Institute for the Wireless Internet of Things at Northeastern University

LXC Containers Assignment

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MASSACHUSETTS TECHNOLOGY COLLABORATIVE

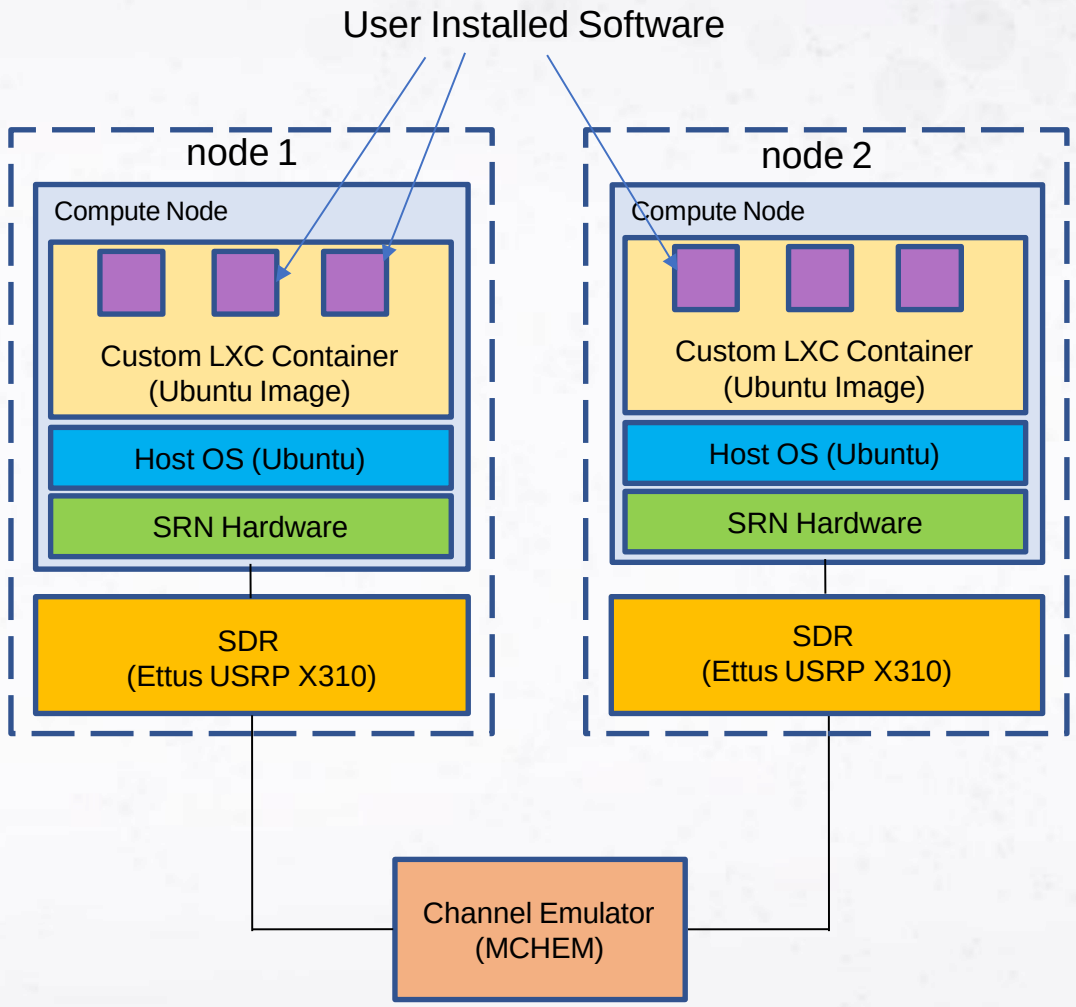
COLOSSEUM at Northeastern University

Agenda

1. Introduction
    1. LXC Containers
    2. File-proxy
    3. Data collection on Colosseum
2. Assignment
    1. GNU Radio
    2. Local container creation and upload
    3. Scenario and experiment run

Colosseum Experiments at glance

- Reserve the resources;
- Access the nodes;
- Run the experiments to the node;
- Save the output somewhere;



