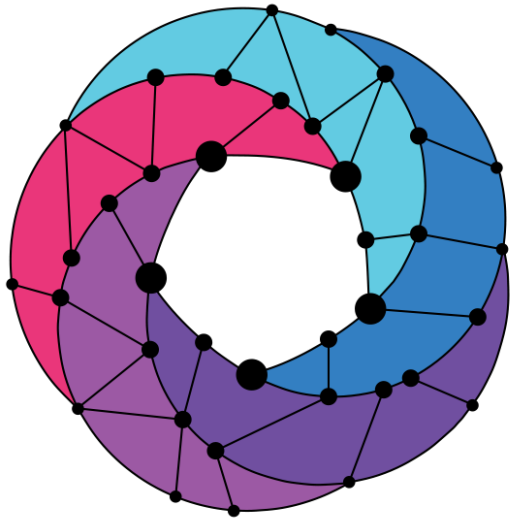

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OSM-MR #11 Hackfest

OAI 5G Core Onboarding Challenge

Team 8 – Team SUNY Poly
Dr. Kholidy, Ruthra, Michael, Mido, Axel, Hadi, Fariborz, & Chris

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Tasks at Hand

- Task 1 - Test OAI deployment according to the tutorial.
- Task 2 - Implement charms for OAI network functions.
- Task 3 - Implement deployment descriptors for OAI network functions.
- Task 4 - Automate a configuration parameter change.
- Task 5 - Automate a scale-up operation by deploying additional gNB RF SIM.
- Task 6 - Automate an upgrade of AMF.

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- ✅ Task 1 - Test OAI deployment according to the tutorial.
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- 🛑 ~~Task 6 - Automate an upgrade of AMF.~~

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Task 1

- We were able to install helm charts, and script the deployment of the OAI 5G Core functions through Step 4.0, as seen here.

clbds — ubuntu@hackfest-team-9: ~/oai-cn5g-fed/charts — ssh ubuntu@172.21.18.19 — 129×17

```
ubuntu@hackfest-team-9:~/oai-cn5g-fed/charts$ helm list
WARNING: Kubernetes configuration file is group-readable. This is insecure. Location: /home/ubuntu/.kube/config
WARNING: Kubernetes configuration file is world-readable. This is insecure. Location: /home/ubuntu/.kube/config
NAME    NAMESPACE       REVISION        UPDATED                                 STATUS    CHART                   APP VERSION
amf     default         1               2021-09-17 12:34:35.267216872 +0000 UTCdeployed oai-amf-1.1.0           1.1.0
mysql   default         1               2021-09-17 12:33:58.679764237 +0000 UTCdeployed mysql-1.6.9             5.7.30
nrf     default         1               2021-09-17 12:34:15.746434807 +0000 UTCdeployed oai-nrf-1.1.0           1.1.0
smf     default         1               2021-09-17 12:34:59.800876213 +0000 UTCdeployed oai-smf-1.1.0           1.1.0
upf     default         1               2021-09-17 12:35:05.252301909 +0000 UTCdeployed oai-spgwu-tiny-1.1.2    1.1.2
ubuntu@hackfest-team-9:~/oai-cn5g-fed/charts$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
mysql-7fd5db64cd-hwzld              1/1     Running   0          107s
oai-nrf-5fb797f749-t6qdm            2/2     Running   0          86s
oai-amf-7595bb48b9-sbx78            2/2     Running   0          52s
oai-smf-66df95578c-rtt5m            2/2     Running   0          47s
oai-spgwu-tiny-cbff445db-sl6kv      2/2     Running   0          28s
ubuntu@hackfest-team-9:~/oai-cn5g-fed/charts$
```

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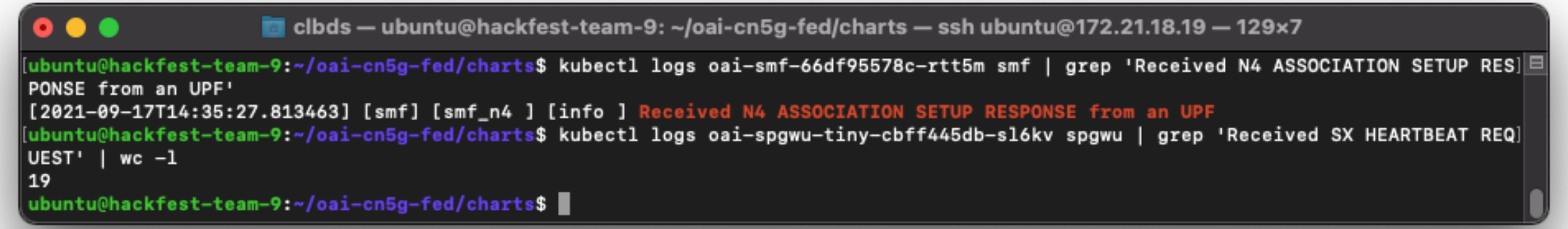
Task 1 (continued)

