Assignment-1

Internet of Things

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CS20MTECH11013

Objective:

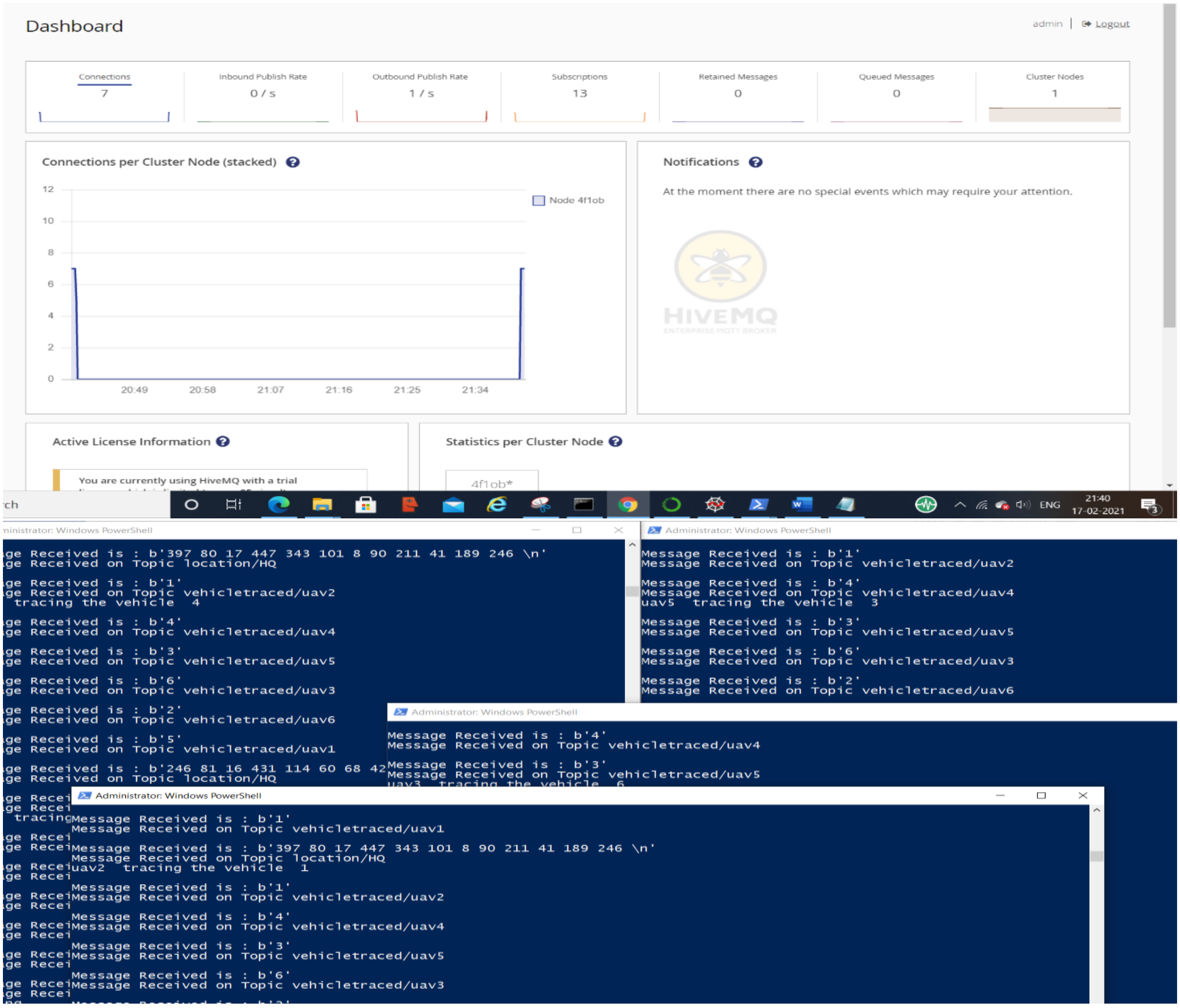
Our Objective is to keep track of the highly crucial vehicles locations continuously with the help of UAVs using an IoT broker, HiveMq. We have 6 vehicles and 6 UAVs. At any point of time, no two UAVs should track the same vehicle.

