Fall 2021 Workshop
RAN LAB1

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December 8, 2021
whoami

- 20+ years of experience in developing HW and SW code
- 14 years in real SW dev as
  - Coder in C/C++/Java/Android/any scripting language
  - Integrator and maintainer for industrial products
  - Negotiator of features/improvements with customers

- Joined OpenAirInterface Software Alliance on April, 2018
  - As “Software Manager” -> Continuous Integration and Methodology expert
  - Now leading a team of 4 people for CI and devops
Pre-Requisites

- Tutorial is [https://gitlab.flux.utah.edu/powderrenewpublic/oai_fall_2021_workshop/-/blob/main/Lab-1-RAN.md](https://gitlab.flux.utah.edu/powderrenewpublic/oai_fall_2021_workshop/-/blob/main/Lab-1-RAN.md)
  - We will also provide a copy on the Zoom chat.

- You SHOULD be registered:
  - Go to the login page: [https://www.powderwireless.net/login.php](https://www.powderwireless.net/login.php)
Why Login Now?

- Creating the experiment environment takes about 6 minutes when I did it alone.
- With all of you in parallel, certainly a bit longer.

Click on the Experiments tab
Start Your Experiment
Select the Correct Profile

The POWDER team has created a dedicated profile for the 2 first LABs.

But there are many others.

Select a Profile

- oai-5g-e2e-rfsim
- vhref-ubuntu20  faas-sched
- NCyze_RBrincksDO8  CS330-F21
- stresstest  OAI2021FallWS
- ubuntu18-retrowrite-magma  Cloudsuite3
- OAI2021FallWS -
- oai-5g-e2e-rfsim
Finalizing the Experiment Setup

Leave it empty
It will be unique
CAUTION: After You Clicked on Finish

- With ~100 experiments being started simultaneously,
- There will likely be a few minutes delay
- Before the POWDER web UI indicates that your experiment is being instantiated

- PLEASE PATIENT
- DO NOT REFRESH YOUR PAGE
And Now We Wait!

As I said, I waited 6 minutes

Let discuss now of the LAB content
You Need Support during the Labs

- If you are really stuck during any of the LABs, please reach out on the Zoom Chat
- Explain what is your problem
  - If it is easy, we will answer by Chat and anyone can see the solution if they face the same problem
  - If it is more complex, then Camille will dispatch into a breakout room with a mentor (Raphael / Kobus / Kirk)
    - You will be able to share your screen with him
    - You will be able to talk with him
OpenAirInterface5G Repository

- The Official GitLab repository
  - https://gitlab.eurecom.fr/oai/openairinterface5g

- Local Mirror at the University of Utah
  - https://gitlab.flux.utah.edu/powder-mirror/openairinterface5g

We are using this local mirror to lower the stress on the bandwidth and clone faster.

Mirror is updated every hour (at the top of the hour!)
How to Contribute

- Anyone can contribute
- You have to sign a Contributor License Agreement
- All contributions are going through
  - Merge Request process: workflow fully described [here](#)
    - We are NOT accepting Merge Requests from forked repos due to CLA
  - Continuous Integration Build and Testing
  - Peer Review
  - Approval during the OAI RAN Developer Weekly Meeting
    - Every Thursday alternating 11AM and 4PM French Time
    - (ie an Asian edition and an American edition)
Official CI Jenkins Servers

- The "Legacy" One
- The "Container-based" One

- We are planning to have also CI pipelines on the PAWR platforms
Repository Structure

- `common`, `openair1/2/3`, `nfapi`, `executables`
  - All contains the source code files
- `cmake_targets`
  - Where the means of buildings are
- `targets`
  - Some examples of configuration files
- `ci-scripts`
  - All the bash/python scripts used by CI
  - But also configuration files and docker-compose examples to deploy
- `docker` and `openshift`
  - Building images
- `doc`
  - Top-level documentation
  - Some documentation is next to source files
Code Architecture

- We don't have time to go into details.
- Florian did a nice presentation during our last physical workshop in Dec 2019
  - You can find it [here](#)
  - It is still valid
- Panos and Laurent will talk in details about the 5G F1 CU/DU split next
Branch/Tag Naming Conventions

- **master** is the release branch
  - Has not been updated for a while
  - Now that we have a stable 5G solution, we will soon

- **develop** is the CI Integration branch
  - Once or Twice a week, we create integration branch with all approved merge requests, we test and merge

- Any other branches are developer's contribution. Once merged, deleted

- **vx.y.z** are tag format on master branch
  - Last one is v1.2.2
  - We want to release an v2.0.0
  - And we will do more frequent releases

