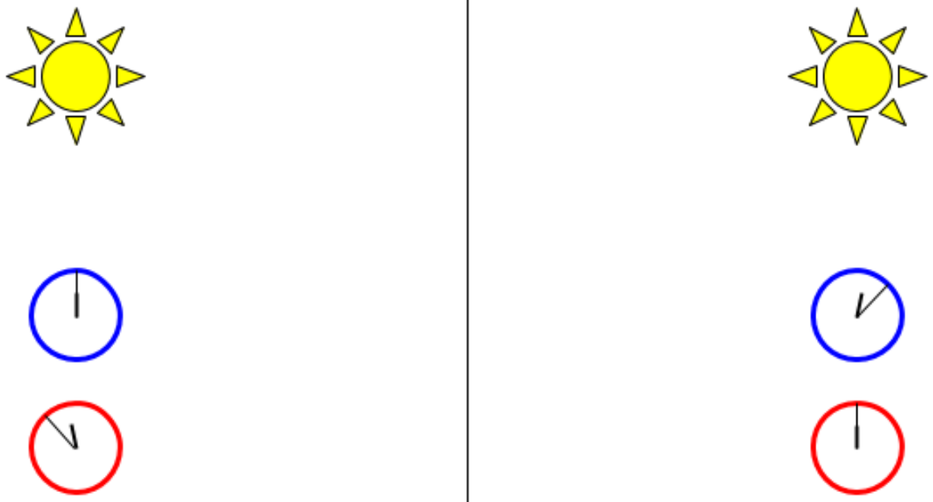
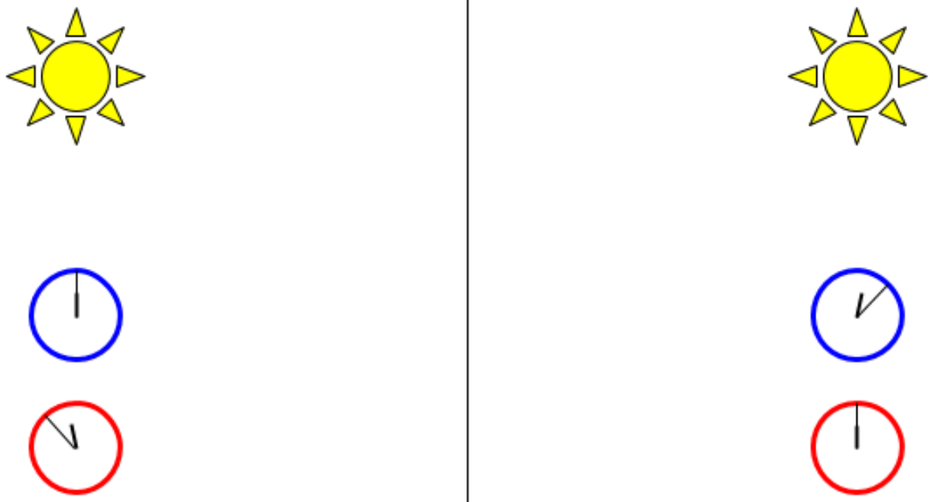