Procedure:

- We have 3 kinds of devices here.
- 1. HQ which has the information of the all-vehicle locations for each time stamps.
- 2. UAV which must find out its nearest vehicle and report back to HQ saying that it is tracking this vehicle.
- 3. IoT broker (here MQTT) which connects both.
- Process that has been followed is-
- At HQ.py
- Read the vehicle_location.txt and published the vehicle locations with respect to the time stamps.
- At UAV.py
- Received those messages and read its own location at that time stamp from uav(id).txt file.
- Calculated the distances between uav and all vehicles at that timestamp and stored.
- Calculated minimum distanced vehicle (Vmin) for that uav and Deployed conflict resolution algorithm.
- Checked whether any other uav is also tracing the same vehicle.
- If yes, then find out the next minimum distanced vehicle.
- Finally, It publishes the traced vehicle details.
- At HQ.py
- HQ already subscribed to all uav clients' messages, HQ receives them and write them to an output file called "output.txt".

- **Conflict Resolution Algorithm: -**
- Each UAV subscribes to the other UAVs messages also.
- For each timestamp-
- Whenever 'present UAV' receives any message from other UAVs about the vehicle number that they are tracing, 'present UAV' stores that vehicle number into a list. (here completed_veh_ids)
- 'Present UAV', just before publishing the minimum distanced vehicle (Vmin), it checks the above list whether Vmin is present in it or not.
- If yes, 'present UAV' goes to search next minimum distanced vehicle.
- Now above 2 steps repeat again to check for this next minimum vehicle.
- Like this loop will run till 'present UAV' gets the possible minimum distanced vehicle which is not traced by other UAVs.
- After publishing the vehicle number that 'present UAV' is tracing, it will empty the completed_veh_ids so that it can store for the next timestamp.
- In simple words, it is like listen before talking, checking other UAVs status before 'present UAV' publishes its own status.

Output:



Dashboard

admin | Logout

Connections	Inbound Publish Rate	Outbound Publish Rate	Subscriptions	Retained Messages	Queued Messages	Cluster Nodes
7	0 / s	1 / s	13	0	0	1

Connections per Cluster Node (stacked)

Notifications

At the moment there are no special events which may require your attention.

Active License Information

You are currently using HiveMQ with a trial

Statistics per Cluster Node

4f1ob*

ministrator: Windows PowerShell

```
ge Received is : b'397 80 17 447 343 101 8 90 211 41 189 246 \n'
ge Received on Topic location/HQ

ge Received is : b'1'
ge Received on Topic vehicletraced/uav2
 tracing the vehicle  4

ge Received is : b'4'
ge Received on Topic vehicletraced/uav4

ge Received is : b'3'
ge Received on Topic vehicletraced/uav5

ge Received is : b'6'
ge Received on Topic vehicletraced/uav3

ge Received is : b'2'
ge Received on Topic vehicletraced/uav6

ge Received is : b'5'
ge Received on Topic vehicletraced/uav1

ge Received is : b'246 81 16 431 114 60 68 42
ge Received on Topic location/HQ

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 tracing

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```

Administrator: Windows PowerShell

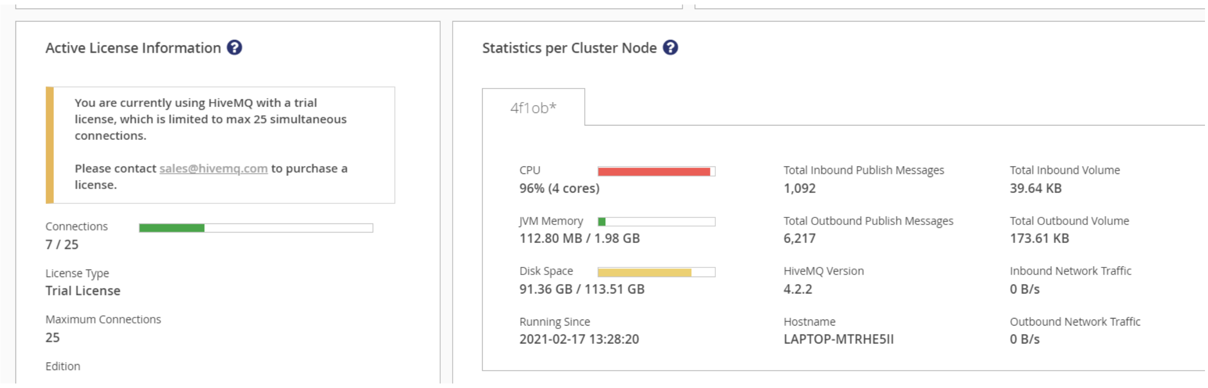
```
Message Received is : b'1'
Message Received on Topic vehicletraced/uav2