- We were also able to confirm the SMF and SPGWU connectivity, as part of Step 4.1.



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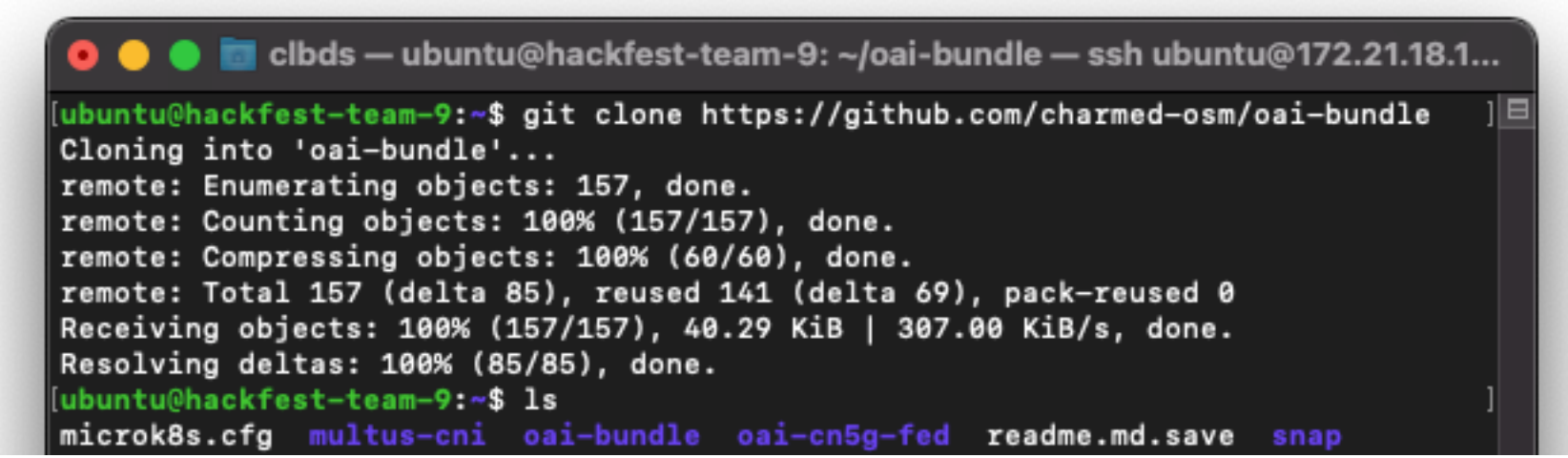
Task 2

- We were able to clone the repository.



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Task 2 (continued)

- We were then able to build from the git files.

```
ubuntu@hackfest-team-9:~/oai-bundle$ ./build.sh
Packing charm 'oai-amf_ubuntu-20.04-amd64.charm'...
Packing charm 'oai-gnb_ubuntu-20.04-amd64.charm'...
Packing charm 'oai-nr-ue_ubuntu-20.04-amd64.charm'...
Packing charm 'oai-nrf_ubuntu-20.04-amd64.charm'...
Packing charm 'oai-smf_ubuntu-20.04-amd64.charm'...
Packing charm 'oai-spgwu-tiny_ubuntu-20.04-amd64.charm'...
Packing charm 'oai-db_ubuntu-20.04-amd64.charm'...
Created 'oai-gnb_ubuntu-20.04-amd64.charm'.
Created 'oai-smf_ubuntu-20.04-amd64.charm'.
Created 'oai-db_ubuntu-20.04-amd64.charm'.
Created 'oai-nrf_ubuntu-20.04-amd64.charm'.
Created 'oai-spgwu-tiny_ubuntu-20.04-amd64.charm'.
Created 'oai-amf_ubuntu-20.04-amd64.charm'.
Created 'oai-nr-ue_ubuntu-20.04-amd64.charm'.
```

