clusters to check for list and read-after-write consistency for Amazon S3 objects written by or synced with EMRFS. <https://docs.aws.amazon.com/emr/latest/ManagementGuide/emr-plan-consistent-view.html>
- **consistent\_view\_retry\_seconds** (*int*) – Delay between the tries (seconds).
- **consistent\_view\_retry\_count** (*int*) – Number of tries.
- **consistent\_view\_table\_name** (*str*) – Name of the DynamoDB table to store the consistent view data.
- **bootstraps\_paths** (*List[str]*, *optional*) – Bootstraps paths (e.g. ["s3://BUCKET\_NAME/script.sh"]).
- **debugging** (*bool*) – Debugging enabled?
- **applications** (*List[str]*, *optional*) – List of applications (e.g. ["Hadoop", "Spark", "Ganglia", "Hive"]). If None, ["Spark"] will be considered.
- **visible\_to\_all\_users** (*bool*) – True or False.
- **key\_pair\_name** (*str*, *optional*) – Key pair name.
- **security\_group\_master** (*str*, *optional*) – The identifier of the Amazon EC2 security group for the master node.
- **security\_groups\_master\_additional** (*str*, *optional*) – A list of additional Amazon EC2 security group IDs for the master node.
- **security\_group\_slave** (*str*, *optional*) – The identifier of the Amazon EC2 security group for the core and task nodes.
- **security\_groups\_slave\_additional** (*str*, *optional*) – A list of additional Amazon EC2 security group IDs for the core and task nodes.
- **security\_group\_service\_access** (*str*, *optional*) – The identifier of the Amazon EC2 security group for the Amazon EMR service to access clusters in VPC private subnets.
- **docker** (*bool*) – Enable Docker Hub and ECR registries access.
- **extra\_public\_registries** (*List[str]*, *optional*) – Additional docker registries.
- **spark\_log\_level** (*str*) – log4j.rootCategory log level (ALL, DEBUG, INFO, WARN, ERROR, FATAL, OFF, TRACE).
- **spark\_jars\_path** (*List[str]*, *optional*) – spark.jars e.g. [s3://.../foo.jar, s3://.../boo.jar] <https://spark.apache.org/docs/latest/configuration.html>
- **spark\_defaults** (*Dict[str, str]*, *optional*) – <https://docs.aws.amazon.com/emr/latest/ReleaseGuide/emr-spark-configure.html#spark-defaults>
- **spark\_pyarrow** (*bool*) – Enable PySpark to use PyArrow behind the scenes. P.S. You must install pyarrow by your self via bootstrap

- **custom\_classifications** (*List[Dict[str, Any]]*, *optional*) – Extra classifications.
- **maximize\_resource\_allocation** (*bool*) – Configure your executors to utilize the maximum resources possible <https://docs.aws.amazon.com/emr/latest/ReleaseGuide/emr-spark-configure.html#emr-spark-maximizeresourceallocation>
- **steps** (*List[Dict[str, Any]]*, *optional*) – Steps definitions (Obs : str Use EMR.build\_step() to build it)
- **keep\_cluster\_alive\_when\_no\_steps** (*bool*) – Specifies whether the cluster should remain available after completing all steps
- **termination\_protected** (*bool*) – Specifies whether the Amazon EC2 instances in the cluster are protected from termination by API calls, user intervention, or in the event of a job-flow error.
- **tags** (*Dict[str, str]*, *optional*) – Key/Value collection to put on the Cluster. e.g. {"foo": "boo", "bar": "xoo"}
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Cluster ID.

**Return type** str

## Examples

### Minimal Example

```
>>> import awswrangler as wr
>>> cluster_id = wr.emr.create_cluster("SUBNET_ID")
```

### Minimal Example With Custom Classification

```
>>> import awswrangler as wr
>>> cluster_id = wr.emr.create_cluster(
>>>     subnet_id="SUBNET_ID",
>>>     custom_classifications=[
>>>         {
>>>             "Classification": "livy-conf",
>>>             "Properties": {
>>>                 "livy.spark.master": "yarn",
>>>                 "livy.spark.deploy-mode": "cluster",
>>>                 "livy.server.session.timeout": "16h",
>>>             },
>>>         }
>>>     ],
>>> )
```

### Full Example

```
>>> import awswrangler as wr
>>> cluster_id = wr.emr.create_cluster(
...     cluster_name="wrangler_cluster",
...     logging_s3_path=f"s3://BUCKET_NAME/emr-logs/",
...     emr_release="emr-5.28.0",
...     subnet_id="SUBNET_ID",
```

(continues on next page)

(continued from previous page)

```

...     emr_ec2_role="EMR_EC2_DefaultRole",
...     emr_role="EMR_DefaultRole",
...     instance_type_master="m5.xlarge",
...     instance_type_core="m5.xlarge",
...     instance_type_task="m5.xlarge",
...     instance_ebs_size_master=50,
...     instance_ebs_size_core=50,
...     instance_ebs_size_task=50,
...     instance_num_on_demand_master=1,
...     instance_num_on_demand_core=1,
...     instance_num_on_demand_task=1,
...     instance_num_spot_master=0,
...     instance_num_spot_core=1,
...     instance_num_spot_task=1,
...     spot_bid_percentage_of_on_demand_master=100,
...     spot_bid_percentage_of_on_demand_core=100,
...     spot_bid_percentage_of_on_demand_task=100,
...     spot_provisioning_timeout_master=5,
...     spot_provisioning_timeout_core=5,
...     spot_provisioning_timeout_task=5,
...     spot_timeout_to_on_demand_master=True,
...     spot_timeout_to_on_demand_core=True,
...     spot_timeout_to_on_demand_task=True,
...     python3=True,
...     spark_glue_catalog=True,
...     hive_glue_catalog=True,
...     presto_glue_catalog=True,
...     bootstraps_paths=None,
...     debugging=True,
...     applications=["Hadoop", "Spark", "Ganglia", "Hive"],
...     visible_to_all_users=True,
...     key_pair_name=None,
...     spark_jars_path=[f"s3://...jar"],
...     maximize_resource_allocation=True,
...     keep_cluster_alive_when_no_steps=True,
...     termination_protected=False,
...     spark_pyarrow=True,
...     tags={
...         "foo": "boo"
...     })

```

### aws wrangler.emr.get\_cluster\_state

`aws wrangler.emr.get_cluster_state` (*cluster\_id*: *str*, *boto3\_session*: *Optional[boto3.session.Session] = None*) → *str*

Get the EMR cluster state.

Possible states: 'STARTING', 'BOOTSTRAPPING', 'RUNNING', 'WAITING', 'TERMINATING', 'TERMINATED', 'TERMINATED\_WITH\_ERRORS'

#### Parameters

- **cluster\_id** (*str*) – Cluster ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** State.

**Return type** str

### Examples

```
>>> import awswrangler as wr
>>> state = wr.emr.get_cluster_state("cluster-id")
```

### awswrangler.emr.get\_step\_state

`awswrangler.emr.get_step_state(cluster_id: str, step_id: str, boto3_session: Optional[boto3.session.Session] = None) → str`

Get EMR step state.

Possible states: 'PENDING', 'CANCEL\_PENDING', 'RUNNING', 'COMPLETED', 'CANCELLED', 'FAILED', 'INTERRUPTED'

#### Parameters

- **cluster\_id** (*str*) – Cluster ID.
- **step\_id** (*str*) – Step ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** State.

**Return type** str

### Examples

```
>>> import awswrangler as wr
>>> state = wr.emr.get_step_state("cluster-id", "step-id")
```

### awswrangler.emr.submit\_ecr\_credentials\_refresh

`awswrangler.emr.submit_ecr_credentials_refresh(cluster_id: str, path: str, action_on_failure: str = 'CONTINUE', boto3_session: Optional[boto3.session.Session] = None) → str`

Update internal ECR credentials.

