gabriel@gabriel-Lenovo-920-13IKB: ~/demo2

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```
nings/venv
gabriel@gabriel-Lenovo-920-13IKB:~/demo$
gabriel@gabriel-Lenovo-920-13IKB:~/demo$ mkdir ~/demo
mkdir: cannot create directory '/home/gabriel/demo': File exists
gabriel@gabriel-Lenovo-920-13IKB:~/demo$ mkdir ~/demo2
gabriel@gabriel-Lenovo-920-13IKB:~/demo$ cp ~/iot/lesson9/intrusiondetection.yang ~/demo2
gabriel@gabriel-Lenovo-920-13IKB:~/demo$ cd demo2
bash: cd: demo2: No such file or directory
gabriel@gabriel-Lenovo-920-13IKB:~/demo$ cd ..
gabriel@gabriel-Lenovo-920-13IKB:~$ cd demo2
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ cat intrusiondetection.yang
module intrusiondetection {

  namespace "http://netconfcentral.org/ns/intrusiondetection";

  prefix "intrusion";

  description
    "YANG module for Intrusion Detection IoT system";

  revision 2014-07-15 {
    description "Intrusion Detection System";
  }

  grouping room {
    leaf doorsensorID {
      type string;
      description
        "ID of door sensor in the room";
    }
    leaf motionsensorID {
      type string;
      description
        "ID of motion sensor in the room";
    }
  }

  container intrusiondetection {
    presence
      "Indicates the service is available";

    description
      "Top-level container for all system objects.";

    leaf systemID {
      type string;
      config false;
      mandatory true;
      description
        "ID of the system";
    }
```

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```
  }

  container intrusiondetection {
    presence
      "Indicates the service is available";

    description
      "Top-level container for all system objects.";

    leaf systemID {
      type string;
      config false;
      mandatory true;
      description
        "ID of the system";
    }

    leaf systemLocation {
      type string;
      config false;
      mandatory true;
      description
        "The location of the system";
    }

    leaf systemStatus {
      type enumeration {
        enum up {
          value 1;
          description
            "This is powered up";
        }
        enum down {
          value 2;
          description
            "This is powered down";
        }
        enum armed {
          value 3;
          description
            "This is armed";
        }
        enum disarmed {
          value 4;
          description
            "This is disarmed";
        }
      }
      config false;
      mandatory true;
      description
        "This variable indicates the current state of
```

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```
      "This is armed";
    }
    enum disarmed {
      value 4;
      description
      "This is disarmed";
    }
  }
  config false;
  mandatory true;
  description
  "This variable indicates the current state of
  the system.";
}
  container sensors {
  uses room;
  config false;
}
}

rpc arm-system {
 description
  "Arm the system";
}

rpc disarm-system {
 description
  "Disarm the system";
}

notification systemArmed {
 description
  "Indicates that system has been armed.";

 leaf armStatus {
  description
   "Indicates the system arming status";

  type enumeration {
   enum armed {
    description
     "The system was armed.";
   }

   enum disarmed {
    description
     "The system was disarmed.";
   }

   enum error {
    description
     "The system is broken.";
```

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```
      description
      "The system was disarmed.";
     }

     enum error {
      description
       "The system is broken.";
      }
     }
    }
   }
  }
}
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ pyang -f yin -o intrusiondetection.yin intrusiondetection.yang
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ cat intrusiondetection.yin
```

```
<?xml version="1.0" encoding="UTF-8"?>
<module name="intrusiondetection"
        xmlns="urn:ietf:params:xml:ns:yang:yin:1"
        xmlns:intrusion="http://netconfcentral.org/ns/intrusiondetection">
  <namespace uri="http://netconfcentral.org/ns/intrusiondetection"/>
  <prefix value="intrusion"/>
  <description>
    <text>YANG module for Intrusion Detection IoT system</text>
  </description>
  <revision date="2014-07-15">
    <description>
      <text>Intrusion Detection System</text>
    </description>
  </revision>
  <grouping name="room">
    <leaf name="doorsensorID">
      <type name="string"/>
      <description>
        <text>ID of door sensor in the room</text>
      </description>
    </leaf>
    <leaf name="motionsensorID">
      <type name="string"/>
      <description>
        <text>ID of motion sensor in the room</text>
      </description>
    </leaf>
  </grouping>
  <container name="intrusiondetection">
    <presence value="Indicates the service is available"/>
    <description>
      <text>Top-level container for all system objects.</text>
    </description>
    <leaf name="systemID">
      <type name="string"/>
      <config value="false"/>
      <mandatory value="true"/>
      <description>
```