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Task 2 (continued)

- We were then able to deploy the packaged charms.

```
ubuntu@hackfest-team-9:~/oai-bundle$ ./deploy.sh
Executing changes:
- upload charm /home/ubuntu/oai-bundle/oai-amf-operator/amf.charm for series focal with architecture=amd64
- deploy application amf with 1 unit on focal
  added resource oai-amf-image
  added resource tcpdump-image
- upload charm /home/ubuntu/oai-bundle/oai-db-operator/db.charm for series focal with architecture=amd64
- deploy application db with 1 unit on focal
  added resource oai-db-image
- upload charm /home/ubuntu/oai-bundle/oai-gnb-operator/gnb.charm for series focal with architecture=amd64
- deploy application gnb with 1 unit on focal
  added resource oai-gnb-image
  added resource tcpdump-image
- upload charm /home/ubuntu/oai-bundle/oai-nr-ue-operator/nr-ue.charm for series focal with architecture=amd64
- deploy application nr-ue with 1 unit on focal
  added resource oai-nr-ue-image
  added resource tcpdump-image
- upload charm /home/ubuntu/oai-bundle/oai-nrf-operator/nrf.charm for series focal with architecture=amd64
- deploy application nrf with 1 unit on focal
  added resource oai-nrf-image
  added resource tcpdump-image
- upload charm /home/ubuntu/oai-bundle/oai-smf-operator/smf.charm for series focal with architecture=amd64
- deploy application smf with 1 unit on focal
  added resource oai-smf-image
  added resource tcpdump-image
- upload charm /home/ubuntu/oai-bundle/oai-spgwu-tiny-operator/spgwu-tiny.charm for series focal with architecture=amd64- deploy application spgwu-tiny with 1 unit on focal

  added resource oai-spgwu-tiny-image
  added resource tcpdump-image
- add relation db:db - amf:db
- add relation nrf:nrf - amf:nrf
- add relation nrf:nrf - smf:nrf
- add relation smf:amf - amf:amf
- add relation nrf:nrf - spgwu-tiny:nrf
- add relation spgwu-tiny:smf - smf:smf
- add relation gnb:amf - amf:amf
- add relation nr-ue:gnb - gnb:gnb
- add relation spgwu-tiny:spgwu - gnb:spgwu
Deploy of bundle completed.
ubuntu@hackfest-team-9:~/oai-bundle$
```

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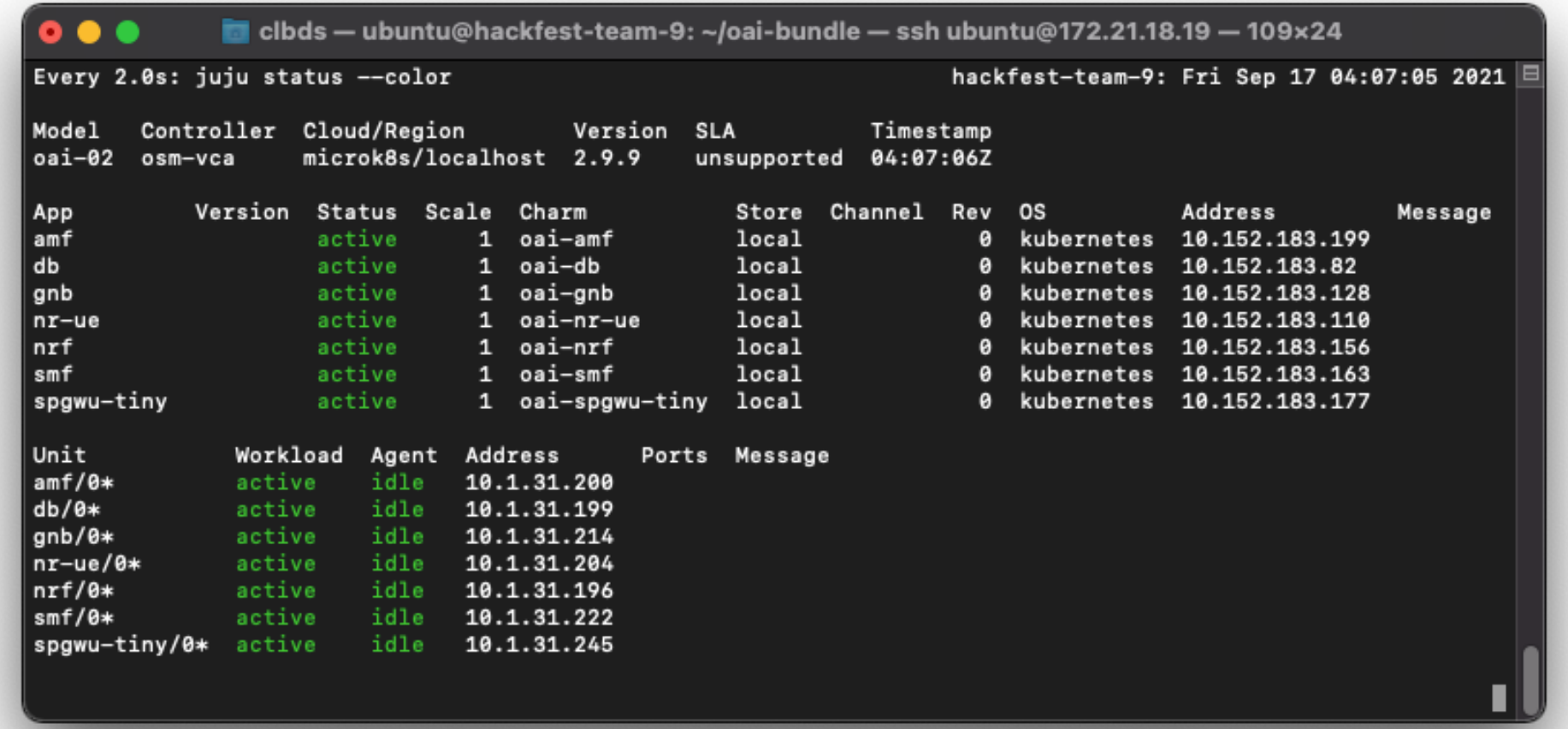
Task 2 (continued)