#### Parameters

- **cluster\_id** (*str*) – Cluster ID.
- **path** (*str*) – Amazon S3 path where Wrangler will stage the script `ecr_credentials_refresh.py` (e.g. `s3://bucket/emr/`)
- **action\_on\_failure** (*str*) – 'TERMINATE\_JOB\_FLOW', 'TERMINATE\_CLUSTER', 'CANCEL\_AND\_WAIT', 'CONTINUE'
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Step ID.

**Return type** str

## Examples

```
>>> import awswrangler as wr
>>> step_id = wr.emr.submit_ecr_credentials_refresh("cluster_id", "s3://bucket/
↳emr/")
```

## awswrangler.emr.submit\_spark\_step

`awswrangler.emr.submit_spark_step`(*cluster\_id*: str, *path*: str, *deploy\_mode*: str = 'cluster', *docker\_image*: Optional[str] = None, *name*: str = 'my-step', *action\_on\_failure*: str = 'CONTINUE', *region*: Optional[str] = None, *boto3\_session*: Optional[boto3.session.Session] = None) → str

Submit Spark Step.

### Parameters

- **cluster\_id** (str) – Cluster ID.
- **path** (str) – Script path. (e.g. s3://bucket/app.py)
- **deploy\_mode** (str) – “cluster” | “client”
- **docker\_image** (str, optional) – e.g. “{ACCOUNT\_ID}.dkr.ecr.{REGION}.amazonaws.com/{IMAGE\_NAME}:{TAG}”
- **name** (str, optional) – Step name.
- **action\_on\_failure** (str) – ‘TERMINATE\_JOB\_FLOW’, ‘TERMINATE\_CLUSTER’, ‘CANCEL\_AND\_WAIT’, ‘CONTINUE’
- **region** (str, optional) – Region name to not get it from boto3.Session. (e.g. *us-east-1*)
- **boto3\_session** (boto3.Session(), optional) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Step ID.

**Return type** str

## Examples

```
>>> import awswrangler as wr
>>> step_id = wr.emr.submit_spark_step(
>>>     cluster_id="cluster-id",
>>>     path="s3://bucket/emr/app.py"
>>> )
```

### aws wrangler.emr.submit\_step

`aws wrangler.emr.submit_step` (*cluster\_id*: str, *command*: str, *name*: str = 'my-step', *action\_on\_failure*: str = 'CONTINUE', *script*: bool = False, *boto3\_session*: Optional[boto3.session.Session] = None) → str

Submit new job in the EMR Cluster.

#### Parameters

- **cluster\_id** (str) – Cluster ID.
- **command** (str) – e.g. 'echo "Hello!"' e.g. for script 's3://.../script.sh arg1 arg2'
- **name** (str, optional) – Step name.
- **action\_on\_failure** (str) – 'TERMINATE\_JOB\_FLOW', 'TERMINATE\_CLUSTER', 'CANCEL\_AND\_WAIT', 'CONTINUE'
- **script** (bool) – True for raw command or False for script runner. <https://docs.aws.amazon.com/emr/latest/ReleaseGuide/emr-commandrunner.html>
- **boto3\_session** (boto3.Session(), optional) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Step ID.

**Return type** str

#### Examples

```
>>> import aws wrangler as wr
>>> step_id = wr.emr.submit_step(
...     cluster_id=cluster_id,
...     name="step_test",
...     command="s3://...script.sh arg1 arg2",
...     script=True)
```

### aws wrangler.emr.submit\_steps

`aws wrangler.emr.submit_steps` (*cluster\_id*: str, *steps*: List[Dict[str, Any]], *boto3\_session*: Optional[boto3.session.Session] = None) → List[str]

Submit a list of steps.

#### Parameters

- **cluster\_id** (str) – Cluster ID.
- **steps** (List[Dict[str, Any]]) – Steps definitions (Obs: Use EMR.build\_step() to build it).
- **boto3\_session** (boto3.Session(), optional) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** List of step IDs.

**Return type** List[str]

## Examples

```
>>> import awswrangler as wr
>>> for cmd in ['echo "Hello"', 'ls -la']:
...     steps.append(wr.emr.build_step(name=cmd, command=cmd))
>>> wr.emr.submit_steps(cluster_id="cluster-id", steps=steps)
```

## awswrangler.emr.terminate\_cluster

`awswrangler.emr.terminate_cluster` (*cluster\_id*: *str*, *boto3\_session*: *Optional[boto3.session.Session]* = *None*) → *None*

Terminate EMR cluster.

### Parameters

- **cluster\_id** (*str*) – Cluster ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive *None*.

**Returns** *None*.

**Return type** *None*

## Examples

```
>>> import awswrangler as wr
>>> wr.emr.terminate_cluster("cluster-id")
```

## 1.4.10 Amazon CloudWatch Logs

<code>read_logs</code> (query, log_group_names[, ...])	Run a query against AWS CloudWatchLogs Insights and convert the results to Pandas DataFrame.
<code>run_query</code> (query, log_group_names[, ...])	Run a query against AWS CloudWatchLogs Insights and wait the results.
<code>start_query</code> (query, log_group_names[, ...])	Run a query against AWS CloudWatchLogs Insights.
<code>wait_query</code> (query_id[, boto3_session])	Wait query ends.

## awswrangler.cloudwatch.read\_logs

`awswrangler.cloudwatch.read_logs` (*query*: *str*, *log\_group\_names*: *List[str]*, *start\_time*: *datetime.datetime* = *datetime.datetime(1970, 1, 1, 0, 0, tzinfo=datetime.timezone.utc)*, *end\_time*: *datetime.datetime* = *datetime.datetime(2021, 4, 15, 17, 21, 31, 301945)*, *limit*: *Optional[int]* = *None*, *boto3\_session*: *Optional[boto3.session.Session]* = *None*) → *pandas.core.frame.DataFrame*

Run a query against AWS CloudWatchLogs Insights and convert the results to Pandas DataFrame.

[https://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/CWL\\_QuerySyntax.html](https://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/CWL_QuerySyntax.html)

### Parameters



- **query** (*str*) – The query string.
- **log\_group\_names** (*str*) – The list of log groups to be queried. You can include up to 20 log groups.
- **start\_time** (*datetime.datetime*) – The beginning of the time range to query.
- **end\_time** (*datetime.datetime*) – The end of the time range to query.
- **limit** (*Optional[int]*) – The maximum number of log events to return in the query.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Result as a Pandas DataFrame.

**Return type** pandas.DataFrame

### Examples

```
>>> import awswrangler as wr
>>> df = wr.cloudwatch.read_logs(
...     log_group_names=["loggroup"],
...     query="fields @timestamp, @message | sort @timestamp desc | limit 5",
... )
```

### awswrangler.cloudwatch.run\_query

`awswrangler.cloudwatch.run_query` (*query: str, log\_group\_names: List[str], start\_time: datetime.datetime = datetime.datetime(1970, 1, 1, 0, 0, tzinfo=datetime.timezone.utc), end\_time: datetime.datetime = datetime.datetime(2021, 4, 15, 17, 21, 31, 301919), limit: Optional[int] = None, boto3\_session: Optional[boto3.session.Session] = None*) → List[List[Dict[str, str]]]

Run a query against AWS CloudWatchLogs Insights and wait the results.

[https://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/CWL\\_QuerySyntax.html](https://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/CWL_QuerySyntax.html)

#### Parameters

- **query** (*str*) – The query string.
- **log\_group\_names** (*str*) – The list of log groups to be queried. You can include up to 20 log groups.
- **start\_time** (*datetime.datetime*) – The beginning of the time range to query.
- **end\_time** (*datetime.datetime*) – The end of the time range to query.
- **limit** (*Optional[int]*) – The maximum number of log events to return in the query.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Result.

**Return type** List[List[Dict[str, str]]]

## Examples

```
>>> import awswrangler as wr
>>> result = wr.cloudwatch.run_query(
...     log_group_names=["loggroup"],
...     query="fields @timestamp, @message | sort @timestamp desc | limit 5",
... )
```

## awswrangler.cloudwatch.start\_query

`awswrangler.cloudwatch.start_query` (*query: str, log\_group\_names: List[str], start\_time: datetime.datetime = datetime.datetime(1970, 1, 1, 0, 0, tzinfo=datetime.timezone.utc), end\_time: datetime.datetime = datetime.datetime(2021, 4, 15, 17, 21, 31, 301905), limit: Optional[int] = None, boto3\_session: Optional[boto3.session.Session] = None*) → str

Run a query against AWS CloudWatchLogs Insights.