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```xml
      <presence value="Indicates the service is available"/>
      <description>
        <text>Top-level container for all system objects.</text>
      </description>
    <leaf name="systemID">
      <type name="string"/>
      <config value="false"/>
      <mandatory value="true"/>
      <description>
        <text>ID of the system</text>
      </description>
    </leaf>
    <leaf name="systemLocation">
      <type name="string"/>
      <config value="false"/>
      <mandatory value="true"/>
      <description>
        <text>The location of the system</text>
      </description>
    </leaf>
    <leaf name="systemStatus">
      <type name="enumeration">
        <enum name="up">
          <value value="1"/>
          <description>
            <text>This is powered up</text>
          </description>
        </enum>
        <enum name="down">
          <value value="2"/>
          <description>
            <text>This is powered down</text>
          </description>
        </enum>
        <enum name="armed">
          <value value="3"/>
          <description>
            <text>This is armed</text>
          </description>
        </enum>
        <enum name="disarmed">
          <value value="4"/>
          <description>
            <text>This is disarmed</text>
          </description>
        </enum>
      </type>
      <config value="false"/>
      <mandatory value="true"/>
      <description>
        <text>This variable indicates the current state of
the system.</text>
```

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```xml
          <description>
            <text>This is disarmed</text>
          </description>
        </enum>
      </type>
      <config value="false"/>
      <mandatory value="true"/>
      <description>
        <text>This variable indicates the current state of
the system.</text>
      </description>
    </leaf>
    <container name="sensors">
      <uses name="room"/>
      <config value="false"/>
    </container>
  </container>
  <rpc name="arm-system">
    <description>
      <text>Arm the system</text>
    </description>
  </rpc>
  <rpc name="disarm-system">
    <description>
      <text>Disarm the system</text>
    </description>
  </rpc>
  <notification name="systemArmed">
    <description>
      <text>Indicates that system has been armed.</text>
    </description>
    <leaf name="armStatus">
      <description>
        <text>Indicates the system arming status</text>
      </description>
      <type name="enumeration">
        <enum name="armed">
          <description>
            <text>The system was armed.</text>
          </description>
        </enum>
        <enum name="disarmed">
          <description>
            <text>The system was disarmed.</text>
          </description>
        </enum>
        <enum name="error">
          <description>
            <text>The system is broken.</text>
          </description>
        </enum>
      </type>
```
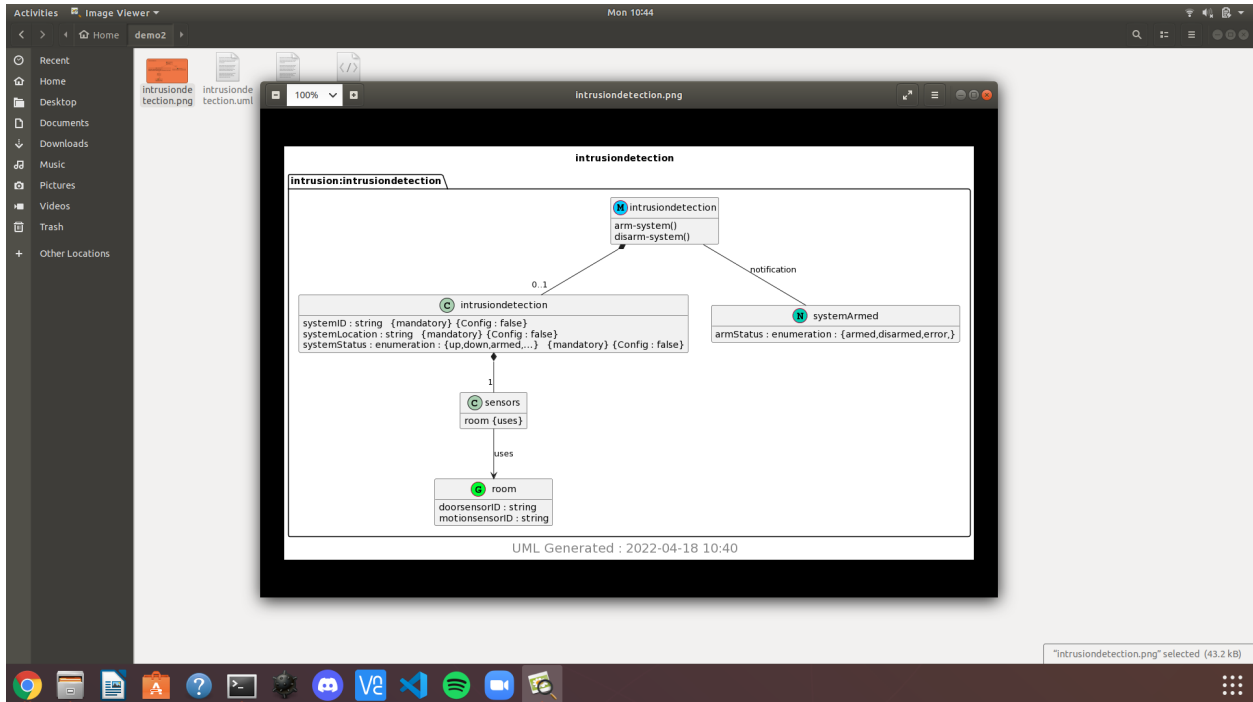
gabriel@gabriel-Lenovo-920-13IKB: ~/demo2