- We were then able to witness the successful deployment.



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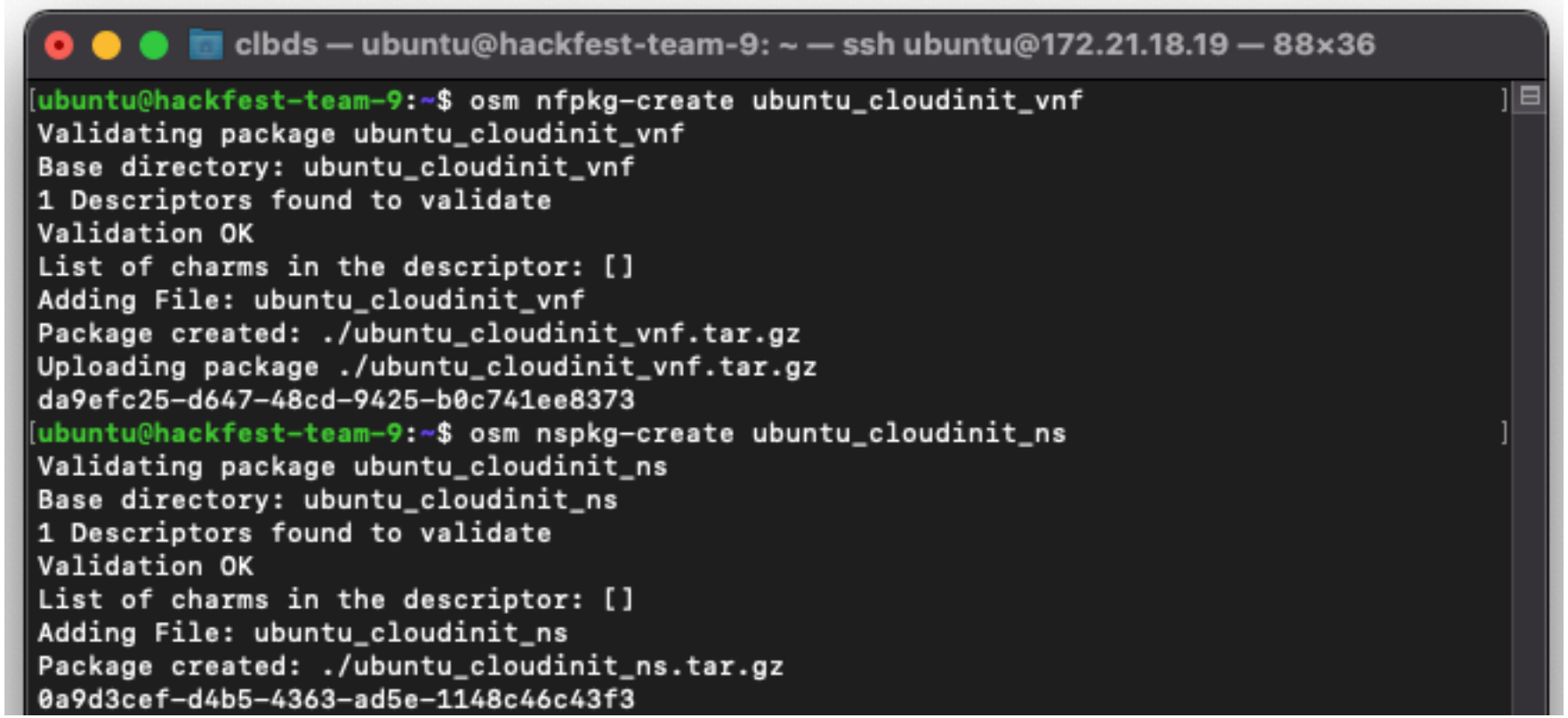
Task 3

