OSM-MR11 Hackfest

OAI 5G Core Onboarding Challenge – Team Eagle #1

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Outline

• Task 1: OAI deployment using Helm Chart
  • Single interface #eth0
  • Multiple interface #eth0 and #net1 using Multus
• Task 2: Charmed implementation for OAI NFs
• Task 3: Deployment descriptor implementation
• Demo
• Tasks 4, 5, and 6 – ongoing
Task 1 – single interface “eth0”

# clone the oai-cn5g-fed
$ git clone -b helm-update https://gitlab.eurecom.fr/oai/cn5g/oai-cn5g-fed.git

# Checking the consistencies – static IP, mcc and mnc values

# check the logs of SMF and UPF to see the session is configured properly
$ kubectl oai-smf-678bbc965f-whdr6 smf | grep 'Received N4 ASSOCIATION SETUP RESPONSE from an UPF'
$ kubectl logs oai-spgwu-tiny-6c4d68fd45-mpv5v spgwu | grep 'Received SX HEARTBEAT REQUEST' | wc -l
Helm list and Kubernetes pods

- `helm list`
- `kubectl -n default get pods`

- Interfaces and ping test from `nr-ue`

```
rout@oai-ue-65957c8bb8-8gvgz:/opt/oai-ue# route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref    Use Iface
0.0.0.0         169.254.1.1   255.255.255.0  UG   0   0   0  eth0
12.1.1.0        0.0.0.0       255.255.255.0  U     0   0   0     oaiue
169.254.1.1     0.0.0.0       255.255.255.255  UG    0   0   0  eth0
root@oai-ue-65957c8bb8-8gvgz:/opt/oai-ue# ping -c 4 google.fr
PING google.fr (142.251.36.3) 56(4) bytes of data.
64 bytes from ams15sw-in-f3.1e108.net (142.251.36.3): icmp_seq=1 ttl=107 time=64.8 ms
64 bytes from ams15sw-in-f3.1e108.net (142.251.36.3): icmp_seq=2 ttl=107 time=74.1 ms
64 bytes from ams15sw-in-f3.1e108.net (142.251.36.3): icmp_seq=3 ttl=107 time=82.1 ms
64 bytes from ams15sw-in-f3.1e108.net (142.251.36.3): icmp_seq=4 ttl=107 time=88.1 ms
^C
--- google.fr ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3003ms
rtt min/avg/max/mdev = 64.879/75.352/82.188/6.737 ms
root@oai-ue-65957c8bb8-8gvgz:/opt/oai-ue#
```
Task 1: using multus – “eth0” and “net1”

- Interfaces

```
root@oai-nr-ue-76755b9c4c-z5swr:/opt/oai-nr-ue# route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0 169.254.1.1 0.0.0.0 UG 0 0 0 eth0
12.1.1.0 0.0.0.0 255.255.255.0 UG 0 0 0 oaitun_ue1
169.254.1.1 0.0.0.0 255.255.255.255 UG 0 0 0 eth0
192.168.18.0 0.0.0.0 255.255.255.0 UG 0 0 0 net1
```

- Ping test

```
root@oai-nr-ue-76755b9c4c-z5swr:/opt/oai-nr-ue# ping -c 4 google.fr
PING google.fr (142.251.36.3) 56(84) bytes of data.
64 bytes from ams1544-in-f3.1e100.net (142.251.36.3): icmp_seq=1 ttl=108 time=57.4 ms
64 bytes from ams1544-in-f3.1e100.net (142.251.36.3): icmp_seq=2 ttl=108 time=56.7 ms
64 bytes from ams1544-in-f3.1e100.net (142.251.36.3): icmp_seq=3 ttl=108 time=56.5 ms
64 bytes from ams1544-in-f3.1e100.net (142.251.36.3): icmp_seq=4 ttl=108 time=58.0 ms
--- google.fr ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3885ms
rtt min/avg/max/mdev = 56.51/57.179/58.037/0.672 ms
```

```
root@oai-nr-ue-76755b9c4c-z5swr:/opt/oai-nr-ue# ping -I oaitun_ue1 google.fr
PING google.fr (142.251.36.3) from 12.1.1.129 oaitun_ue1: 56(84) bytes of data.
64 bytes from ams1544-in-f3.1e100.net (142.251.36.3): icmp_seq=1 ttl=107 time=63.2 ms
64 bytes from ams1544-in-f3.1e100.net (142.251.36.3): icmp_seq=2 ttl=107 time=67.9 ms
64 bytes from ams1544-in-f3.1e100.net (142.251.36.3): icmp_seq=3 ttl=107 time=66.0 ms
64 bytes from ams1544-in-f3.1e100.net (142.251.36.3): icmp_seq=4 ttl=107 time=61.6 ms
--- google.fr ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3883ms
rtt min/avg/max/mdev = 61.632/64.724/67.986/2.454 ms
```