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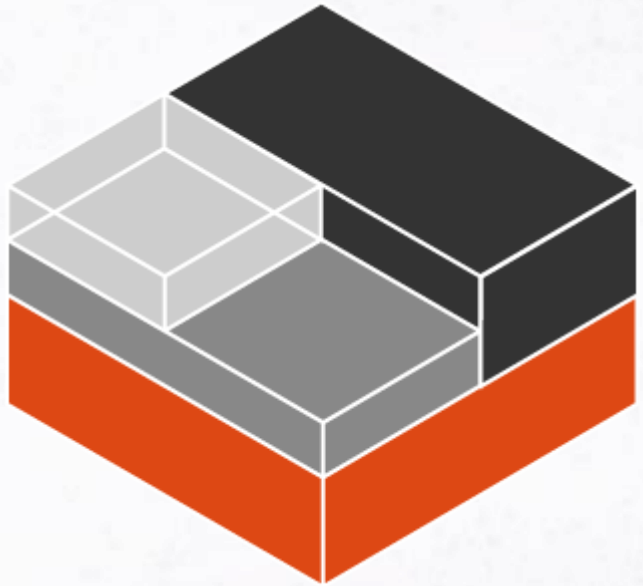
LXC containers

- Image-based software for the creation of OS Linux instances:
  - Isolated environments
  - Hardware access (e.g., SDRs)
- In Colosseum:
  - LXC images are immutable
  - Every experiment will be consistent and repeatable
  - Limited storage space to save for container images
    - (e.g., don't save your data in the containers)



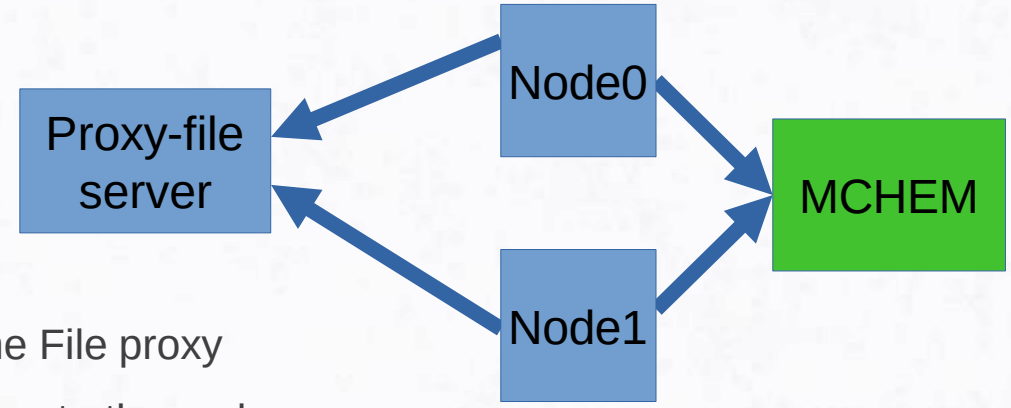
File Proxy Server

- Server on Colosseum:
  - Location of all LXC images;
    - Common images: /share/nas/common
    - Group images: /share/nas/<your_group>/images
  - Connected with your reservations:
    - Store configurations
    - Save data location

```
ssh alacava@file-proxy # ssh <your_username>@file-proxy
```

Save results of an experiment

- Reservations and File Proxy are connected between each other:
  - /share/ on every node is a symlink to a folder on File Proxy
  - /share/<your_team>/reservation/<reservation_id>
- Data must be written as unpriviledged user
  - su srn-user # within the container
- Examples commands to save data:
  - cp results.txt /share/ # copy the file results.txt from the node to the File proxy
  - cp /share/config.conf , # copy the file results.txt from the File proxy to the node



Hands-on: Creating custom containers

1. Download base image from the File Proxy;
2. Customize it locally (install GNU Radio);
3. Upload the image;
4. Run a basic experiment;