- We were able to build and upload an NS, VNF.



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Task 3 (continued)

- We were able to validate the packages, but not instantiate.

```
ubuntu@hackfest-team-9:~$ osm package-validate ubuntu_cloudinit_ns
Base directory: ubuntu_cloudinit_ns
1 Descriptors found to validate
+-------------+-----------------------------------------------+-------+-------+
| TYPE        | PATH                                          | VALID | ERROR |
+-------------+-----------------------------------------------+-------+-------+
| etsi_nfv_nsd | ubuntu_cloudinit_ns/ubuntu_cloudinit_nsd.yaml |   OK  | -     |
+-------------+-----------------------------------------------+-------+-------+
ubuntu@hackfest-team-9:~$ osm package-validate ubuntu_cloudinit_vnf
Base directory: ubuntu_cloudinit_vnf
1 Descriptors found to validate
+--------------+-------------------------------------------------+-------+-------+
| TYPE         | PATH                                            | VALID | ERROR |
+--------------+-------------------------------------------------+-------+-------+
| etsi_nfv_vnfd | ubuntu_cloudinit_vnf/ubuntu_cloudinit_vnfd.yaml |   OK  | -     |
+--------------+-------------------------------------------------+-------+-------+
ubuntu@hackfest-team-9:~$
```

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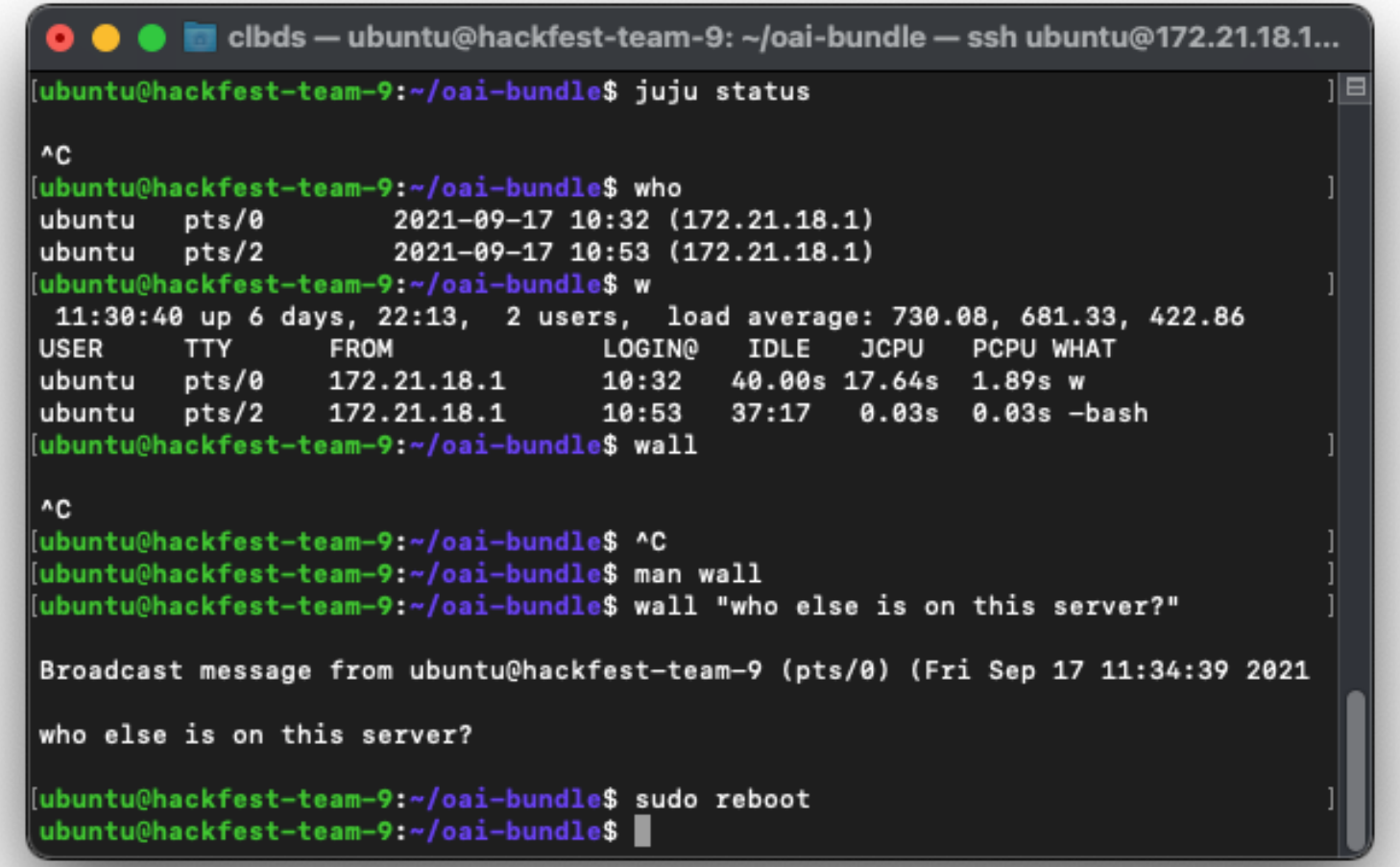
Task 4 & Task 6

- We had some last-minute, fatal, performance issues on two tasks.



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Task 5

- We were able to define scaling on gNB, but not trigger scaling.

```
ubuntu@hackfest-team-9:~$ juju status
Model   Controller  Cloud/Region        Version  SLA          Timestamp
oai-02  osm-vca     microk8s/localhost  2.9.9    unsupported  12:00:30Z

App          Version  Status  Scale  Charm           Store  Channel  Rev  OS          Address         Message
amf                   active      1  oai-amf         local              1  kubernetes  10.152.183.12