[https://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/CWL\\_QuerySyntax.html](https://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/CWL_QuerySyntax.html)

### Parameters

- **query** (*str*) – The query string.
- **log\_group\_names** (*str*) – The list of log groups to be queried. You can include up to 20 log groups.
- **start\_time** (*datetime.datetime*) – The beginning of the time range to query.
- **end\_time** (*datetime.datetime*) – The end of the time range to query.
- **limit** (*Optional[int]*) – The maximum number of log events to return in the query.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Query ID.

**Return type** str

## Examples

```
>>> import awswrangler as wr
>>> query_id = wr.cloudwatch.start_query(
...     log_group_names=["loggroup"],
...     query="fields @timestamp, @message | sort @timestamp desc | limit 5",
... )
```

**aws wrangler.cloudwatch.wait\_query**

`aws wrangler.cloudwatch.wait_query` (*query\_id*: *str*, *boto3\_session*: *Optional[boto3.session.Session] = None*) → Dict[str, Any]

Wait query ends.

[https://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/CWL\\_QuerySyntax.html](https://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/CWL_QuerySyntax.html)

**Parameters**

- **query\_id** (*str*) – Query ID.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Query result payload.

**Return type** Dict[str, Any]

**Examples**

```
>>> import aws wrangler as wr
>>> query_id = wr.cloudwatch.start_query(
...     log_group_names=["loggroup"],
...     query="fields @timestamp, @message | sort @timestamp desc | limit 5",
... )
... response = wr.cloudwatch.wait_query(query_id=query_id)
```

**1.4.11 Amazon QuickSight**

<code>cancel_ingestion(ingestion_id[, ...])</code>	Cancel an ongoing ingestion of data into SPICE.
<code>create_athena_data_source(name[, work-group, ...])</code>	Create a QuickSight data source pointing to an Athena/Workgroup.
<code>create_athena_dataset(name[, database, ...])</code>	Create a QuickSight dataset.
<code>create_ingestion([dataset_name, dataset_id, ...])</code>	Create and starts a new SPICE ingestion on a dataset.
<code>delete_all_dashboards([account_id, ...])</code>	Delete all dashboards.
<code>delete_all_data_sources([account_id, ...])</code>	Delete all data sources.
<code>delete_all_datasets([account_id, boto3_session])</code>	Delete all datasets.
<code>delete_all_templates([account_id, boto3_session])</code>	Delete all templates.
<code>delete_dashboard([name, dashboard_id, ...])</code>	Delete a dashboard.
<code>delete_data_source([name, data_source_id, ...])</code>	Delete a data source.
<code>delete_dataset([name, dataset_id, ...])</code>	Delete a dataset.
<code>delete_template([name, template_id, ...])</code>	Delete a tamplate.
<code>describe_dashboard([name, dashboard_id, ...])</code>	Describe a QuickSight dashboard by name or ID.
<code>describe_data_source([name, data_source_id, ...])</code>	Describe a QuickSight data source by name or ID.
<code>describe_data_source_permissions([name, ...])</code>	Describe a QuickSight data source permissions by name or ID.
<code>describe_dataset([name, dataset_id, ...])</code>	Describe a QuickSight dataset by name or ID.

continues on next page

Table 12 – continued from previous page

<code>describe_ingestion(ingestion_id[, ...])</code>	Describe a QuickSight ingestion by ID.
<code>get_dashboard_id(name[, account_id, ...])</code>	Get QuickSight dashboard ID given a name and fails if there is more than 1 ID associated with this name.
<code>get_dashboard_ids(name[, account_id, ...])</code>	Get QuickSight dashboard IDs given a name.
<code>get_data_source_arn(name[, account_id, ...])</code>	Get QuickSight data source ARN given a name and fails if there is more than 1 ARN associated with this name.
<code>get_data_source_arns(name[, account_id, ...])</code>	Get QuickSight Data source ARNs given a name.
<code>get_data_source_id(name[, account_id, ...])</code>	Get QuickSight data source ID given a name and fails if there is more than 1 ID associated with this name.
<code>get_data_source_ids(name[, account_id, ...])</code>	Get QuickSight data source IDs given a name.
<code>get_dataset_id(name[, account_id, boto3_session])</code>	Get QuickSight Dataset ID given a name and fails if there is more than 1 ID associated with this name.
<code>get_dataset_ids(name[, account_id, ...])</code>	Get QuickSight dataset IDs given a name.
<code>get_template_id(name[, account_id, ...])</code>	Get QuickSight template ID given a name and fails if there is more than 1 ID associated with this name.
<code>get_template_ids(name[, account_id, ...])</code>	Get QuickSight template IDs given a name.
<code>list_dashboards([account_id, boto3_session])</code>	List dashboards in an AWS account.
<code>list_data_sources([account_id, boto3_session])</code>	List all QuickSight Data sources summaries.
<code>list_datasets([account_id, boto3_session])</code>	List all QuickSight datasets summaries.
<code>list_groups([namespace, account_id, ...])</code>	List all QuickSight Groups.
<code>list_group_memberships(group_name[, ...])</code>	List all QuickSight Group memberships.
<code>list_iam_policy_assignments([status, ...])</code>	List IAM policy assignments in the current Amazon QuickSight account.
<code>list_iam_policy_assignments_for_user(user[, ...])</code>	List the IAM policy assignments.
<code>list_ingestions([dataset_name, dataset_id, ...])</code>	List the history of SPICE ingestions for a dataset.
<code>list_templates([account_id, boto3_session])</code>	List all QuickSight templates.
<code>list_users([namespace, account_id, ...])</code>	Return a list of all of the Amazon QuickSight users belonging to this account.
<code>list_user_groups(user_name[, namespace, ...])</code>	List the Amazon QuickSight groups that an Amazon QuickSight user is a member of.

## aws wrangler quicksight.cancel\_ingestion

`aws wrangler quicksight.cancel_ingestion(ingestion_id: str, dataset_name: Optional[str] = None, dataset_id: Optional[str] = None, account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → None`

Cancel an ongoing ingestion of data into SPICE.

**Note:** You must pass a not None value for `dataset_name` or `dataset_id` argument.

### Parameters

- **ingestion\_id** (*str*) – Ingestion ID.
- **dataset\_name** (*str, optional*) – Dataset name.
- **dataset\_id** (*str, optional*) – Dataset ID.
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.

- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.cancel_ingestion(ingestion_id="...", dataset_name="...")
```

## awswrangler.quicksight.create\_athena\_data\_source

```
awswrangler.quicksight.create_athena_data_source(name: str, workgroup: str
                                                  = 'primary', allowed_to_use:
                                                  Optional[List[str]] = None,
                                                  allowed_to_manage:
                                                  Optional[List[str]] = None, tags:
                                                  Optional[Dict[str, str]] = None,
                                                  account_id: Optional[str] =
                                                  None, boto3_session:
                                                  Optional[boto3.session.Session] =
                                                  None, namespace: str = 'default') →
                                                  None
```

Create a QuickSight data source pointing to an Athena/Workgroup.

**Note:** You will not be able to see the the data source in the console if you not pass your user to one of the `allowed_*` arguments.

### Parameters

- **name** (*str*) – Data source name.
- **workgroup** (*str*) – Athena workgroup.
- **tags** (*Dict[str, str]*, *optional*) – Key/Value collection to put on the Cluster. e.g. {"foo": "boo", "bar": "xoo"}
- **allowed\_to\_use** (*optional*) – List of principals that will be allowed to see and use the data source. e.g. ["John"]
- **allowed\_to\_manage** (*optional*) – List of principals that will be allowed to see, use, update and delete the data source. e.g. ["Mary"]
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **namespace** (*str*) – The namespace. Currently, you should set this to default.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.create_athena_data_source(
...     name="...",
...     allowed_to_manage=["john"]
... )
```

### awswrangler.quicksight.create\_athena\_dataset

```
awswrangler.quicksight.create_athena_dataset(name: str, database: Optional[str] =
None, table: Optional[str] = None, sql:
Optional[str] = None, sql_name: str =
'CustomSQL', data_source_name: Op-
tional[str] = None, data_source_arn:
Optional[str] = None, import_mode: str
= 'DIRECT_QUERY', allowed_to_use:
Optional[List[str]] = None, al-
lowed_to_manage: Optional[List[str]]
= None, logical_table_alias: str
= 'LogicalTable', rename_columns:
Optional[Dict[str, str]] = None,
cast_columns_types: Optional[Dict[str,
str]] = None, tags: Optional[Dict[str,
str]] = None, account_id: Op-
tional[str] = None, boto3_session:
Optional[boto3.session.Session] = None,
namespace: str = 'default') → str
```

Create a QuickSight dataset.