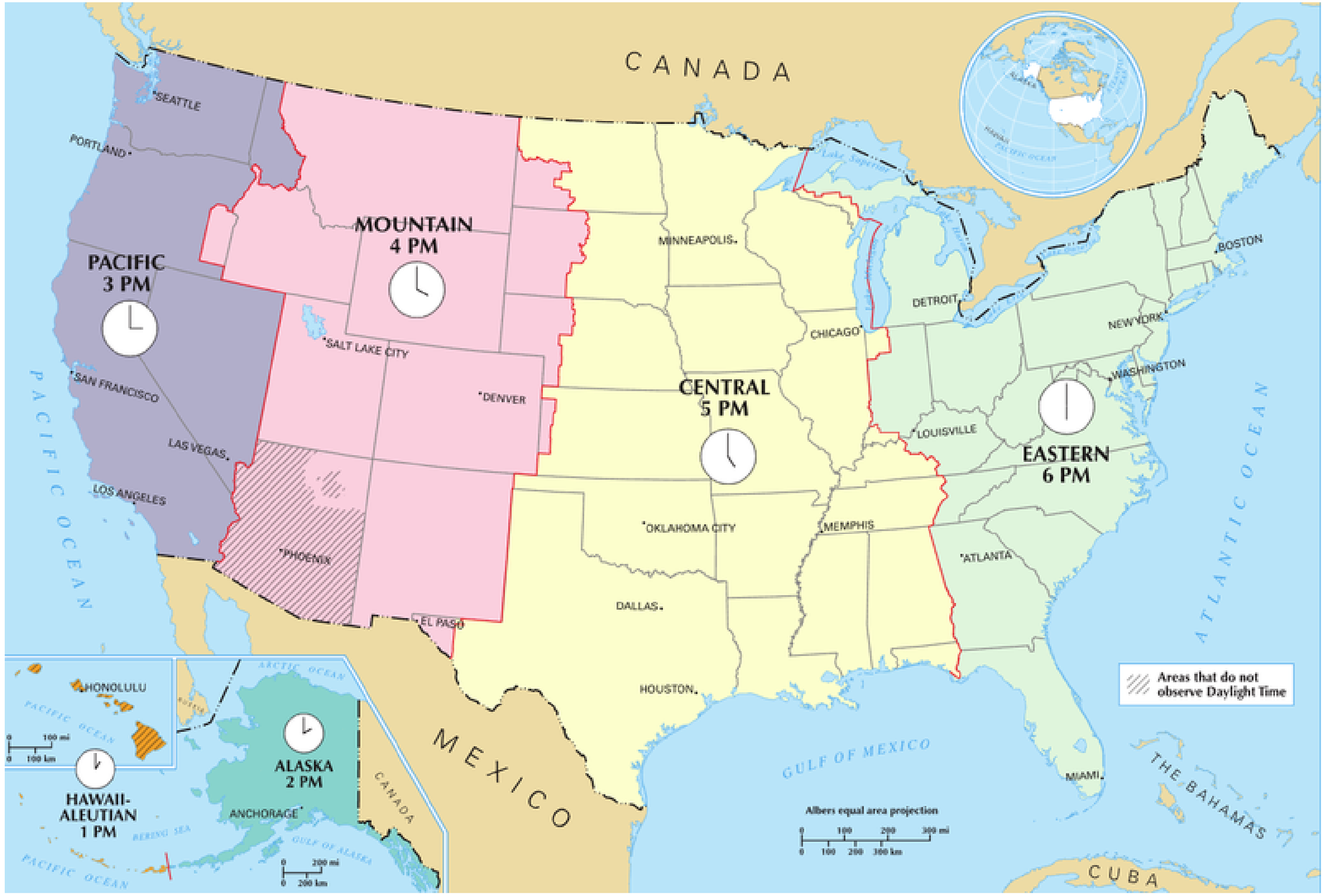
WORKING WITH DATES AND TIMES IN PYTHON