db                    active      1  oai-db          local              1  kubernetes  10.152.183.25
gnb                   active      2  oai-gnb         local              1  kubernetes  10.152.183.160
nr-ue                 active      1  oai-nr-ue       local              1  kubernetes  10.152.183.203
nrf                   active      1  oai-nrf         local              1  kubernetes  10.152.183.94
smf                   active      1  oai-smf         local              1  kubernetes  10.152.183.234
spgwu-tiny            active      1  oai-spgwu-tiny  local              1  kubernetes  10.152.183.138

Unit           Workload  Agent  Address      Ports  Message
amf/0*         active    idle   10.1.31.252
db/0*          active    idle   10.1.31.239
gnb/0*         active    idle   10.1.31.233
gnb/1          active    idle   10.1.31.207
nr-ue/0*       active    idle   10.1.31.195
nrf/0*         active    idle   10.1.31.205
smf/0*         active    idle   10.1.31.247
spgwu-tiny/0*  active    idle   10.1.31.212

ubuntu@hackfest-team-9:~$
```

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Lessons Learned

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OAI 5G Core Onboarding Challenge

- Communication – We had some trouble early on with the asynchronous communication and the diverse time zones of our participants.
- Documentation – We lost out on recording a lot of our documentation for the tasks we completed, thus missing out on screenshots that we would have otherwise had for our presentation.
- Known Bugs – Multiple teams ran into known bugs that hampered our progress.
- Unknown Bugs – Multiple teams ran into unknown bugs and code issues that caused a us to re-pull a few git repos during our progress.
- Server Performance – We lost our ability to take additional screenshots due to some performance issues with our server instances on the last day.

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Thank you to all the mentors!

Thank you to the teams and team members!

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