---

**Note:** You will not be able to see the the dataset in the console if you not pass your username to one of the `allowed_*` arguments.

---



---

**Note:** You must pass database/table OR sql argument.

---



---

**Note:** You must pass `data_source_name` OR `data_source_arn` argument.

---

### Parameters

- **name** (*str*) – Dataset name.
- **database** (*str*) – Athena's database name.
- **table** (*str*) – Athena's table name.
- **sql** (*str*) – Use a SQL query to define your table.
- **sql\_name** (*str*) – Query name.
- **data\_source\_name** (*str*, *optional*) – QuickSight data source name.
- **data\_source\_arn** (*str*, *optional*) – QuickSight data source ARN.

- **import\_mode** (*str*) – Indicates whether you want to import the data into SPICE. ‘SPICE’|‘DIRECT\_QUERY’
- **tags** (*Dict[str, str]*, *optional*) – Key/Value collection to put on the Cluster. e.g. {“foo”: “boo”, “bar”: “xoo”}
- **allowed\_to\_use** (*optional*) – List of usernames that will be allowed to see and use the data source. e.g. [“john”, “Mary”]
- **allowed\_to\_manage** (*optional*) – List of usernames that will be allowed to see, use, update and delete the data source. e.g. [“Mary”]
- **logical\_table\_alias** (*str*) – A display name for the logical table.
- **rename\_columns** (*Dict[str, str]*, *optional*) – Dictionary to map column re-names. e.g. {“old\_name”: “new\_name”, “old\_name2”: “new\_name2”}
- **cast\_columns\_types** (*Dict[str, str]*, *optional*) – Dictionary to map column casts. e.g. {“col\_name”: “STRING”, “col\_name2”: “DECIMAL”} Valid types: ‘STRING’|‘INTEGER’|‘DECIMAL’|‘DATETIME’
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.
- **namespace** (*str*) – The namespace. Currently, you should set this to default.

**Returns** Dataset ID.

**Return type** *str*

## Examples

```
>>> import awswrangler as wr
>>> dataset_id = wr.quicksight.create_athena_dataset(
...     name="...",
...     database="..."
...     table="..."
...     data_source_name="..."
...     allowed_to_manage=["Mary"]
... )
```

## awswrangler.quicksight.create\_ingestion

`awswrangler.quicksight.create_ingestion` (*dataset\_name: Optional[str] = None, dataset\_id: Optional[str] = None, ingestion\_id: Optional[str] = None, account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → *str*

Create and starts a new SPICE ingestion on a dataset.

---

**Note:** You must pass `dataset_name` OR `dataset_id` argument.

---

## Parameters

- **dataset\_name** (*str*, *optional*) – Dataset name.
- **dataset\_id** (*str*, *optional*) – Dataset ID.
- **ingestion\_id** (*str*, *optional*) – Ingestion ID.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Ingestion ID

**Return type** *str*

### Examples

```
>>> import awswrangler as wr
>>> status = wr.quicksight.create_ingestion("my_dataset")
```

### awswrangler.quicksight.delete\_all\_dashboards

```
awswrangler.quicksight.delete_all_dashboards (account_id: Optional[str] =
None, boto3_session: Optional[boto3.session.Session] = None)
→ None
```

Delete all dashboards.

#### Parameters

- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.delete_all_dashboards()
```

### awswrangler.quicksight.delete\_all\_data\_sources

```
awswrangler.quicksight.delete_all_data_sources (account_id: Optional[str] =
None, boto3_session: Optional[boto3.session.Session] = None)
→ None
```

Delete all data sources.

#### Parameters



- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.delete_all_data_sources()
```

### awswrangler.quicksight.delete\_all\_datasets

```
awswrangler.quicksight.delete_all_datasets(account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → None
```

Delete all datasets.

#### Parameters

- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.delete_all_datasets()
```

### awswrangler.quicksight.delete\_all\_templates

```
awswrangler.quicksight.delete_all_templates(account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → None
```

Delete all templates.

#### Parameters

- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.delete_all_templates()
```

### awswrangler.quicksight.delete\_dashboard

`awswrangler.quicksight.delete_dashboard` (*name: Optional[str] = None, dashboard\_id: Optional[str] = None, version\_number: Optional[int] = None, account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → None

Delete a dashboard.

---

**Note:** You must pass a not None name or dashboard\_id argument.

---

#### Parameters

- **name** (*str, optional*) – Dashboard name.
- **dashboard\_id** (*str, optional*) – The ID for the dashboard.
- **version\_number** (*int, optional*) – The version number of the dashboard. If the version number property is provided, only the specified version of the dashboard is deleted.
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

### Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.delete_dashboard(name="...")
```

### awswrangler.quicksight.delete\_data\_source

`awswrangler.quicksight.delete_data_source` (*name: Optional[str] = None, data\_source\_id: Optional[str] = None, account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → None

Delete a data source.

---

**Note:** You must pass a not None name or data\_source\_id argument.

---

#### Parameters

- **name** (*str*, *optional*) – Dashboard name.
- **data\_source\_id** (*str*, *optional*) – The ID for the data source.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

#### Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.delete_data_source(name="...")
```

#### awswrangler.quicksight.delete\_dataset

`awswrangler.quicksight.delete_dataset` (*name: Optional[str] = None, dataset\_id: Optional[str] = None, account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → None

Delete a dataset.

---

**Note:** You must pass a not None name or dataset\_id argument.

---

#### Parameters

- **name** (*str*, *optional*) – Dashboard name.
- **dataset\_id** (*str*, *optional*) – The ID for the dataset.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.delete_dataset(name="...")
```

### awswrangler.quicksight.delete\_template

`awswrangler.quicksight.delete_template` (*name: Optional[str] = None, template\_id: Optional[str] = None, version\_number: Optional[int] = None, account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → None

Delete a template.

---

**Note:** You must pass a not None name or template\_id argument.

---

#### Parameters

- **name** (*str, optional*) – Dashboard name.
- **template\_id** (*str, optional*) – The ID for the dashboard.
- **version\_number** (*int, optional*) – Specifies the version of the template that you want to delete. If you don't provide a version number, it deletes all versions of the template.
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** None.

**Return type** None

## Examples

```
>>> import awswrangler as wr
>>> wr.quicksight.delete_template(name="...")
```

### awswrangler.quicksight.describe\_dashboard

`awswrangler.quicksight.describe_dashboard` (*name: Optional[str] = None, dashboard\_id: Optional[str] = None, account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Dict[str, Any]

Describe a QuickSight dashboard by name or ID.

---

**Note:** You must pass a not None name or dashboard\_id argument.

---

#### Parameters

- **name** (*str*, *optional*) – Dashboard name.
- **dashboard\_id** (*str*, *optional*) – Dashboard ID.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dashboard Description.

**Return type** Dict[str, Any]

### Examples

```
>>> import awswrangler as wr
>>> description = wr.quicksight.describe_dashboard(name="my-dashboard")
```

### awswrangler.quicksight.describe\_data\_source