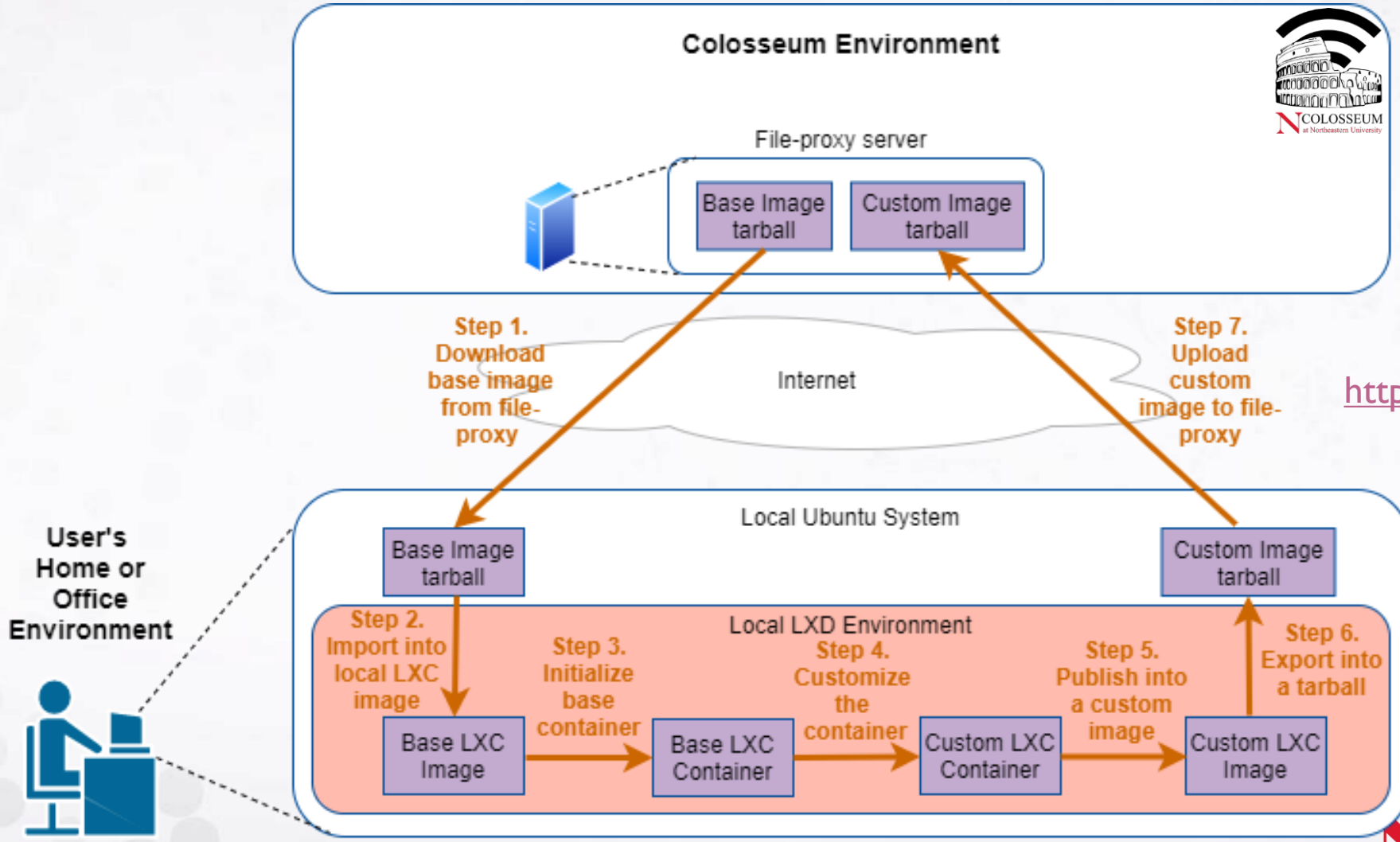
Follow the link: https://tinyurl.com/container2022

GNU Radio

- Software development toolkit
- Compose signal processing blocks
- Usable with USRP x310 radios (Colosseum main RF hardware)