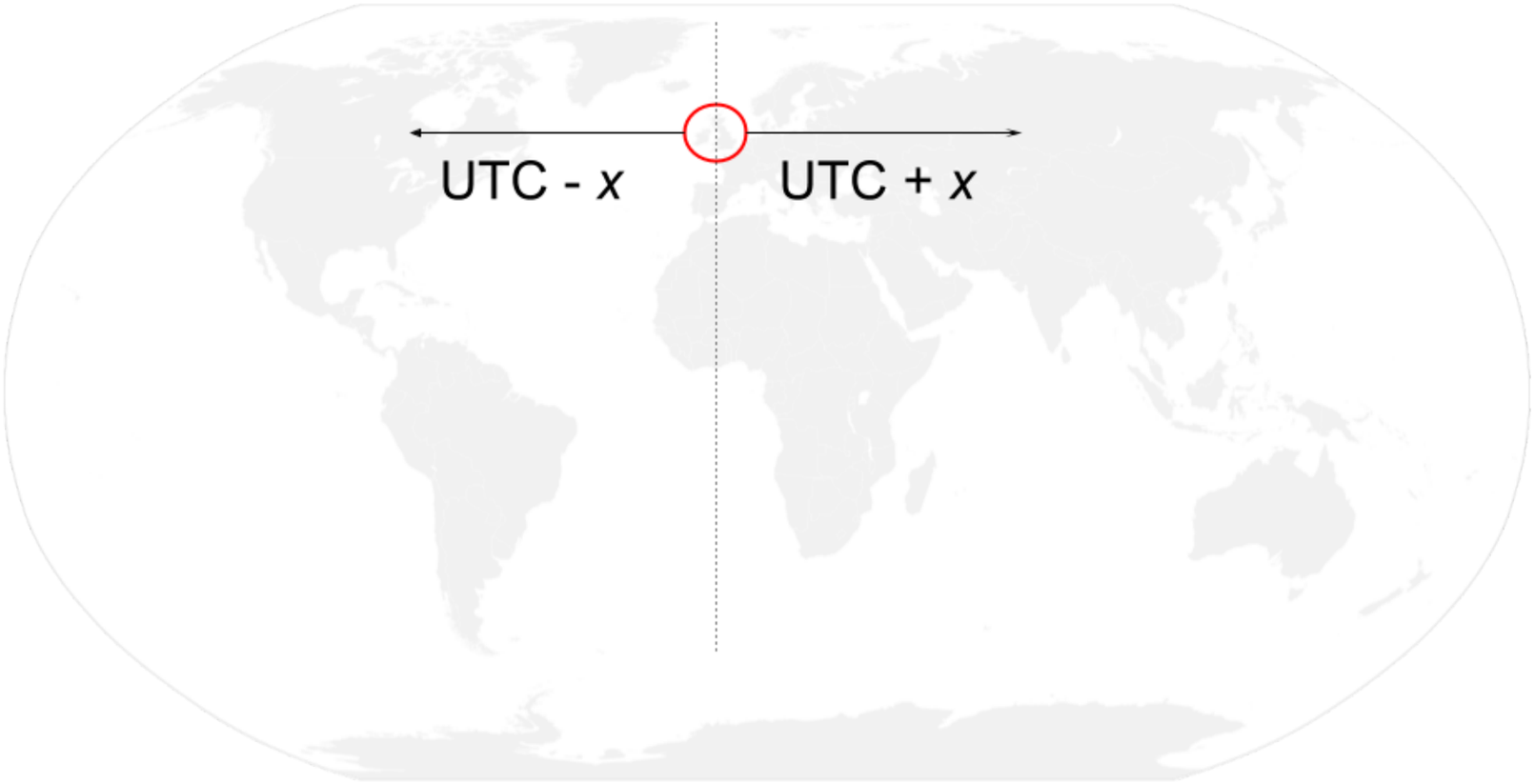
UTC offsets

Max Shron
Data Scientist and Author






CANADA
SEATTLE
PORTLAND
PACIFIC
3 PM
MOUNTAIN
4 PM
SALT LAKE CITY
DENVER
SAN FRANCISCO
LAS VEGAS
LOS ANGELES
PHOENIX
EL PASO
MINNEAPOLIS
CHICAGO
DETROIT
BOSTON
NEW YORK
WASHINGTON
CENTRAL
5 PM
LOUISVILLE
EASTERN
6 PM
OKLAHOMA CITY
MEMPHIS
ATLANTA
DALLAS
HOUSTON
MIAMI
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
THE BAHAMAS
CUBA
MEXICO
HONOLULU
HAWAII-
ALEUTIAN
1 PM
ALASKA
2 PM
ANCHORAGE
ARCTIC OCEAN
BERING SEA
GULF OF ALASKA
CANADA
Areas that do not
observe Daylight Time
Albers equal area projection


UTC - x
UTC + x

UTC

```
# Import relevant classes
from datetime import datetime, timedelta, timezone
```

UTC

```
# Import relevant classes
from datetime import datetime, timedelta, timezone

# US Eastern Standard time zone
ET = timezone(timedelta(hours=-5))
```