```
awswrangler.quicksight.describe_data_source (name: Optional[str] = None,
                                              data_source_id: Optional[str] =
                                              None, account_id: Optional[str]
                                              = None, boto3_session: Op-
                                              tional[boto3.session.Session] = None)
                                              → Dict[str, Any]
```

Describe a QuickSight data source by name or ID.

---

**Note:** You must pass a not None name or data\_source\_id argument.

---

#### Parameters

- **name** (*str*, *optional*) – Data source name.
- **data\_source\_id** (*str*, *optional*) – Data source ID.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Data source Description.

**Return type** Dict[str, Any]

## Examples

```
>>> import awswrangler as wr
>>> description = wr.quicksight.describe_data_source("...")
```

### awswrangler.quicksight.describe\_data\_source\_permissions

`awswrangler.quicksight.describe_data_source_permissions` (*name: Optional[str] = None, data\_source\_id: Optional[str] = None, account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Dict[str, Any]

Describe a QuickSight data source permissions by name or ID.

---

**Note:** You must pass a not None name or data\_source\_id argument.

---

#### Parameters

- **name** (*str, optional*) – Data source name.
- **data\_source\_id** (*str, optional*) – Data source ID.
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Data source Permissions Description.

**Return type** Dict[str, Any]

## Examples

```
>>> import awswrangler as wr
>>> description = wr.quicksight.describe_data_source_permissions("my-data-source")
```

### awswrangler.quicksight.describe\_dataset

`awswrangler.quicksight.describe_dataset` (*name: Optional[str] = None, dataset\_id: Optional[str] = None, account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → Dict[str, Any]

Describe a QuickSight dataset by name or ID.

---

**Note:** You must pass a not None name or dataset\_id argument.

---

#### Parameters

- **name**(*str*, *optional*) – Dataset name.
- **dataset\_id**(*str*, *optional*) – Dataset ID.
- **account\_id**(*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session**(*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dataset Description.

**Return type** Dict[str, Any]

### Examples

```
>>> import awswrangler as wr
>>> description = wr.quicksight.describe_dataset("my-dataset")
```

### awswrangler.quicksight.describe\_ingestion

`awswrangler.quicksight.describe_ingestion`(*ingestion\_id: str*, *dataset\_name: Optional[str] = None*, *dataset\_id: Optional[str] = None*, *account\_id: Optional[str] = None*, *boto3\_session: Optional[boto3.session.Session] = None*) → Dict[str, Any]

Describe a QuickSight ingestion by ID.

---

**Note:** You must pass a not None value for `dataset_name` or `dataset_id` argument.

---

#### Parameters

- **ingestion\_id**(*str*) – Ingestion ID.
- **dataset\_name**(*str*, *optional*) – Dataset name.
- **dataset\_id**(*str*, *optional*) – Dataset ID.
- **account\_id**(*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session**(*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Ingestion Description.

**Return type** Dict[str, Any]

## Examples

```
>>> import awswrangler as wr
>>> description = wr.quicksight.describe_dataset(ingestion_id="...", dataset_name=
↳ "...")
```

### awswrangler.quicksight.get\_dashboard\_id

`awswrangler.quicksight.get_dashboard_id(name: str, account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → str`

Get QuickSight dashboard ID given a name and fails if there is more than 1 ID associated with this name.

#### Parameters

- **name** (*str*) – Dashboard name.
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dashboard ID.

**Return type** str

## Examples

```
>>> import awswrangler as wr
>>> my_id = wr.quicksight.get_dashboard_id(name="...")
```

### awswrangler.quicksight.get\_dashboard\_ids

`awswrangler.quicksight.get_dashboard_ids(name: str, account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → List[str]`

Get QuickSight dashboard IDs given a name.

---

**Note:** This function returns a list of ID because Quicksight accepts duplicated dashboard names, so you may have more than 1 ID for a given name.

---

#### Parameters

- **name** (*str*) – Dashboard name.
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dashboard IDs.

**Return type** List[str]



## Examples

```
>>> import awswrangler as wr
>>> ids = wr.quicksight.get_dashboard_ids(name="...")
```

### awswrangler.quicksight.get\_data\_source\_arn

```
awswrangler.quicksight.get_data_source_arn(name: str, account_id: Optional[str]
                                           = None, boto3_session: Optional[boto3.session.Session] = None) →
                                           str
```

Get QuickSight data source ARN given a name and fails if there is more than 1 ARN associated with this name.

---

**Note:** This function returns a list of ARNs because QuickSight accepts duplicated data source names, so you may have more than 1 ARN for a given name.

---

#### Parameters

- **name** (*str*) – Data source name.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Data source ARN.

**Return type** str

## Examples

```
>>> import awswrangler as wr
>>> arn = wr.quicksight.get_data_source_arn("...")
```

### awswrangler.quicksight.get\_data\_source\_arns

```
awswrangler.quicksight.get_data_source_arns(name: str, account_id: Optional[str]
                                              = None, boto3_session: Optional[boto3.session.Session] = None)
                                              → List[str]
```

Get QuickSight Data source ARNs given a name.

---

**Note:** This function returns a list of ARNs because QuickSight accepts duplicated data source names, so you may have more than 1 ARN for a given name.

---

#### Parameters

- **name** (*str*) – Data source name.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.

- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Data source ARNs.

**Return type** List[str]

### Examples

```
>>> import awswrangler as wr
>>> arns = wr.quicksight.get_data_source_arns(name="...")
```

### awswrangler.quicksight.get\_data\_source\_id

```
awswrangler.quicksight.get_data_source_id(name: str, account_id: Optional[str]
                                           = None, boto3_session: Optional[boto3.session.Session] = None) →
                                           str
```

Get QuickSight data source ID given a name and fails if there is more than 1 ID associated with this name.

#### Parameters

- **name** (*str*) – Data source name.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dataset ID.

**Return type** str

### Examples

```
>>> import awswrangler as wr
>>> my_id = wr.quicksight.get_data_source_id(name="...")
```

### awswrangler.quicksight.get\_data\_source\_ids

```
awswrangler.quicksight.get_data_source_ids(name: str, account_id: Optional[str]
                                           = None, boto3_session: Optional[boto3.session.Session] = None) →
                                           List[str]
```

Get QuickSight data source IDs given a name.

---

**Note:** This function returns a list of ID because Quicksight accepts duplicated data source names, so you may have more than 1 ID for a given name.

---

#### Parameters

- **name** (*str*) – Data source name.

- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Data source IDs.

**Return type** List[str]

### Examples

```
>>> import awswrangler as wr
>>> ids = wr.quicksight.get_data_source_ids(name="...")
```

### awswrangler.quicksight.get\_dataset\_id

`awswrangler.quicksight.get_dataset_id(name: str, account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → str`

Get QuickSight Dataset ID given a name and fails if there is more than 1 ID associated with this name.

#### Parameters

- **name** (*str*) – Dataset name.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dataset ID.

**Return type** str

### Examples

```
>>> import awswrangler as wr
>>> my_id = wr.quicksight.get_dataset_id(name="...")
```

### awswrangler.quicksight.get\_dataset\_ids

`awswrangler.quicksight.get_dataset_ids(name: str, account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → List[str]`

Get QuickSight dataset IDs given a name.

---

**Note:** This function returns a list of ID because QuickSight accepts duplicated datasets names, so you may have more than 1 ID for a given name.

---

#### Parameters

- **name** (*str*) – Dataset name.

- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Datasets IDs.

**Return type** List[str]

### Examples

```
>>> import awswrangler as wr
>>> ids = wr.quicksight.get_dataset_ids(name="...")
```

### awswrangler.quicksight.get\_template\_id

`awswrangler.quicksight.get_template_id(name: str, account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → str`

Get QuickSight template ID given a name and fails if there is more than 1 ID associated with this name.

#### Parameters

- **name** (*str*) – Template name.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Template ID.

**Return type** str

### Examples