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```
                </enum>
            <enum name="disarmed">
                <description>
                    <text>The system was disarmed.</text>
                </description>
            </enum>
            <enum name="error">
                <description>
                    <text>The system is broken.</text>
                </description>
            </enum>
        </type>
    </leaf>
</notification>
</module>
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ pyang -f uml -o intrusiondetection.uml intrusiondetection.yang --uml-no=stereotypes,annotation,typedef
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ cat intrusiondetection.uml
'Download plantuml from http://plantuml.sourceforge.net/
'Generate png with java -jar plantuml.jar <file>
'Output in img/<module>.png
'If Java spits out memory error increase heap size with java -Xmx1024m  -jar plantuml.jar <file>
@startuml img/intrusiondetection.png
hide empty fields
hide empty methods
hide <<case>> circle
hide <<augment>> circle
hide <<choice>> circle
hide <<leafref>> stereotype
hide <<leafref>> circle
hide stereotypes
page 1x1
Title intrusiondetection
package "intrusion:intrusiondetection" as intrusion_intrusiondetection {
class "intrusiondetection" as intrusiondetection << (M, #33CCFF) module>>
class "room" as intrusiondetection_I_room_grouping <<(G,Lime) grouping>>
intrusiondetection_I_room_grouping : doorsensorID : string
intrusiondetection_I_room_grouping : motionsensorID : string
class "intrusiondetection" as  intrusiondetection_I_intrusiondetection <<container>>
intrusiondetection *-- "0..1" intrusiondetection_I_intrusiondetection
intrusiondetection_I_intrusiondetection : systemID : string    {mandatory} {Config : false}
intrusiondetection_I_intrusiondetection : systemLocation : string    {mandatory} {Config : false}
intrusiondetection_I_intrusiondetection : systemStatus : enumeration : {up,down,armed,...}    {mandatory} {Config : false}
class "sensors" as  intrusiondetection_I_intrusiondetection_I_sensors <<container>>
intrusiondetection_I_intrusiondetection *-- "1" intrusiondetection_I_intrusiondetection_I_sensors
intrusiondetection_I_intrusiondetection_I_sensors : room {uses}
intrusiondetection : arm-system()
intrusiondetection : disarm-system()
class "systemArmed" as intrusiondetection_I_systemArmed << (N,#00D1B2) notification>>
intrusiondetection -- intrusiondetection_I_systemArmed : notification
intrusiondetection_I_systemArmed : armStatus : enumeration : {armed,disarmed,error,}
}
```

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```
                </description>
            </enum>
        </type>
    </leaf>
</notification>
</module>
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ pyang -f uml -o intrusiondetection.uml intrusiondetection.yang --uml-no=stereotypes,annotation,typedef