Hands-on recap

PWD: 123lecci321



https://tinyurl.com/container2022

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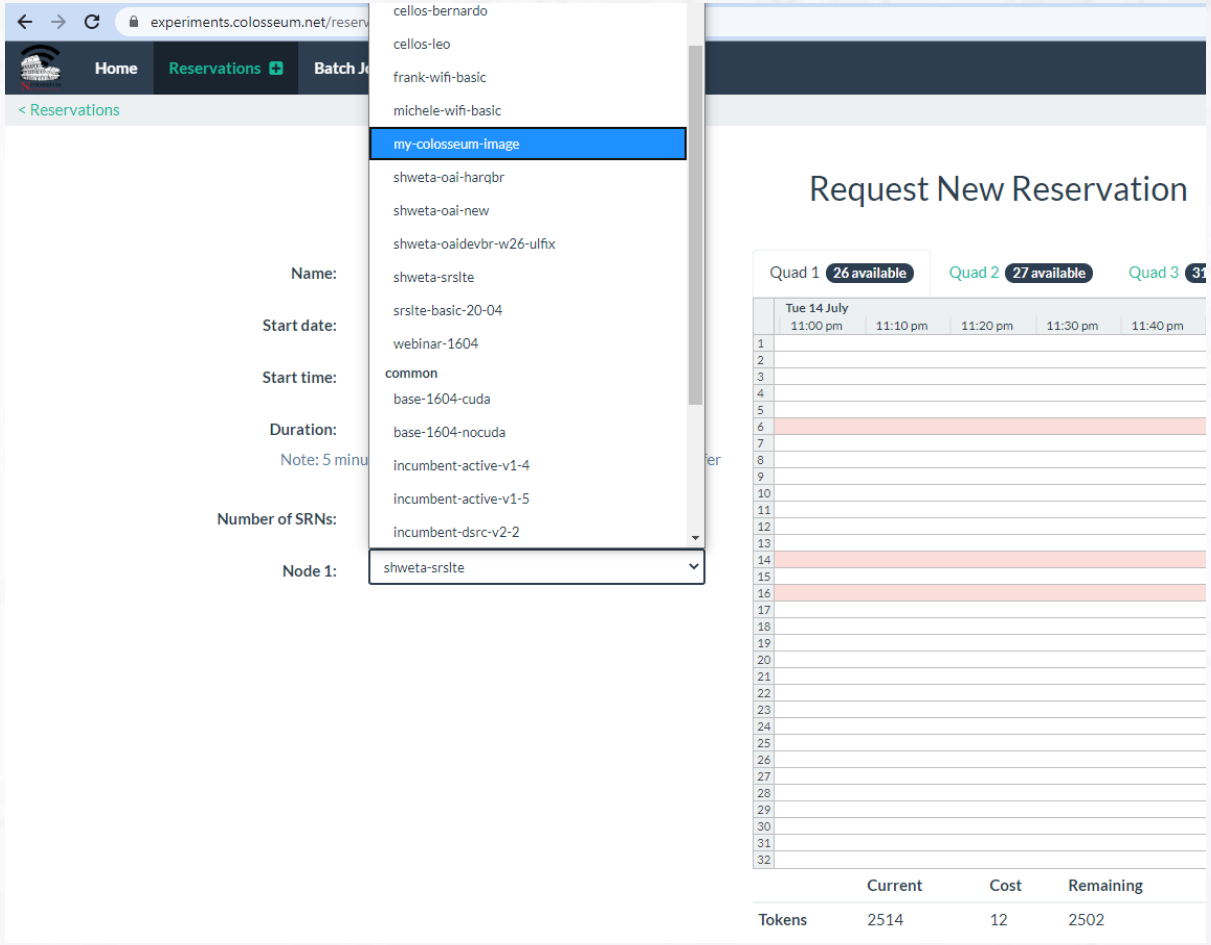
Reservation setup

- Upload the image prepared with GNURadio
- Make and start a reservation for two nodes, using the image
- Check the SRNs identifiers



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Login and start RF

- Login
  - use two different terminals

```
$> ssh -Y <srn-hostname1>
$> ssh -Y <srn-hostname2>
```

- Start the MCHEM
  - scenario 1009 (CF 1GHz, 0dB of path loss)
  - This command should be executed just in one of the terminals

```
#> colosseumcli rf start 1009 -c
```