```
>>> import awswrangler as wr
>>> my_id = wr.quicksight.get_template_id(name="...")
```

### awswrangler.quicksight.get\_template\_ids

`awswrangler.quicksight.get_template_ids(name: str, account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → List[str]`

Get QuickSight template IDs given a name.

---

**Note:** This function returns a list of ID because Quicksight accepts duplicated templates names, so you may have more than 1 ID for a given name.

---

#### Parameters

- **name** (*str*) – Template name.

- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Template IDs.

**Return type** List[str]

### Examples

```
>>> import awswrangler as wr
>>> ids = wr.quicksight.get_template_ids(name="...")
```

### awswrangler.quicksight.list\_dashboards

**awswrangler.quicksight.list\_dashboards** (*account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → List[Dict[str, Any]]

List dashboards in an AWS account.

#### Parameters

- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Dashboards.

**Return type** List[Dict[str, Any]]

### Examples

```
>>> import awswrangler as wr
>>> dashboards = wr.quicksight.list_dashboards()
```

### awswrangler.quicksight.list\_data\_sources

**awswrangler.quicksight.list\_data\_sources** (*account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → List[Dict[str, Any]]

List all QuickSight Data sources summaries.

#### Parameters

- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Data sources summaries.

**Return type** List[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> sources = wr.quicksight.list_data_sources()
```

## awswrangler.quicksight.list\_datasets

`awswrangler.quicksight.list_datasets` (*account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → List[Dict[str, Any]]

List all QuickSight datasets summaries.

### Parameters

- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Datasets summaries.

**Return type** List[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> datasets = wr.quicksight.list_datasets()
```

## awswrangler.quicksight.list\_groups

`awswrangler.quicksight.list_groups` (*namespace: str = 'default', account\_id: Optional[str] = None, boto3\_session: Optional[boto3.session.Session] = None*) → List[Dict[str, Any]]

List all QuickSight Groups.

### Parameters

- **namespace** (*str*) – The namespace. Currently, you should set this to default .
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Groups.

**Return type** List[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> groups = wr.quicksight.list_groups()
```

### awswrangler.quicksight.list\_group\_memberships

```
awswrangler.quicksight.list_group_memberships (group_name: str, namespace: str = 'default', account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None)
→ List[Dict[str, Any]]
```

List all QuickSight Group memberships.

#### Parameters

- **group\_name** (*str*) – The name of the group that you want to see a membership list of.
- **namespace** (*str*) – The namespace. Currently, you should set this to default .
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Group memberships.

**Return type** List[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> memberships = wr.quicksight.list_group_memberships()
```

### awswrangler.quicksight.list\_iam\_policy\_assignments

```
awswrangler.quicksight.list_iam_policy_assignments (status: Optional[str] = None, namespace: str = 'default', account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None)
→ List[Dict[str, Any]]
```

List IAM policy assignments in the current Amazon QuickSight account.

#### Parameters

- **status** (*str*, *optional*) – The status of the assignments. 'ENABLED'|'DRAFT'|'DISABLED'
- **namespace** (*str*) – The namespace. Currently, you should set this to default .
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** IAM policy assignments.

**Return type** List[Dict[str, Any]]

### Examples

```
>>> import awswrangler as wr
>>> assigns = wr.quicksight.list_iam_policy_assignments()
```

### awswrangler.quicksight.list\_iam\_policy\_assignments\_for\_user

```
awswrangler.quicksight.list_iam_policy_assignments_for_user(user_name: str,
                                                             namespace: str
                                                             = 'default', ac-
                                                             count_id: Op-
                                                             tional[str] = None,
                                                             boto3_session: Op-
                                                             tional[boto3.session.Session]
                                                             = None) →
                                                             List[Dict[str, Any]]
```

List all the IAM policy assignments.

Including the Amazon Resource Names (ARNs) for the IAM policies assigned to the specified user and group or groups that the user belongs to.

#### Parameters

- **user\_name** (*str*) – The name of the user.
- **namespace** (*str*) – The namespace. Currently, you should set this to default .
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** IAM policy assignments.

**Return type** List[Dict[str, Any]]

### Examples

```
>>> import awswrangler as wr
>>> assigns = wr.quicksight.list_iam_policy_assignments_for_user()
```



**awswrangler.quicksight.list\_ingestions**

```
awswrangler.quicksight.list_ingestions(dataset_name: Optional[str] = None, dataset_id:
                                         Optional[str] = None, account_id: Op-
                                         tional[str] = None, boto3_session: Op-
                                         tional[boto3.session.Session] = None) →
                                         List[Dict[str, Any]]
```

List the history of SPICE ingestions for a dataset.

**Parameters**

- **dataset\_name** (*str, optional*) – Dataset name.
- **dataset\_id** (*str, optional*) – The ID of the dataset used in the ingestion.
- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** IAM policy assignments.

**Return type** List[Dict[str, Any]]

**Examples**

```
>>> import awswrangler as wr
>>> ingestions = wr.quicksight.list_ingestions()
```

**awswrangler.quicksight.list\_templates**

```
awswrangler.quicksight.list_templates(account_id: Optional[str] = None, boto3_session:
                                       Optional[boto3.session.Session] = None) →
                                       List[Dict[str, Any]]
```

List all QuickSight templates.

**Parameters**

- **account\_id** (*str, optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session(), optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Templates summaries.

**Return type** List[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> templates = wr.quicksight.list_templates()
```

### awswrangler.quicksight.list\_users

`awswrangler.quicksight.list_users(namespace: str = 'default', account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → List[Dict[str, Any]]`

Return a list of all of the Amazon QuickSight users belonging to this account.

#### Parameters

- **namespace** (*str*) – The namespace. Currently, you should set this to default.
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Groups.

**Return type** List[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> users = wr.quicksight.list_users()
```

### awswrangler.quicksight.list\_user\_groups

`awswrangler.quicksight.list_user_groups(user_name: str, namespace: str = 'default', account_id: Optional[str] = None, boto3_session: Optional[boto3.session.Session] = None) → List[Dict[str, Any]]`

List the Amazon QuickSight groups that an Amazon QuickSight user is a member of.

#### Parameters

- **user\_name** (*str:*) – The Amazon QuickSight user name that you want to list group memberships for.
- **namespace** (*str*) – The namespace. Currently, you should set this to default .
- **account\_id** (*str*, *optional*) – If None, the account ID will be inferred from your boto3 session.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Groups.

**Return type** List[Dict[str, Any]]

## Examples

```
>>> import awswrangler as wr
>>> groups = wr.quicksight.list_user_groups()
```

### 1.4.12 AWS STS

<code>get_account_id([boto3_session])</code>	Get Account ID.
<code>get_current_identity_arn([boto3_session])</code>	Get current user/role ARN.
<code>get_current_identity_name([boto3_session])</code>	Get current user/role name.

#### `awswrangler.sts.get_account_id`

`awswrangler.sts.get_account_id(boto3_session: Optional[boto3.session.Session] = None) → str`  
Get Account ID.

**Parameters** `boto3_session` (`boto3.Session()`, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** Account ID.

**Return type** str

## Examples

```
>>> import awswrangler as wr
>>> account_id = wr.sts.get_account_id()
```

#### `awswrangler.sts.get_current_identity_arn`

`awswrangler.sts.get_current_identity_arn(boto3_session: Optional[boto3.session.Session] = None) → str`  
Get current user/role ARN.

**Parameters** `boto3_session` (`boto3.Session()`, *optional*) – Boto3 Session. The default boto3 session will be used if `boto3_session` receive None.

**Returns** User/role ARN.

**Return type** str

## Examples

```
>>> import awswrangler as wr
>>> arn = wr.sts.get_current_identity_arn()
```

**aws wrangler.sts.get\_current\_identity\_name**

`aws wrangler.sts.get_current_identity_name` (*boto3\_session*: *Optional[boto3.session.Session]* = *None*) → *str*

Get current user/role name.

**Parameters** *boto3\_session* (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if *boto3\_session* receive *None*.

**Returns** User/role name.

**Return type** *str*

**Examples**