- **YYYY.wWW** are tag format on develop branch
  - 2021.w45_b is sometimes used when we merged twice in the same week
Build Enhancements

UHD Version Selection

- Since early November, in Ubuntu18, the default UHD version is **4.1.0.0**
- For us at OAI, we saw that it was not working well in 5G TDD. So we kept most of our setups in **3.15** or **4.0**

Ninja Support

- Thanks to Laurent Thomas
- Build is faster (20 to 25%)

- On the ROADMAP
  - Proper support for Ubuntu20+
  - Better library approach (especially with the offloads)
Continuous Delivery

- Our new CI Jenkins server has a container strategy
  - We are building images for **Ubuntu-18** and **Red-Hat-Entreprise-Linux-8**
  - And then on our test servers, we are not running bare-metal but with containers

- Why not making these images public?
  - Since tag **2021.w31**, we are pushing when we merge to `develop` branch on Docker-Hub our **Ubuntu18** images
  - 4 types of images:
    - eNB, gNB, LTE-UE and NR-UE
  - You can retrieve them and play with them without worrying about installation of a lot of things.
  - But your computer requirements SHALL remain the same as in Bare-Metal
Why Lab1 is Bare-Metal?

- This is the preferred Developer's environment
- Because when debugging, re-compiling is a must!
- Target images published on Docker-Hub have NO means to debug/re-compile
- Container may create a degraded performance
Why Lab1 is about RF Simulator?

- And not using real radio?
- We wanted to offer these 2 lab sessions to the maximum of participants
- The POWDER platform has only a limited number of 5G Radio Equipements
  - Certainly not enough for the 80+ participants we are
- They will show what they have
- Interest of accessing POWDER or any PAWR platform
  - Setting up from scratch a 5G radio setup is difficult
  - First use prepared environment
  - Then you can switch to your own environment, knowing more what to do and the resource requirements
Is Your Experiment Ready?

Your experiment is ready!

Name: Raphael
State: ready
Profile: oai-5g-e2e-rfsim
RefSpec: refs/heads/master (82d6b2a3)
Creator: rdefosse
Project: OAI2021FallWS
Started: Nov 25, 2021 10:34 AM
Expires: Nov 26, 2021 2:33 AM (in 16 hours)
Almost There!

December 8, 2021

RAN LAB1
Select Your Experiment

Click on the Name

[1] PHours: Number of nodes times number of hours in use.

Experiments In my Projects

<table>
<thead>
<tr>
<th>Name</th>
<th>Profile</th>
<th>Creator</th>
<th>Project</th>
<th>Status</th>
<th>Cluster</th>
<th>PCs</th>
<th>PHours[1]</th>
<th>VMs</th>
<th>Created</th>
<th>Expires</th>
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<tr>
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<td>oai-5g-e2e-rfsim</td>
<td>rdefosse</td>
<td>OAI2021FallWS</td>
<td>ready</td>
<td>Emulab</td>
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<td>Nov 25, 2021</td>
<td>Nov 26, 2021</td>
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<td>single-node</td>
<td>dmaas</td>
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<td>ready</td>
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<td>OAI2021FallWS</td>
<td>ready</td>
<td>Emulab</td>
<td>1</td>
<td>15.22</td>
<td>0</td>
<td>Nov 24, 2021</td>
<td>Nov 25, 2021</td>
</tr>
</tbody>
</table>

[1] PHours: Number of nodes times number of hours in use.
Start the Shell Session

First Click on this Wheel

If you are nerdy enough, SSH is possible

Then on the Shell option
You Should Get This

Experiment expires: Nov 26, 2021 2:35 AM (in 16 hours)

Welcome to Ubuntu 18.04.1 LTS (GNU/Linux 4.15.0-159-generic x86_64)
* Documentation: https://help.ubuntu.com
* Management: https://landscapen.canonical.com
* Support: https://ubuntu.com/advantage

* Canonical Livepatch is available for installation.
  - Reduce system reboots and improve kernel security. Activate at:
    https://ubuntu.com/livepatch
  New release ‘20.04.3 LPP’ available.
  Run "do-release-upgrade" to upgrade to it.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

node ->
Starting the VNC Server

Remember my "unique" name
Log onto Your VNC Session

Mine was

Warning: Potential Security Risk Ahead

Firefox detected a potential security threat and did not continue to node.raphael.oai2021fallws.emulab.net. If you visit this site, attackers could try to steal information like your passwords, emails, or credit card details.

Learn more...
At the End of LAB, You Should Get This