Demo: Task 1

# see the pods
$kubectl get pods

# access the bash of nr-ue

$kubectl -n oai-charm exec -it nr-ue-0 -c nr-ue bash

# ping google

$ ping -c 4 google.com

# for multus

$ kubectl get pods -n 5gtest

$ kubectl -n 5gtest exec -it oai-nr-ue-65957c8bb8-8gzvg -c nr-ue bash
### Task 2: charmed deployment

- **Namespace:** `oai-charm`

- **Juju status**

  ```
<table>
<thead>
<tr>
<th>Unit</th>
<th>Workload</th>
<th>Agent</th>
<th>Address</th>
<th>Parts</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>oai-db/0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>oai-nf/0</td>
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<tr>
<td>oai-nginx/0</td>
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</tr>
<tr>
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</table>
  ```

  ```
<table>
<thead>
<tr>
<th>Model</th>
<th>Controller</th>
<th>Cloud/Region</th>
<th>Version</th>
<th>SLA</th>
<th>Timestamp</th>
</tr>
</thead>
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<tr>
<td>oai-nginx/0</td>
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<tr>
<td>oai-nf-web/0</td>
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<td></td>
</tr>
</tbody>
</table>
  ```

  ```
<table>
<thead>
<tr>
<th>App</th>
<th>Status</th>
<th>Scale</th>
<th>Charm</th>
<th>Store</th>
<th>Channel</th>
<th>Rev</th>
<th>OS</th>
<th>Address</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
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<td>waiting</td>
<td>1</td>
<td>oai-db</td>
<td>local</td>
<td></td>
<td></td>
<td>kubernetes 10.152.183.17</td>
<td>waiting for units settled down</td>
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</tr>
<tr>
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<td>oai-nf</td>
<td>local</td>
<td></td>
<td></td>
<td>kubernetes 10.152.183.20</td>
<td>installing agent</td>
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<tr>
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<td>oai-nginx</td>
<td>local</td>
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<td>installing agent</td>
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<tr>
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<td>0/1</td>
<td>oai-nf-web-ingress</td>
<td>local</td>
<td></td>
<td></td>
<td>kubernetes 10.152.183.41</td>
<td>installing agent</td>
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<tr>
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<td>waiting</td>
<td>1</td>
<td>oai-nf-web</td>
<td>local</td>
<td></td>
<td></td>
<td>kubernetes 10.152.183.41</td>
<td>installing agent</td>
<td></td>
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<tr>
<td>oai-nf-web</td>
<td>waiting</td>
<td>0/1</td>
<td>oai-nf-web</td>
<td>local</td>
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<td>kubernetes 10.152.183.41</td>
<td>installing agent</td>
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<tr>
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<td>waiting</td>
<td>0/1</td>
<td>oai-spgw-tiny</td>
<td>local</td>
<td></td>
<td></td>
<td>kubernetes 10.152.183.41</td>
<td>installing agent</td>
<td></td>
</tr>
</tbody>
</table>
  ```

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Task 2: charmed deployment (contd.)

- **nr-ue interfaces**

```
root@nr-ue-0:/var/lib/juju# route -n
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
0.0.0.0      169.254.1.1 0.0.0.0     UG 0 0 0 eth0
12.1.1.0      0.0.0.0     255.255.255.0 U 0 0 0 oaitun_ue1
169.254.1.1   0.0.0.0     255.255.255.0 U 0 0 0 eth0
root@nr-ue-0:/var/lib/juju#
```