```
>>> import aws wrangler as wr
>>> name = wr.sts.get_current_identity_name()
```

**1.4.13 AWS Secrets Manager**

<code>get_secret(name[, boto3_session])</code>	Get secret value.
<code>get_secret_json(name[, boto3_session])</code>	Get JSON secret value.

**aws wrangler.secretsmanager.get\_secret**

`aws wrangler.secretsmanager.get_secret` (*name*: *str*, *boto3\_session*: *Optional[boto3.session.Session]* = *None*) → *Union[str, bytes]*

Get secret value.

**Parameters**

- **name** (*str*:) – Specifies the secret containing the version that you want to retrieve. You can specify either the Amazon Resource Name (ARN) or the friendly name of the secret.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if *boto3\_session* receive *None*.

**Returns** Secret value.

**Return type** *Union[str, bytes]*

**Examples**

```
>>> import aws wrangler as wr
>>> value = wr.secretsmanager.get_secret("my-secret")
```

**aws wrangler.secretsmanager.get\_secret\_json**

`aws wrangler.secretsmanager.get_secret_json` (*name:* *str*, *boto3\_session:* *Optional[boto3.session.Session] = None*) → *Dict[str, Any]*

Get JSON secret value.

**Parameters**

- **name** (*str:*) – Specifies the secret containing the version that you want to retrieve. You can specify either the Amazon Resource Name (ARN) or the friendly name of the secret.
- **boto3\_session** (*boto3.Session()*, *optional*) – Boto3 Session. The default boto3 session will be used if boto3\_session receive None.

**Returns** Secret JSON value parsed as a dictionary.

**Return type** *Dict[str, Any]*

**Examples**

```
>>> import aws wrangler as wr
>>> value = wr.secretsmanager.get_secret_json("my-secret-with-json-content")
```

**1.4.14 Amazon Chime**


---

<code>post_message(webhook, message)</code>	Send message on an existing Chime Chat rooms.
---	---

---

**aws wrangler.chime.post\_message**

`aws wrangler.chime.post_message` (*webhook:* *str*, *message:* *str*) → *Optional[Any]*

Send message on an existing Chime Chat rooms.

:param : Webhook: This contains all the authentication information to send the message :type : param webhook  
 : webhook :param : The actual message which needs to be posted on Slack channel :type : param message :  
 message

**Returns** Represents the response from Chime

**Return type** *dict*

**1.4.15 Global Configurations**


---

<code>reset([item])</code>	Reset one or all (if None is received) configuration values.
<code>to_pandas()</code>	Load all configurations on a Pandas DataFrame.

---

**aws wrangler.config.reset**

`config.reset(item: Optional[str] = None) → None`

Reset one or all (if None is received) configuration values.

**Parameters** `item` (*str*, *optional*) – Configuration item name.

**Returns** None.

**Return type** None

**Examples**

```
>>> import aws wrangler as wr
>>> wr.config.reset("database") # Reset one specific configuration
>>> wr.config.reset() # Reset all
```

**aws wrangler.config.to\_pandas**

`config.to_pandas() → pandas.core.frame.DataFrame`

Load all configurations on a Pandas DataFrame.

**Returns** Configuration DataFrame.

**Return type** `pd.DataFrame`

**Examples**