UTC

```
# Import relevant classes
from datetime import datetime, timedelta, timezone

# US Eastern Standard time zone
ET = timezone(timedelta(hours=-5))

# Timezone-aware datetime
dt = datetime(2017, 12, 30, 15, 9, 3, tzinfo = ET)
```

UTC

```
# Import relevant classes
from datetime import datetime, timedelta, timezone

# US Eastern Standard time zone
ET = timezone(timedelta(hours=-5))

# Timezone-aware datetime
dt = datetime(2017, 12, 30, 15, 9, 3, tzinfo = ET)

# Print result
print(dt)
'2017-12-30 15:09:03-05:00'
```

```
# Import relevant classes
from datetime import datetime, timedelta, timezone

# US Eastern Standard time zone
ET = timezone(timedelta(hours=-5))

# Timezone-aware datetime
dt = datetime(2017, 12, 30, 15, 9, 3, tzinfo = ET)

# Print result
print(dt)
'2017-12-30 15:09:03-05:00'

# India Standard time zone
IST = timezone(timedelta(hours=5, minutes=30))
```

UTC

```
# Import relevant classes
from datetime import datetime, timedelta, timezone

# US Eastern Standard time zone
ET = timezone(timedelta(hours=-5))

# Timezone-aware datetime
dt = datetime(2017, 12, 30, 15, 9, 3, tzinfo = ET)

# Print result
print(dt)
'2017-12-30 15:09:03-05:00'

# India Standard time zone
IST = timezone(timedelta(hours=5, minutes=30))

# Convert to IST
print(dt.astimezone(IST))
'2017-12-31 01:39:03+05:30'
```

Adjusting timezone vs changing tzinfo

```
# Original datetime
print(dt)
'2017-10-01 15:23:25-05:00'

# Set to UTC
print(dt.replace(tzinfo=timezone.utc))
'2017-10-01 15:23:25+00:00'
```

Adjusting timezone vs changing tzinfo

```
# Original datetime
print(dt)
'2017-10-01 15:23:25-05:00'

# Set to UTC
print(dt.replace(tzinfo=timezone.utc))
'2017-10-01 15:23:25+00:00'

# Moved to UTC
print(dt.astimezone(timezone.utc))
'2017-10-01 20:23:25+00:00'
```