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ cat intrusiondetection.uml
'Download plantuml from http://plantuml.sourceforge.net/
'Generate png with java -jar plantuml.jar <file>
'Output in img/<module>.png
'If Java spits out memory error increase heap size with java -Xmx1024m  -jar plantuml.jar <file>
@startuml img/intrusiondetection.png
hide empty fields
hide empty methods
hide <<case>> circle
hide <<augment>> circle
hide <<choice>> circle
hide <<leafref>> stereotype
hide <<leafref>> circle
hide stereotypes
page 1x1
Title intrusiondetection
package "intrusion:intrusiondetection" as intrusion_intrusiondetection {
class "intrusiondetection" as intrusiondetection << (M, #33CCFF) module>>
class "room" as intrusiondetection_I_room_grouping <<(G,Lime) grouping>>
intrusiondetection_I_room_grouping : doorsensorID : string
intrusiondetection_I_room_grouping : motionsensorID : string
class "intrusiondetection" as  intrusiondetection_I_intrusiondetection <<container>>
intrusiondetection *-- "0..1" intrusiondetection_I_intrusiondetection
intrusiondetection_I_intrusiondetection : systemID : string    {mandatory} {Config : false}
intrusiondetection_I_intrusiondetection : systemLocation : string    {mandatory} {Config : false}
intrusiondetection_I_intrusiondetection : systemStatus : enumeration : {up,down,armed,...}    {mandatory} {Config : false}
class "sensors" as  intrusiondetection_I_intrusiondetection_I_sensors <<container>>
intrusiondetection_I_intrusiondetection *-- "1" intrusiondetection_I_intrusiondetection_I_sensors
intrusiondetection_I_intrusiondetection_I_sensors : room {uses}
intrusiondetection : arm-system()
intrusiondetection : disarm-system()
class "systemArmed" as intrusiondetection_I_systemArmed << (N,#00D1B2) notification>>
intrusiondetection -- intrusiondetection_I_systemArmed : notification
intrusiondetection_I_systemArmed : armStatus : enumeration : {armed,disarmed,error,}
}

intrusiondetection_I_intrusiondetection_I_sensors --> intrusiondetection_I_room_grouping : uses
center footer
  <size:20> UML Generated : 2022-04-18 10:40 </size>
  endfooter
@enduml
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ python3 -m plantuml intrusiondetection.uml
[{'filename': 'intrusiondetection.uml', 'gen_success': True}]
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$
```
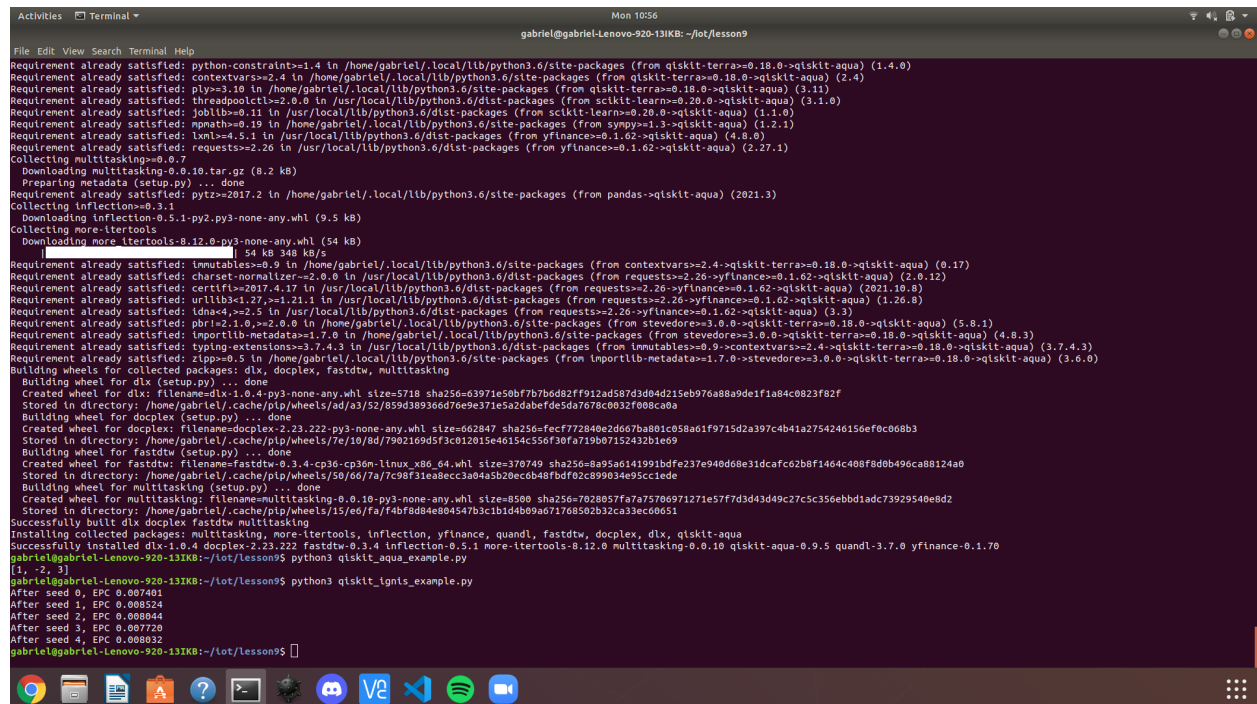
UML Generated : 2022-04-18 10:40


```
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ pyang -f uml -o intrusiondetection.uml intrusiondetection.yang --uml-no=stereotypes,annotation,typedef
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ cat intrusiondetection.uml
'Download plantuml from http://plantuml.sourceforge.net/
'Generate png with java -jar plantuml.jar <file>
'Output in img/<module>.png
'If Java spits out memory error increase heap size with java -Xmx1024m  -jar plantuml.jar <file>