```
>>> import aws wrangler as wr
>>> wr.config.to_pandas()
```

## A

`add_column()` (in module `awswrangler.catalog`), 134  
`add_csv_partitions()` (in module `awswrangler.catalog`), 135  
`add_parquet_partitions()` (in module `awswrangler.catalog`), 136

## B

`build_spark_step()` (in module `awswrangler.emr`), 210  
`build_step()` (in module `awswrangler.emr`), 211

## C

`cancel_ingestion()` (in module `awswrangler.quicksight`), 224  
`connect()` (in module `awswrangler.mysql`), 193  
`connect()` (in module `awswrangler.postgresql`), 189  
`connect()` (in module `awswrangler.redshift`), 176  
`connect()` (in module `awswrangler.sqlserver`), 198  
`connect_temp()` (in module `awswrangler.redshift`), 177  
`copy()` (in module `awswrangler.redshift`), 178  
`copy_from_files()` (in module `awswrangler.redshift`), 180  
`copy_objects()` (in module `awswrangler.s3`), 90  
`create_athena_bucket()` (in module `awswrangler.athena`), 163  
`create_athena_data_source()` (in module `awswrangler.quicksight`), 225  
`create_athena_dataset()` (in module `awswrangler.quicksight`), 226  
`create_cluster()` (in module `awswrangler.emr`), 212  
`create_csv_table()` (in module `awswrangler.catalog`), 137  
`create_database()` (in module `awswrangler.catalog`), 139  
`create_database()` (in module `awswrangler.timestream`), 205  
`create_ingestion()` (in module `awswrangler.quicksight`), 227

`create_parquet_table()` (in module `awswrangler.catalog`), 140  
`create_table()` (in module `awswrangler.timestream`), 206

## D

`databases()` (in module `awswrangler.catalog`), 142  
`delete_all_dashboards()` (in module `awswrangler.quicksight`), 228  
`delete_all_data_sources()` (in module `awswrangler.quicksight`), 228  
`delete_all_datasets()` (in module `awswrangler.quicksight`), 229  
`delete_all_partitions()` (in module `awswrangler.catalog`), 145  
`delete_all_templates()` (in module `awswrangler.quicksight`), 229  
`delete_column()` (in module `awswrangler.catalog`), 143  
`delete_dashboard()` (in module `awswrangler.quicksight`), 230  
`delete_data_source()` (in module `awswrangler.quicksight`), 230  
`delete_database()` (in module `awswrangler.catalog`), 143  
`delete_database()` (in module `awswrangler.timestream`), 207  
`delete_dataset()` (in module `awswrangler.quicksight`), 231  
`delete_items()` (in module `awswrangler.dynamodb`), 202  
`delete_objects()` (in module `awswrangler.s3`), 92  
`delete_partitions()` (in module `awswrangler.catalog`), 144  
`delete_table()` (in module `awswrangler.timestream`), 208  
`delete_table_if_exists()` (in module `awswrangler.catalog`), 146  
`delete_template()` (in module `awswrangler.quicksight`), 232  
`describe_dashboard()` (in module `awswrangler.quicksight`), 232

[describe\\_data\\_source\(\)](#) (in module `aws wrangler.quicksight`), 233  
[describe\\_data\\_source\\_permissions\(\)](#) (in module `aws wrangler.quicksight`), 234  
[describe\\_dataset\(\)](#) (in module `aws wrangler.quicksight`), 234  
[describe\\_ingestion\(\)](#) (in module `aws wrangler.quicksight`), 235  
[describe\\_objects\(\)](#) (in module `aws wrangler.s3`), 93  
[does\\_object\\_exist\(\)](#) (in module `aws wrangler.s3`), 94  
[does\\_table\\_exist\(\)](#) (in module `aws wrangler.catalog`), 146  
[download\(\)](#) (in module `aws wrangler.s3`), 95  
[drop\\_duplicated\\_columns\(\)](#) (in module `aws wrangler.catalog`), 147

## E

[extract\\_athena\\_types\(\)](#) (in module `aws wrangler.catalog`), 148

## G

[get\\_account\\_id\(\)](#) (in module `aws wrangler.sts`), 247  
[get\\_bucket\\_region\(\)](#) (in module `aws wrangler.s3`), 95  
[get\\_cluster\\_state\(\)](#) (in module `aws wrangler.emr`), 216  
[get\\_columns\\_comments\(\)](#) (in module `aws wrangler.catalog`), 148  
[get\\_csv\\_partitions\(\)](#) (in module `aws wrangler.catalog`), 149  
[get\\_current\\_identity\\_arn\(\)](#) (in module `aws wrangler.sts`), 247  
[get\\_current\\_identity\\_name\(\)](#) (in module `aws wrangler.sts`), 248  
[get\\_dashboard\\_id\(\)](#) (in module `aws wrangler.quicksight`), 236  
[get\\_dashboard\\_ids\(\)](#) (in module `aws wrangler.quicksight`), 236  
[get\\_data\\_source\\_arn\(\)](#) (in module `aws wrangler.quicksight`), 237  
[get\\_data\\_source\\_arns\(\)](#) (in module `aws wrangler.quicksight`), 237  
[get\\_data\\_source\\_id\(\)](#) (in module `aws wrangler.quicksight`), 238  
[get\\_data\\_source\\_ids\(\)](#) (in module `aws wrangler.quicksight`), 238  
[get\\_databases\(\)](#) (in module `aws wrangler.catalog`), 150  
[get\\_dataset\\_id\(\)](#) (in module `aws wrangler.quicksight`), 239  
[get\\_dataset\\_ids\(\)](#) (in module `aws wrangler.quicksight`), 239

[get\\_parquet\\_partitions\(\)](#) (in module `aws wrangler.catalog`), 151  
[get\\_partitions\(\)](#) (in module `aws wrangler.catalog`), 152  
[get\\_query\\_columns\\_types\(\)](#) (in module `aws wrangler.athena`), 164  
[get\\_query\\_execution\(\)](#) (in module `aws wrangler.athena`), 164  
[get\\_secret\(\)](#) (in module `aws wrangler.secretsmanager`), 248  
[get\\_secret\\_json\(\)](#) (in module `aws wrangler.secretsmanager`), 249  
[get\\_step\\_state\(\)](#) (in module `aws wrangler.emr`), 217  
[get\\_table\(\)](#) (in module `aws wrangler.dynamodb`), 202  
[get\\_table\\_description\(\)](#) (in module `aws wrangler.catalog`), 153  
[get\\_table\\_location\(\)](#) (in module `aws wrangler.catalog`), 154  
[get\\_table\\_number\\_of\\_versions\(\)](#) (in module `aws wrangler.catalog`), 154  
[get\\_table\\_parameters\(\)](#) (in module `aws wrangler.catalog`), 155  
[get\\_table\\_types\(\)](#) (in module `aws wrangler.catalog`), 156  
[get\\_table\\_versions\(\)](#) (in module `aws wrangler.catalog`), 156  
[get\\_tables\(\)](#) (in module `aws wrangler.catalog`), 157  
[get\\_template\\_id\(\)](#) (in module `aws wrangler.quicksight`), 240  
[get\\_template\\_ids\(\)](#) (in module `aws wrangler.quicksight`), 240  
[get\\_work\\_group\(\)](#) (in module `aws wrangler.athena`), 165

## L

[list\\_dashboards\(\)](#) (in module `aws wrangler.quicksight`), 241  
[list\\_data\\_sources\(\)](#) (in module `aws wrangler.quicksight`), 241  
[list\\_datasets\(\)](#) (in module `aws wrangler.quicksight`), 242  
[list\\_directories\(\)](#) (in module `aws wrangler.s3`), 96  
[list\\_group\\_memberships\(\)](#) (in module `aws wrangler.quicksight`), 243  
[list\\_groups\(\)](#) (in module `aws wrangler.quicksight`), 242  
[list\\_iam\\_policy\\_assignments\(\)](#) (in module `aws wrangler.quicksight`), 243  
[list\\_iam\\_policy\\_assignments\\_for\\_user\(\)](#) (in module `aws wrangler.quicksight`), 244



`list_ingestions()` (in module `aws wrangler.quicksight`), 245  
`list_objects()` (in module `aws wrangler.s3`), 97  
`list_templates()` (in module `aws wrangler.quicksight`), 245  
`list_user_groups()` (in module `aws wrangler.quicksight`), 246  
`list_users()` (in module `aws wrangler.quicksight`), 246

## M

`merge_datasets()` (in module `aws wrangler.s3`), 98  
`merge_upsert_table()` (in module `aws wrangler.s3`), 99

## O

`overwrite_table_parameters()` (in module `aws wrangler.catalog`), 158

## P

`post_message()` (in module `aws wrangler.chime`), 249  
`put_csv()` (in module `aws wrangler.dynamodb`), 203  
`put_df()` (in module `aws wrangler.dynamodb`), 203  
`put_items()` (in module `aws wrangler.dynamodb`), 204  
`put_json()` (in module `aws wrangler.dynamodb`), 205

## Q

`query()` (in module `aws wrangler.timestream`), 208

## R

`read_csv()` (in module `aws wrangler.s3`), 100  
`read_excel()` (in module `aws wrangler.s3`), 102  
`read_fwf()` (in module `aws wrangler.s3`), 103  
`read_json()` (in module `aws wrangler.s3`), 105  
`read_logs()` (in module `aws wrangler.cloudwatch`), 220  
`read_parquet()` (in module `aws wrangler.s3`), 107  
`read_parquet_metadata()` (in module `aws wrangler.s3`), 110  
`read_parquet_table()` (in module `aws wrangler.s3`), 111  
`read_sql_query()` (in module `aws wrangler.athena`), 165  
`read_sql_query()` (in module `aws wrangler.mysql`), 194  
`read_sql_query()` (in module `aws wrangler.postgresql`), 190  
`read_sql_query()` (in module `aws wrangler.redshift`), 182  
`read_sql_query()` (in module `aws wrangler.sqlserver`), 199

`read_sql_table()` (in module `aws wrangler.athena`), 169  
`read_sql_table()` (in module `aws wrangler.mysql`), 195  
`read_sql_table()` (in module `aws wrangler.postgresql`), 191  
`read_sql_table()` (in module `aws wrangler.redshift`), 183  
`read_sql_table()` (in module `aws wrangler.sqlserver`), 199  
`repair_table()` (in module `aws wrangler.athena`), 172  
`reset()` (`aws wrangler.config` method), 250  
`run_query()` (in module `aws wrangler.cloudwatch`), 221

## S

`sanitize_column_name()` (in module `aws wrangler.catalog`), 159  
`sanitize_dataframe_columns_names()` (in module `aws wrangler.catalog`), 159  
`sanitize_table_name()` (in module `aws wrangler.catalog`), 160  
`search_tables()` (in module `aws wrangler.catalog`), 160  
`size_objects()` (in module `aws wrangler.s3`), 113  
`start_query()` (in module `aws wrangler.cloudwatch`), 222  
`start_query_execution()` (in module `aws wrangler.athena`), 173  
`stop_query_execution()` (in module `aws wrangler.athena`), 174  
`store_parquet_metadata()` (in module `aws wrangler.s3`), 115  
`submit_ecr_credentials_refresh()` (in module `aws wrangler.emr`), 217  
`submit_spark_step()` (in module `aws wrangler.emr`), 218  
`submit_step()` (in module `aws wrangler.emr`), 219  
`submit_steps()` (in module `aws wrangler.emr`), 219

## T

`table()` (in module `aws wrangler.catalog`), 161  
`tables()` (in module `aws wrangler.catalog`), 161  
`terminate_cluster()` (in module `aws wrangler.emr`), 220  
`to_csv()` (in module `aws wrangler.s3`), 118  
`to_excel()` (in module `aws wrangler.s3`), 123  
`to_json()` (in module `aws wrangler.s3`), 124  
`to_pandas()` (`aws wrangler.config` method), 250  
`to_parquet()` (in module `aws wrangler.s3`), 126  
`to_sql()` (in module `aws wrangler.mysql`), 196  
`to_sql()` (in module `aws wrangler.postgresql`), 192  
`to_sql()` (in module `aws wrangler.redshift`), 184

`to_sql()` (in module *awswrangler.sqlserver*), 200

## U

`unload()` (in module *awswrangler.redshift*), 186

`unload_to_files()` (in module *awswrangler.redshift*), 188

`upload()` (in module *awswrangler.s3*), 131

`upsert_table_parameters()` (in module *awswrangler.catalog*), 162

## W

`wait_objects_exist()` (in module *awswrangler.s3*), 131

`wait_objects_not_exist()` (in module *awswrangler.s3*), 132

`wait_query()` (in module *awswrangler.athena*), 175

`wait_query()` (in module *awswrangler.cloudwatch*), 223

`write()` (in module *awswrangler.timestream*), 209