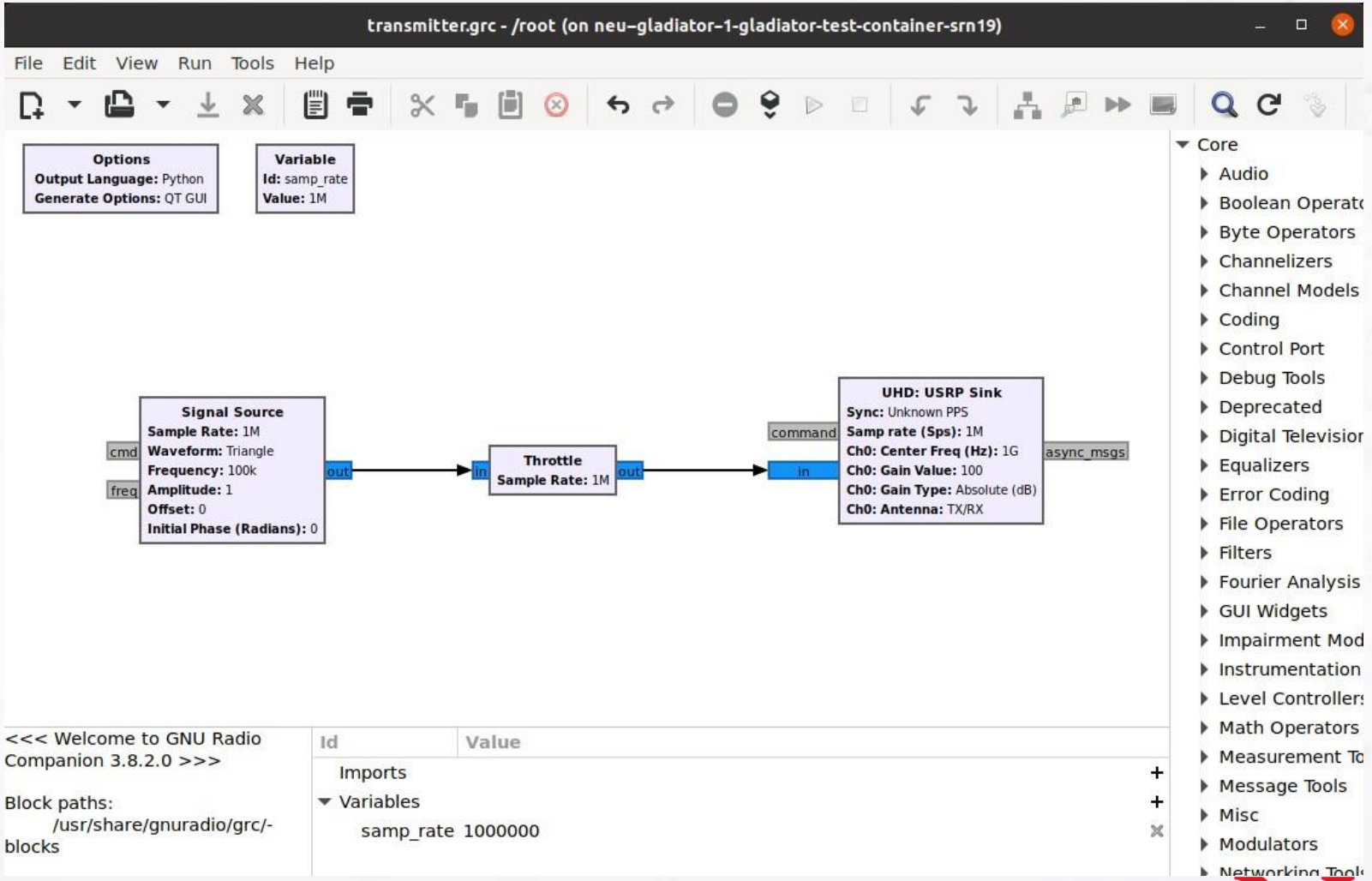
Start software

- In both terminals:
  - update the FPGA image;
  - start GNURadio companion:

```
#> ./flash_fpga_x310.sh
```

```
#> gnuradio-companion
```