@startuml img/intrusiondetection.png
hide empty fields
hide empty methods
hide <<case>> circle
hide <<augment>> circle
hide <<choice>> circle
hide <<leafref>> stereotype
hide <<leafref>> circle
hide stereotypes
page 1x1
Title intrusiondetection
package "intrusion:intrusiondetection" as intrusion_intrusiondetection {
class "intrusiondetection" as intrusiondetection << (M, #33CCFF) module>>
class "room" as intrusiondetection_I_room_grouping <<(G,Lime) grouping>>
intrusiondetection_I_room_grouping : doorsensorID : string
intrusiondetection_I_room_grouping : motionsensorID : string
class "intrusiondetection" as  intrusiondetection_I_intrusiondetection <<container>>
intrusiondetection *-- "0..1" intrusiondetection_I_intrusiondetection
intrusiondetection_I_intrusiondetection : systemID : string    {mandatory} {Config : false}
intrusiondetection_I_intrusiondetection : systemLocation : string   {mandatory} {Config : false}
intrusiondetection_I_intrusiondetection : systemStatus : enumeration : {up,down,armed,...}   {mandatory} {Config : false}
class "sensors" as  intrusiondetection_I_intrusiondetection_I_sensors <<container>>
intrusiondetection_I_intrusiondetection *-- "1" intrusiondetection_I_intrusiondetection_I_sensors
intrusiondetection_I_intrusiondetection_I_sensors : room {uses}
intrusiondetection : arm-system()
intrusiondetection : disarm-system()
class "systemArmed" as intrusiondetection_I_systemArmed << (N,#00D1B2) notification>>
intrusiondetection -- intrusiondetection_I_systemArmed : notification
intrusiondetection_I_systemArmed : armStatus : enumeration : {armed,disarmed,error,}
}

intrusiondetection_I_intrusiondetection_I_sensors --> intrusiondetection_I_room_grouping : uses
center footer
 <size:20> UML Generated : 2022-04-18 10:40 </size>
 endfooter
@enduml
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ python3 -m plantuml intrusiondetection.uml
[['filename': 'intrusiondetection.uml', 'gen_success': True]]
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ pip3 install qiskit[visualization]
Defaulting to user installation because normal site-packages is not writeable
Collecting qiskit[visualization]
  Downloading qiskit-0.34.2.tar.gz (13 kB)
  Preparing metadata (setup.py) ... done
Collecting qiskit-terra==0.19.2
  Downloading qiskit_terra-0.19.2-cp36-cp36m-manylinux_2_12_x86_64.manylinux2010_x86_64.whl (6.4 MB)
     | 6.4 MB 1.2 MB/s
```

```
>>> IBMQ.load_accont()
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "/home/gabriel/.local/lib/python3.6/site-packages/qiskit/__init__.py", line 124, in __getattr__
    return getattr(self.ibmq, attr)
AttributeError: 'IBMQFactory' object has no attribute 'load_accont'
>>> IBMQ.load_account()
<AccountProvider for IBMQ(hub='ibm-q', group='open', project='main')>
>>> exit()
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ python3 qiskit_terra_example.py