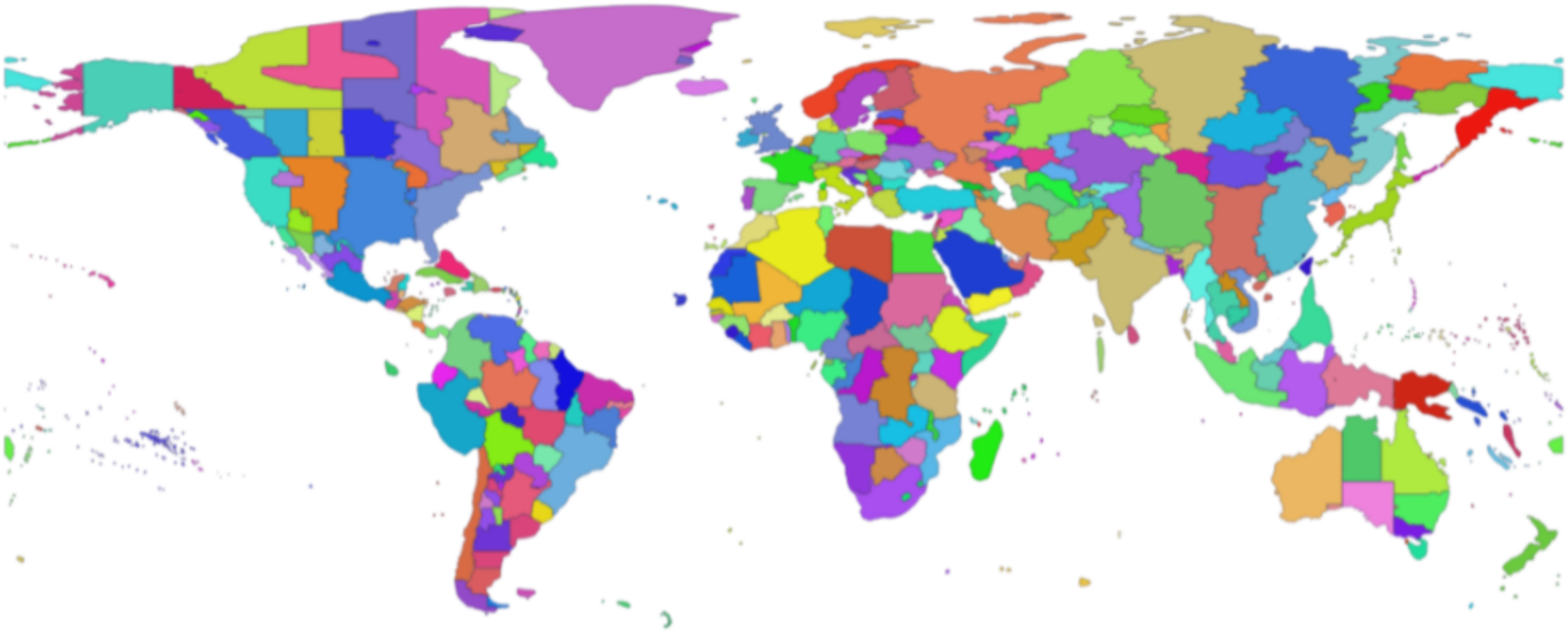
WORKING WITH DATES AND TIMES IN PYTHON

UTC Offsets

WORKING WITH DATES AND TIMES IN PYTHON

Time zone database

Max Shron
Data Scientist and Author



Time zone database

```
# Imports
from datetime import datetime
from dateutil import tz
```

tz database

Time zone database

```
# Imports
from datetime import datetime
from dateutil import tz

# Eastern time
et = tz.gettz('America/New York')
```

tz database

- Format: 'Continent/City'

Time zone database

```
# Imports
from datetime import datetime
from dateutil import tz

# Eastern time
et = tz.gettz('America/New_York')
```

tz database

- Format: 'Continent/City'
- Examples:
  - 'America/New_York'
  - 'America/Mexico_City'
  - 'Europe/London'
  - 'Africa/Accra'

Time zone database

```
# Imports
from datetime import datetime
from dateutil import tz

# Eastern time
et = tz.gettz('America/New_York')

# Last ride
last = datetime(2017, 12, 30, 15, 9, 3, tzinfo=et)
print(last)
'2017-12-30 15:09:03-05:00'
```

Time zone database

```
# Imports
from datetime import datetime
from dateutil import tz

# Eastern time
et = tz.gettz('America/New_York')

# Last ride
last = datetime(2017, 12, 30, 15, 9, 3, tzinfo=et)
print(last)
'2017-12-30 15:09:03-05:00'

# First ride
first = datetime(2017, 10, 1, 15, 23, 25, tzinfo=et)
print(first)
'2017-10-01 15:23:25-04:00'
```

