Crontab Setup Guide for Automatically Starting Kafka Programs at Market Open and Close Times

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1 Overview

This document explains how to configure `crontab` on your PC to automatically launch three Python programs at specified times on trading days:

- **realtime_kafka.py**: Responsible for real-time data processing, to be launched at market open.

- **consumer.py**: A Kafka consumer that will run simultaneously with `realtime_kafka.py` at market open.

- **consumer_history.py**: A consumer designed to process historical data and calculate overall VaR, to be launched at market close.

In our example, we consider two markets:

- **Singapore Market (SGT):**

  - Morning Session: Opens at **9:00 AM SGT** and closes at 12:00 PM SGT.
  - Afternoon Session: Opens at **1:00 PM SGT** and closes at 5:00 PM SGT.

- **U.S. Eastern Market (ET):**

  - Market Open: Opens at **9:30 AM ET**.
  - Market Close: Closes at **4:00 PM ET**.

2 Prerequisites

Before configuring the crontab, ensure the following:

1. **Python Environment & Dependencies:**
   Ensure that your PC has Python installed along with all dependencies required by the scripts. If you are using a conda environment, note the full path to your Python interpreter (e.g., `/opt/anaconda3/envs/your_env/bin/python`).

2. **Program File Paths:**

   - `realtime_kafka.py` is assumed to be located at:
     `/Users/abc/PycharmProjects/QF5214/realtime_kafka.py`.

- consumer.py is assumed to be located at:
  /Users/abc/PycharmProjects/QF5214/consumer.py.

- consumer_history.py is assumed to be located at:
  /Users/abc/PycharmProjects/QF5214/consumer_history.py.

3. **Log File Directories (Optional):**
   For debugging, it is recommended to redirect program output to log files, e.g.,

   - /Users/abc/logs/realtime_kafka.log

   - /Users/abc/logs/consumer.log

   - /Users/abc/logs/consumer_history.log

   Ensure these directories exist.

3 Configuring Crontab

3.1 Step 1: Open the Crontab Editor

Open your Terminal and type:

```
crontab -e
```

This command opens your crontab file in the default text editor (such as vi or nano).

3.2 Step 2: Add Cron Jobs

Add the following lines to schedule the tasks.

A. Singapore Market (SGT)

Market Open (Start realtime_kafka.py and consumer.py)

- **Morning Session at 9:00 AM SGT:**

```
0 9 * * 1-5 /opt/anaconda3/envs/your_env/bin/python /Users/abc/
    PycharmProjects/QF5214/realtime_kafka.py >> /Users/abc/logs/
    realtime_kafka.log 2>&1
0 9 * * 1-5 /opt/anaconda3/envs/your_env/bin/python /Users/abc/
    PycharmProjects/QF5214/consumer.py >> /Users/abc/logs/consumer.log 2>&1
```

- **Afternoon Session at 1:00 PM SGT:**

```
0 13 * * 1-5 /opt/anaconda3/envs/your_env/bin/python /Users/abc/
    PycharmProjects/QF5214/realtime_kafka.py >> /Users/abc/logs/
    realtime_kafka.log 2>&1
0 13 * * 1-5 /opt/anaconda3/envs/your_env/bin/python /Users/abc/
    PycharmProjects/QF5214/consumer.py >> /Users/abc/logs/consumer.log 2>&1
```

Market Close (Start consumer_history.py)

- **Morning Session Close at 12:00 PM SGT:**

```
1  0 12 * * 1-5 /opt/anaconda3/envs/your_env/bin/python /Users/abc/
     PycharmProjects/QF5214/consumer_history.py >> /Users/abc/logs/
     consumer_history.log 2>&1
```

- **Afternoon Session Close at 5:00 PM SGT:**

```
1  0 17 * * 1-5 /opt/anaconda3/envs/your_env/bin/python /Users/abc/
     PycharmProjects/QF5214/consumer_history.py >> /Users/abc/logs/
     consumer_history.log 2>&1
```

B. U.S. Eastern Market (ET)

If your system time zone is not ET, use the `TZ` variable.

Market Open (Start realtime_kafka.py and consumer.py)

- **Market Open at 9:30 AM ET:**

```
1  30 9 * * 1-5 TZ="America/New_York" /opt/anaconda3/envs/your_env/bin/python
     /Users/abc/PycharmProjects/QF5214/realtime_kafka.py >> /Users/abc/logs/
     realtime_kafka_ET.log 2>&1
2  30 9 * * 1-5 TZ="America/New_York" /opt/anaconda3/envs/your_env/bin/python
     /Users/abc/PycharmProjects/QF5214/consumer.py >> /Users/abc/logs/
     consumer_ET.log 2>&1
```

Market Close (Start consumer_history.py)

- **Market Close at 4:00 PM ET:**

```
1  0 16 * * 1-5 TZ="America/New_York" /opt/anaconda3/envs/your_env/bin/python
     /Users/abc/PycharmProjects/QF5214/consumer_history.py >> /Users/abc/
     logs/consumer_history_ET.log 2>&1
```

3.3 Step 3: Save and Exit

Save the file and exit the editor.

- For `vi`: Type `:wq` and press Enter.

- For `nano`: Press `Ctrl+O` to save, then `Ctrl+X` to exit.

3.4 Step 4: Verify Crontab Configuration

To verify your scheduled tasks, run:

```
1  crontab -l
```

Ensure that your entries appear as expected.

4 Additional Considerations

- **Time Zone Settings:**
  Ensure that your system's time and time zone settings are correct. The ET jobs use the
  `TZ` variable to enforce Eastern Time.

- **Market Holidays:**
  Crontab does not automatically exclude holidays. If the market is closed on a holiday,
  you may need to disable the job manually or incorporate logic into your Python script.

- **Log Management:**
  Regularly monitor the log files (e.g.,
  `/Users/abc/logs/realtime_kafka.log`, `/Users/abc/logs/consumer.log`, and
  `/Users/abc/logs/consumer_history.log`) to ensure proper operation and to manage
  disk space.

5 Conclusion

By following these steps, your environment will automatically launch:

- `realtime_kafka.py` and `consumer.py` at the designated market open times for both
  Singapore (SGT) and U.S. Eastern (ET) markets.

- `consumer_history.py` at the market close times.

Adjust the Python interpreter path, program file paths, and log file locations as necessary for
your environment.