python3: can't open file 'qiskit_terra_example.py': [Errno 2] No such file or directory
gabriel@gabriel-Lenovo-920-13IKB:~/demo2$ cd ~/iot/lesson9
gabriel@gabriel-Lenovo-920-13IKB:~/iot/lesson9$ python3 qiskit_terra_example.py
{'00': 518, '11': 506}
gabriel@gabriel-Lenovo-920-13IKB:~/iot/lesson9$ python3 qiskit_aer_example.py
{'010': 10, '001': 12, '101': 17, '100': 18, '110': 34, '000': 446, '111': 458, '011': 29}
gabriel@gabriel-Lenovo-920-13IKB:~/iot/lesson9$ python3 qiskit_aqua_example.py
Traceback (most recent call last):
  File "qiskit_aqua_example.py", line 2, in <module>
    from qiskit.aqua.components.oracles import LogicalExpressionOracle
ModuleNotFoundError: No module named 'qiskit.aqua'
```



```
Requirement already satisfied: python-constraint>=1.4 in /home/gabriel/.local/lib/python3.6/site-packages (from qiskit-terra>=0.18.0->qiskit-aqua) (1.4.0)
Requirement already satisfied: contextvars>=2.4 in /home/gabriel/.local/lib/python3.6/site-packages (from qiskit-terra>=0.18.0->qiskit-aqua) (2.4)
Requirement already satisfied: ply>=3.10 in /home/gabriel/.local/lib/python3.6/site-packages (from qiskit-terra>=0.18.0->qiskit-aqua) (3.11)
Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.6/dist-packages (from scikit-learn>=0.20.0->qiskit-aqua) (3.1.0)
Requirement already satisfied: joblib>=0.11 in /usr/local/lib/python3.6/dist-packages (from scikit-learn>=0.20.0->qiskit-aqua) (1.1.0)
Requirement already satisfied: mpmath>=0.19 in /home/gabriel/.local/lib/python3.6/site-packages (from sympy>=1.3->qiskit-aqua) (1.2.1)
Requirement already satisfied: lxml>=4.5.1 in /usr/local/lib/python3.6/dist-packages (from yfinance>=0.1.62->qiskit-aqua) (4.8.0)
Requirement already satisfied: requests>=2.26 in /usr/local/lib/python3.6/dist-packages (from yfinance>=0.1.62->qiskit-aqua) (2.27.1)
Collecting multitasking>=0.0.7
  Downloading multitasking-0.0.10.tar.gz (8.2 kB)
  Preparing metadata (setup.py) ... done
Requirement already satisfied: pytz>=2017.2 in /home/gabriel/.local/lib/python3.6/site-packages (from pandas->qiskit-aqua) (2021.3)
Collecting inflection>=0.3.1
  Downloading inflection-0.5.1-py2.py3-none-any.whl (9.5 kB)
Collecting more-itertools
  Downloading more_itertools-8.12.0-py3-none-any.whl (54 kB)
     |                                | 54 kB 348 kB/s
Requirement already satisfied: immutables>=0.9 in /home/gabriel/.local/lib/python3.6/site-packages (from contextvars>=2.4->qiskit-terra>=0.18.0->qiskit-aqua) (0.17)
Requirement already satisfied: charset-normalizer~=2.0.0 in /usr/local/lib/python3.6/dist-packages (from requests>=2.26->yfinance>=0.1.62->qiskit-aqua) (2.0.12)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.6/dist-packages (from requests>=2.26->yfinance>=0.1.62->qiskit-aqua) (2021.10.8)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.6/dist-packages (from requests>=2.26->yfinance>=0.1.62->qiskit-aqua) (1.26.8)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.6/dist-packages (from requests>=2.26->yfinance>=0.1.62->qiskit-aqua) (3.3)