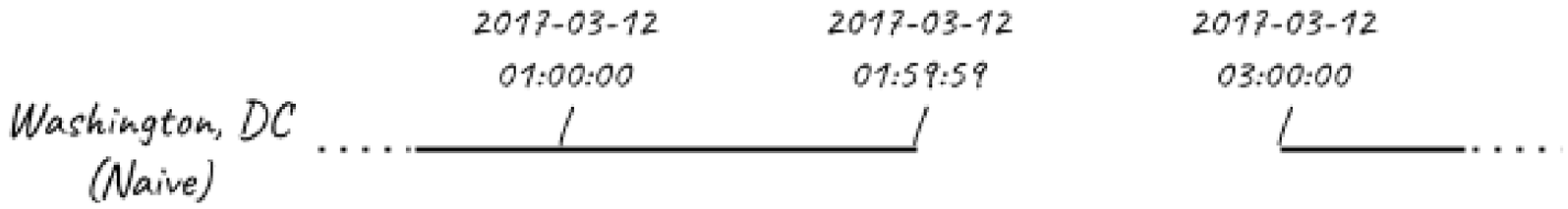
WORKING WITH DATES AND TIMES IN PYTHON

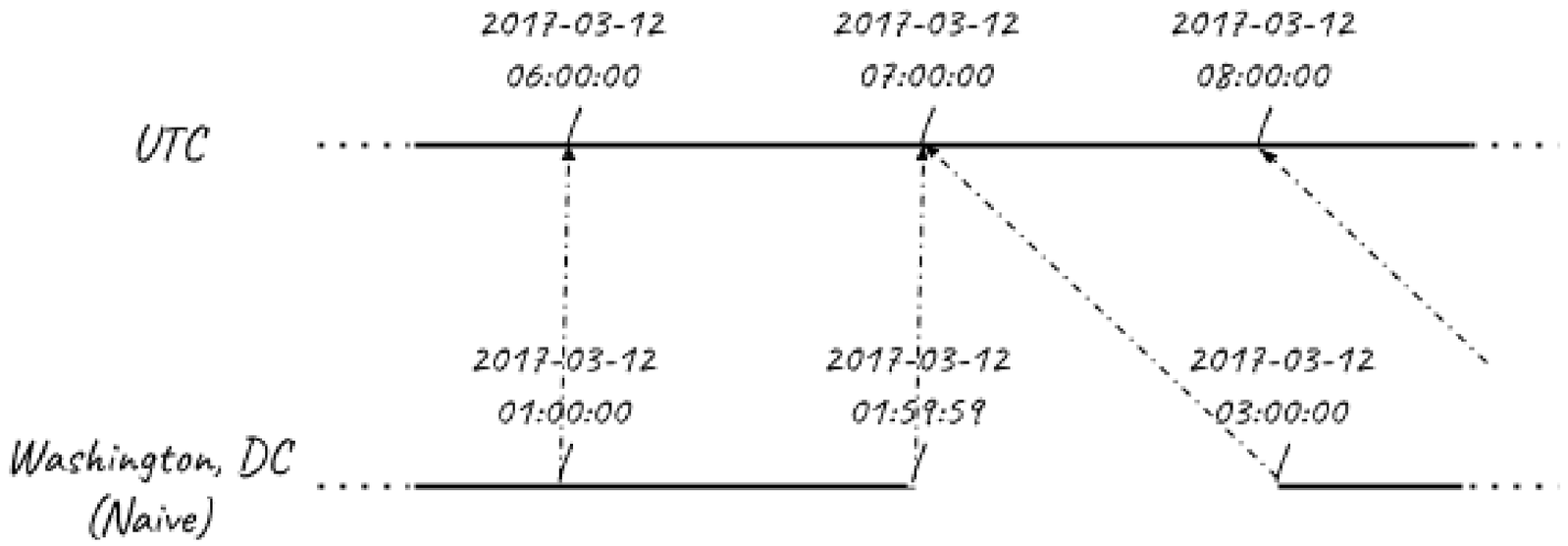
Time zone database

WORKING WITH DATES AND TIMES IN PYTHON

Starting Daylight Saving Time

Max Shron
Data Scientist and Author


2017-03-12
01:00:00
2017-03-12
01:59:59
2017-03-12
03:00:00
Washington, DC
(Naive)


2017-03-12
06:00:00
2017-03-12
07:00:00
2017-03-12
08:00:00
UTC
2017-03-12
01:00:00
2017-03-12
01:59:59
2017-03-12
03:00:00
Washington, DC
(Naive)

Start of Daylight Saving Time

```
from datetime import datetime

spring_ahead_159am = datetime(2017, 3, 12, 1, 59, 59)
spring_ahead_159am.isoformat()
'2017-03-12T01:59:59'

spring_ahead_3am = datetime(2017, 3, 12, 3, 0, 0)
spring_ahead_3am.isoformat()
'2017-03-12T03:00:00'

(spring_ahead_3am - spring_ahead_159am).total_seconds()

3601
```

Start of Daylight Saving Time

```
from datetime import timezone, timedelta

EST = timezone(timedelta(hours=-5))
EDT = timezone(timedelta(hours=-4))

spring_ahead_159am = spring_ahead_159am.replace(tzinfo = EST)
spring_ahead_159am.isoformat()
'2017-03-12T01:59:59-05:00'

spring_ahead_3am = spring_ahead_159am.replace(tzinfo = EDT)
spring_ahead_3am.isoformat()
'2017-03-12T03:00:00-04:00'

(spring_ahead_3am - spring_ahead_159am).seconds

1
```