Message Received is : b'4'
Message Received on Topic vehicletraced/uav4
uav5  tracing the vehicle  3

Message Received is : b'3'
Message Received on Topic vehicletraced/uav5

Message Received is : b'6'
Message Received on Topic vehicletraced/uav3

Message Received is : b'2'
Message Received on Topic vehicletraced/uav6
```

Administrator: Windows PowerShell

```
Message Received is : b'4'
Message Received on Topic vehicletraced/uav4

Message Received is : b'3'
Message Received on Topic vehicletraced/uav5
uav3  tracing the vehicle  6
```

Administrator: Windows PowerShell

```
Message Received is : b'1'
Message Received on Topic vehicletraced/uav1

Message Received is : b'397 80 17 447 343 101 8 90 211 41 189 246 \n'
Message Received on Topic location/HQ
uav2  tracing the vehicle  1

Message Received is : b'1'
Message Received on Topic vehicletraced/uav2

Message Received is : b'4'
Message Received on Topic vehicletraced/uav4

Message Received is : b'3'
Message Received on Topic vehicletraced/uav5

Message Received is : b'6'
Message Received on Topic vehicletraced/uav3
```



Active License Information

You are currently using HiveMQ with a trial license, which is limited to max 25 simultaneous connections.

Please contact sales@hivemq.com to purchase a license.

Connections
7 / 25

License Type
Trial License

Maximum Connections
25

Edition

Statistics per Cluster Node

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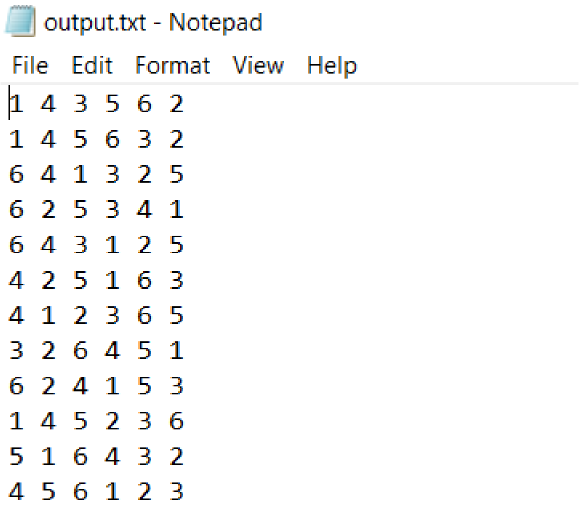
CPU 96% (4 cores)	Total Inbound Publish Messages 1,092	Total Inbound Volume 39.64 KB
JVM Memory 112.80 MB / 1.98 GB	Total Outbound Publish Messages 6,217	Total Outbound Volume 173.61 KB
Disk Space 91.36 GB / 113.51 GB	HiveMQ Version 4.2.2	Inbound Network Traffic 0 B/s
Running Since 2021-02-17 13:28:20	Hostname LAPTOP-MTRHE5II	Outbound Network Traffic 0 B/s



```
1 4 3 5 6 2
1 4 5 6 3 2
6 4 1 3 2 5
6 2 5 3 4 1
6 4 3 1 2 5
4 2 5 1 6 3
4 1 2 3 6 5
3 2 6 4 5 1
6 2 4 1 5 3
1 4 5 2 3 6
5 1 6 4 3 2
4 5 6 1 2 3
```

Conclusion:

We have successfully assigned 6 UAVs to trace 6 vehicles at every timestamp.