Requirement already satisfied: pbr!=2.1.0,>=2.0.0 in /home/gabriel/.local/lib/python3.6/site-packages (from stevedore>=3.0.0->qiskit-terra>=0.18.0->qiskit-aqua) (5.8.1)
Requirement already satisfied: importlib-metadata>=1.7.0 in /home/gabriel/.local/lib/python3.6/site-packages (from stevedore>=3.0.0->qiskit-terra>=0.18.0->qiskit-aqua) (4.8.3)
Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/python3.6/dist-packages (from immutables>=0.9->contextvars>=2.4->qiskit-terra>=0.18.0->qiskit-aqua) (3.7.4.3)
Requirement already satisfied: zipp>=0.5 in /home/gabriel/.local/lib/python3.6/site-packages (from importlib-metadata>=1.7.0->stevedore>=3.0.0->qiskit-terra>=0.18.0->qiskit-aqua) (3.6.0)
Building wheels for collected packages: dlx, docplex, fastdtw, multitasking
  Building wheel for dlx (setup.py) ... done
  Created wheel for dlx: filename=dlx-1.0.4-py3-none-any.whl size=5718 sha256=63971e50bf7b7b6d82ff912ad587d3d04d215eb976a88a9de1f1a84c0823f82f
  Stored in directory: /home/gabriel/.cache/pip/wheels/ad/a3/52/859d389366d76e9e371e5a2dabefde5da7678c0032f008ca0a
  Building wheel for docplex (setup.py) ... done
  Created wheel for docplex: filename=docplex-2.23.222-py3-none-any.whl size=662847 sha256=fecf772840e2d667ba801c058a61f9715d2a397c4b41a2754246156ef0c068b3
  Stored in directory: /home/gabriel/.cache/pip/wheels/7e/10/8d/7902169d5f3c012015e46154c556f30fa719b07152432b1e69
  Building wheel for fastdtw (setup.py) ... done
  Created wheel for fastdtw: filename=fastdtw-0.3.4-cp36-cp36m-linux_x86_64.whl size=370749 sha256=8a95a6141991bdfe237e940d68e31dcafc62b8f1464c408f8d0b496ca88124a0
  Stored in directory: /home/gabriel/.cache/pip/wheels/50/66/7a/7c98f31ea8ecc3a04a5b20ec6b48fbdf02c899034e95cc1ede
  Building wheel for multitasking (setup.py) ... done
  Created wheel for multitasking: filename=multitasking-0.0.10-py3-none-any.whl size=8500 sha256=7028057fa7a75706971271e57f7d3d43d49c27c5c356ebbd1adc73929540e8d2
  Stored in directory: /home/gabriel/.cache/pip/wheels/15/e6/fa/f4bf8d84e804547b3c1b1d4b09a671768502b32ca33ec60651
Successfully built dlx docplex fastdtw multitasking
Installing collected packages: multitasking, more-itertools, inflection, yfinance, quandl, fastdtw, docplex, dlx, qiskit-aqua
Successfully installed dlx-1.0.4 docplex-2.23.222 fastdtw-0.3.4 inflection-0.5.1 more-itertools-8.12.0 multitasking-0.0.10 qiskit-aqua-0.9.5 quandl-3.7.0 yfinance-0.1.70
gabriel@gabriel-Lenovo-920-13IKB:~/iot/lesson9$ python3 qiskit_aqua_example.py
[1, -2, 3]
gabriel@gabriel-Lenovo-920-13IKB:~/iot/lesson9$ python3 qiskit_ignis_example.py
After seed 0, EPC 0.007401
After seed 1, EPC 0.008524
After seed 2, EPC 0.008044
After seed 3, EPC 0.007720
After seed 4, EPC 0.008032
gabriel@gabriel-Lenovo-920-13IKB:~/iot/lesson9$
```