Start of Daylight Saving Time

Using `dateutil`

```
# Import tz
from dateutil import tz

# Create eastern timezone
eastern = tz.gettz('America/New_York')

# 2017-03-12 01:59:59 in Eastern Time (EST)
spring_ahead_159am = datetime(2017, 3, 12, 1, 59, 59,
                              tzinfo = eastern)

# 2017-03-12 03:00:00 in Eastern Time (EDT)
spring_ahead_3am = datetime(2017, 3, 12, 3, 0, 0,
                            tzinfo = eastern)
```

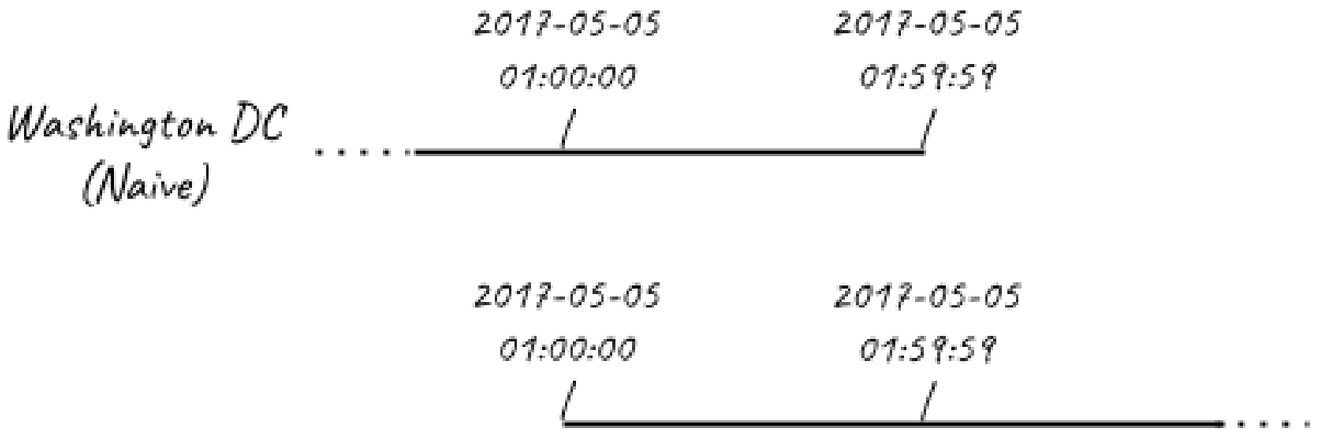
WORKING WITH DATES AND TIMES IN PYTHON

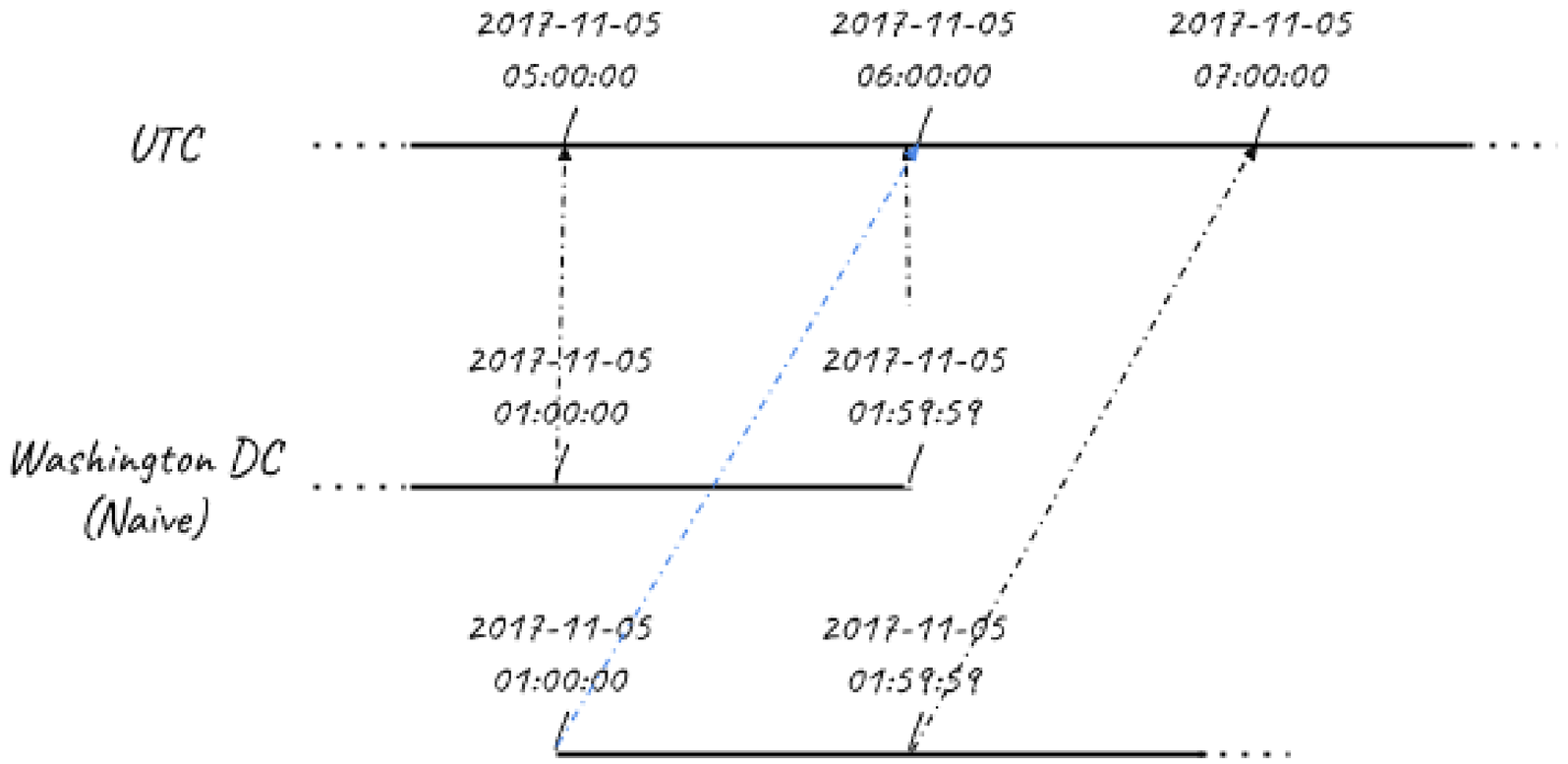
Daylight Saving

WORKING WITH DATES AND TIMES IN PYTHON

Ending Daylight Saving Time

Max Shron
Data Scientist and Author


2017-05-05
01:00:00
2017-05-05
01:59:59
Washington DC
(Naive)
2017-05-05
01:00:00
2017-05-05
01:59:59


2017-11-05
05:00:00
2017-11-05
06:00:00
2017-11-05
07:00:00
UTC
2017-11-05
01:00:00
2017-11-05
01:59:59
Washington DC
(Naive)
2017-11-05
01:00:00
2017-11-05
01:59:59

Ending Daylight Saving Time

```
eastern = tz.gettz('US/Eastern')
# 2017-11-05 01:00:00
first_1am = datetime(2017, 11, 5, 1, 0, 0,
                     tzinfo = eastern)

tz.datetime_ambiguous(first_1am)
True

# 2017-11-05 01:00:00 again
second_1am = datetime(2017, 11, 5, 1, 0, 0,
                      tzinfo = eastern)
second_1am = tz.enfold(second_1am)
```

Ending Daylight Saving Time

```
(first_1am - second_1am).total_seconds()
0.0

first_1am = first_1am.astimezone(tz.UTC)
second_1am = second_1am.astimezone(tz.UTC)

(first_1am - second_1am).total_seconds()
3600.0
```

WORKING WITH DATES AND TIMES IN PYTHON

Ending Daylight Saving Time