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Activity 4 - Container

1. Create a network bridge named "mynet"

```
PS D:\CU_submission\Software_Defined_Systems\Activity_4> docker network create mynet
07ba27c2f4f3b04d62d0fceb1344c3671aed85324fcbbf50daecd95fb3d608f2
```

2. Create a persistent volume named "grafana-vol"

```
PS D:\CU_submission\Software_Defined_Systems\Activity_4> docker volume create grafana-vol
grafana-vol
```

3. List of running container:
- Run the Node-Exporter container using port 9100 for both the host machine and Docker, which Prometheus will use to scrape data. Also, attach it to the mynet bridge.

```
PS D:\CU_submission\Software_Defined_Systems\Activity_4> docker run --rm -d -p 9100:9100 --network my
net --name node-exporter prom/node-exporter
Unable to find image 'prom/node-exporter:latest' locally
latest: Pulling from prom/node-exporter
9fa9226be034: Pull complete
1617e25568b2: Pull complete
a7193bcb1fb2: Pull complete
Digest: sha256:4032c6d5bfd752342c3e631c2f1de93ba6b86c41db6b167b9a35372c139e7706
Status: Downloaded newer image for prom/node-exporter:latest
bd63e8ed098456777bc23c47315759e6b6552a6bd33f0f277372fc87f1eb2f9e
```

- Run the Prometheus container using port 9090 for both sides and attach it to the mynet bridge, as done with the node-exporter. Also, overwrite the Prometheus job description at /etc/prometheus/prometheus.yml by my file on host machine.

```
PS D:\CU_submission\Software_Defined_Systems\Activity_4> docker run --rm -d -p 9090:9090 --network my
net --name prometheus -v .\prometheus.yml:/etc/prometheus/prometheus.yml prom/prometheus
Unable to find image 'prom/prometheus:latest' locally
latest: Pulling from prom/prometheus
9fa9226be034: Already exists
1617e25568b2: Already exists
02203e3d6934: Pull complete
8be4b7271108: Pull complete
8becc689631f: Pull complete
ceaeea15c1bf: Pull complete
564720d6ed13: Pull complete
1fd5d47e09da: Pull complete
1afe4a0d7329: Pull complete
bd55ccfa5aad: Pull complete
54f884861fc1: Pull complete
b09316e948c6: Pull complete
Digest: sha256:f6639335d34a77d9d9db382b92eeb7fc00934be8eae81dbc03b31cfe90411a94
Status: Downloaded newer image for prom/prometheus:latest
4ecbf279cea1be9db16896bd3e94971ab7c6fb9c7e9a6456890bb2dc056d2256
```

- Run the Grafana container using port 3000 for both sides, attach it to the mynet bridge, and remove it after it stops. Mount the Docker volume grafana-vol at /var/lib/grafana, which Grafana uses for its data storage.

```
PS D:\CU_submission\Software_Defined_Systems\Activity_4> docker run --rm -d -p 3000:3000 --network my
net -v grafana-vol:/var/lib/grafana --name grafana grafana/grafana
Unable to find image 'grafana/grafana:latest' locally
latest: Pulling from grafana/grafana
4abcf2066143: Already exists
39aee5fd3406: Pull complete
592f1e71407c: Pull complete
66aec874ce0c: Pull complete
bde37282dfba: Pull complete
b6982d0733af: Pull complete
ab3c28da242b: Pull complete
e4892977d944: Pull complete
ef2b3f3f597e: Pull complete
27a3c8ebdfbf: Pull complete
Digest: sha256:408afb9726de5122b00a2576763a8a57a3c86d5b0eff5305bc994ceb3eb96c3f
Status: Downloaded newer image for grafana/grafana:latest
5e3185fb40705fe7fa37639b9adbccefeea8ecd060d7c7ec2477d9a16a32756b
```

- Run the Apache container using port 8080 on the host and port 80 in the container, and attach it to the mynet bridge. Mount the custom server status page configuration to /etc/apache2/mods-enabled/status.conf, where the Apache configuration is located.

```
PS D:\CU_submission\Software_Defined_Systems\Activity_4> docker run -d --name apache -p 8080:80 --net
work mynet -v D:\CU_submission\Software_Defined_Systems\Activity_4\status.conf:/etc/apache2/mods-enab
led/status.conf ubuntu/apache2
f737239e990039f086744ba228e227c4952bd65338a0a31cf3a8093951fdc743
```

- Run the Apache-Exporter using port 9117 for both sides, and attach it to the mynet bridge. Also, set scrape_uri to the Docker localhost, which is host.docker.internal, at port 8080, where the Apache server reports its status.

```
PS D:\CU_submission\Software_Defined_Systems\Activity_4> docker run -d -p 9117:9117 --name apache-exp
orter --network mynet bitnami/apache-exporter --scrape_uri="http://host.docker.internal:8080/server-s
tatus?auto"
18406eb0aa03543f2593d448b56034dfe9932233b1ded0947717f78410e31c14
```

Result

- The `Node-Exporter` metric `node_load1` measures system CPU load relative to the number of threads (a value of 24 means fully utilized on my system), and the reported value is the 1-minute average.
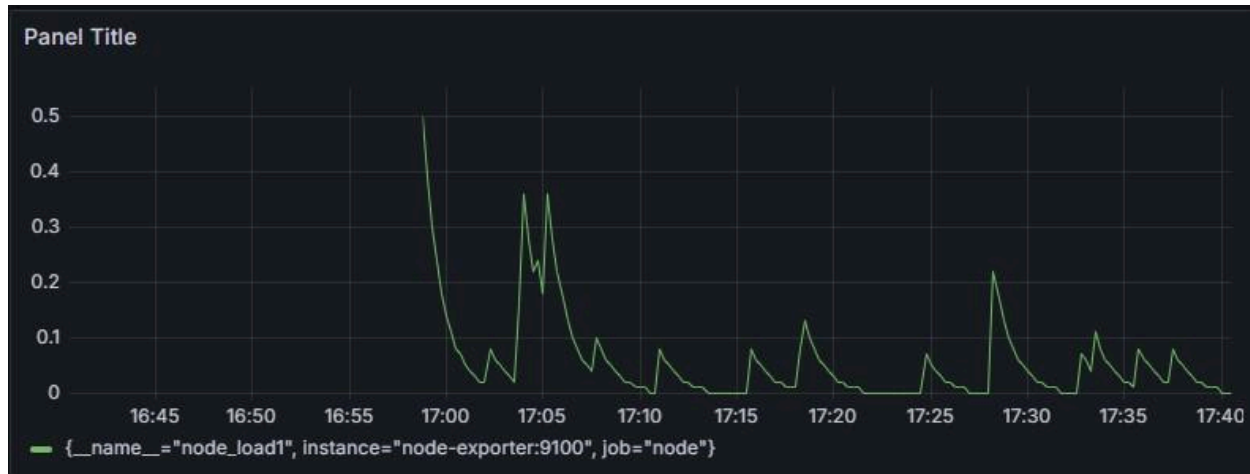
- The `Apache-Exporter` metric `apache_cpuload` measures the CPU load of the Apache server relative to the number of threads, similar to how node_load1 measures system load.