- **Ping test**

```
root@nr-ue-0:/var/lib/juju# ping -l 5 google.fr
PING google.fr (142.251.36.3) 56(84) bytes of data.
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=1 ttl=187 time=69.8 ms
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=2 ttl=187 time=69.8 ms
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=3 ttl=187 time=53.6 ms
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=4 ttl=187 time=31.5 ms
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=5 ttl=187 time=54.4 ms
```

```
root@nr-ue-0:/var/lib/juju# ip -br a
lo      UNKNOWN 127.0.0.1/8 ::1/128
eth0    UP 10.1.229.165/32 fe80::ac79:35ff:feae:95d4/64
oaitun_ue1  UNKNOWN 12.1.1.129/24 fe80::817c:1:e:1b7:4c99/64
root@nr-ue-0:/var/lib/juju#
```

```
root@nr-ue-0:/var/lib/juju# ping -c 5 google.fr
PING google.fr (142.251.36.3) 56(84) bytes of data.
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=1 ttl=108 time=56.2 ms
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=2 ttl=108 time=55.0 ms
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=3 ttl=108 time=55.1 ms
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=4 ttl=108 time=55.3 ms
64 bytes from ams1544-in-f3.1e106.net (142.251.36.3): icmp_seq=5 ttl=108 time=55.3 ms
```
Demo: Task 2

# see the pods

$ kubectl get pods -n oai-charm

# access the bash of nr-ue-0

$ kubectl -n oai-charm exec -it nr-ue-0 -c nr-ue bash

# ping google

$ ping –c 4 google.com
Task 3: deployment descriptors

- VNFD.yaml

```yaml
vnfd:
  df:
    - id: default-df
  ext-cpd:
    - id: mgmt-ext
      k8s-cluster-net: mgmtnet
  id: oai-cn5g-cnfcnf
  k8s-cluster:
    nets:
      - id: mgmtnet
  kdu:
    - name: native-kdu
  jujubundle: bundle.yaml
  mgmt-cp: mgmt-ext
  product-name: oai-cn5g-cnfcnf
```

- File Structure

```
Oai_vnfd
  |- checksums.txt
  |- jujubundles
    |- README.md
    |- bundle.yaml
    |- charms
      |- amf.charm
      |- db.charm
      |- smf.charm
      |- nr-ue.charm
      |- spgwu-tiny.charm
      |- nrf.charm
      |- gnb.charm
  |- oai_cn5g_cnfcnf_vnfd.yaml
```
Task 3: Instantiation of NS from OSM to microk8s cluster

• OSM gui – NS state

• Kubernetes pods (namespace: native-kdu-***)

```
$ kubectl -n native-kdu-32e72b5d-3f8d-4a90-89c1-32563cf945db get pods

+---------------------------------+--------+-----------------+----------+-------+
| NAME                           | READY  | STATUS          | RESTARTS | AGE   |
| model-operator-669757556f-2577c| 1/1    | Running         | 0        | 12h   |
| gnb-0                          | 3/3    | Running         | 7        | 12h   |
| nr-ue-0                        | 3/3    | Running         | 7        | 12h   |
| nr-f-0                         | 3/3    | Running         | 7        | 12h   |
| amf-0                          | 3/3    | Running         | 6        | 12h   |
| spgwu-tiny-0                   | 3/3    | Running         | 5        | 12h   |
| db-0                           | 2/2    | Running         | 5        | 12h   |
| smf-0                          | 3/3    | Running         | 3        | 12h   |
```

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Task 3: Instantiation of NS from OSM to microk8s cluster

- Ping test from nr-ue

```
root@nr-ue-0:/opt/oai-nr-ue# ping -c 4 google.com
PING google.com (142.250.179.142) 56(84) bytes of data.
64 bytes from ams17s10-in-f14.1e106.net (142.250.179.142): icmp_seq=1 ttl=107 time=58.1 ms
64 bytes from ams17s10-in-f14.1e106.net (142.250.179.142): icmp_seq=2 ttl=107 time=58.4 ms
64 bytes from ams17s10-in-f14.1e106.net (142.250.179.142): icmp_seq=3 ttl=107 time=58.4 ms
64 bytes from ams17s10-in-f14.1e106.net (142.250.179.142): icmp_seq=4 ttl=107 time=58.3 ms
--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 58.105/58.337/58.497/0.227 ms
root@nr-ue-0:/opt/oai-nr-ue#`

Demo: Task 3

# access the bash of nr-ue-0

$ kubectl -n native-kdu-32e72b5d-3f8d-4a90-89c1-32563cf945db exec -it nr-ue-0 -c nr-ue bash

# ping google

$ ping –c 4 google.com
Tasks 4, 5, and 6

• Tried to deploy – it was deployed, but
  • Could not progress – due to OSM vm overloading issue
Issues faced!

• Why are the pods restarted automatically? – creates issues with configuration

• Folder_name problem in juju bundles – it only takes “juju-bundles”
Acknowledgement

• All teammates
• Hackfest organizers
• Silvia, Maciej, Sagar, David, Endika, ...

Q&A...

Thank You!