Design the transmitter



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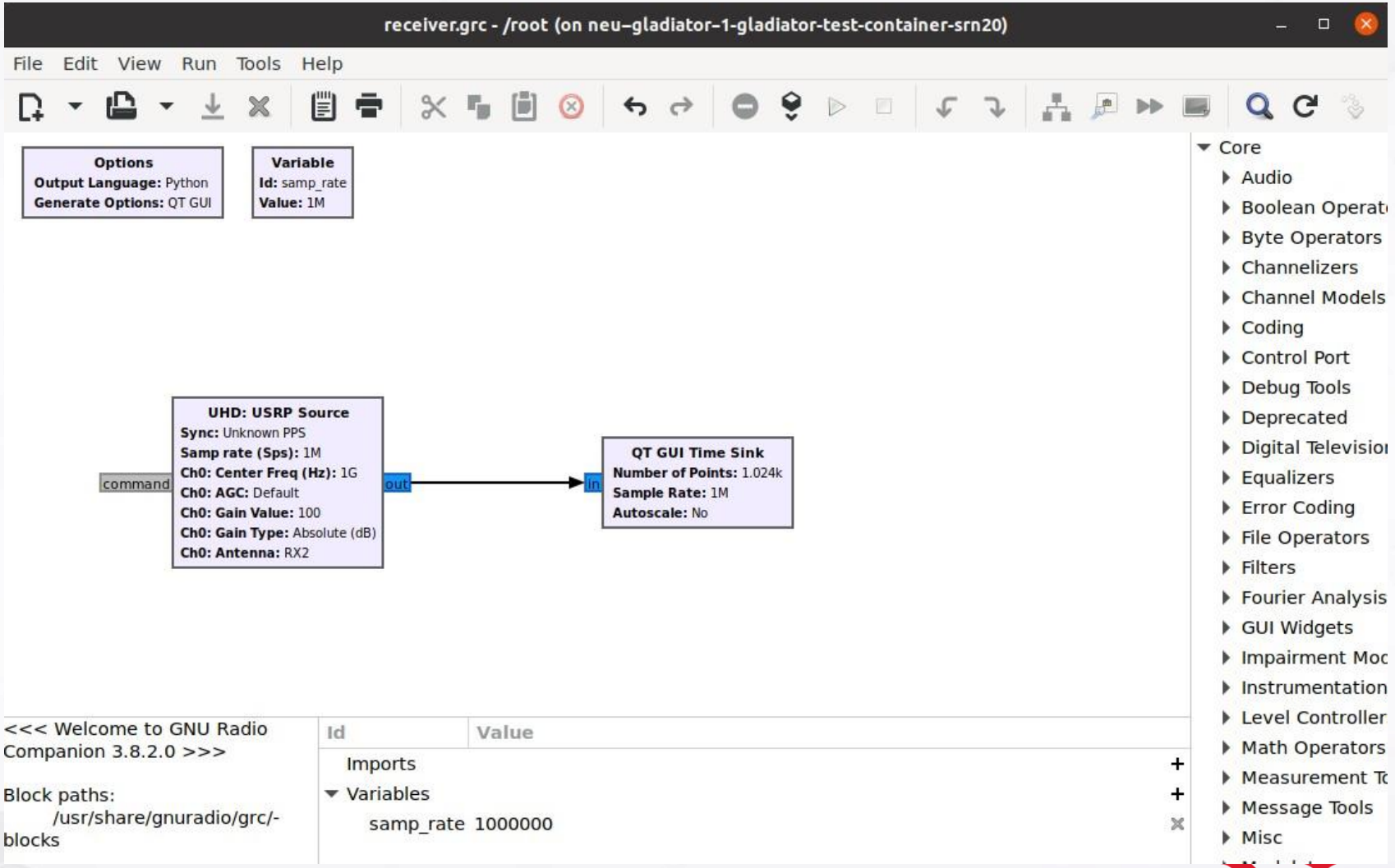
Design the receiver



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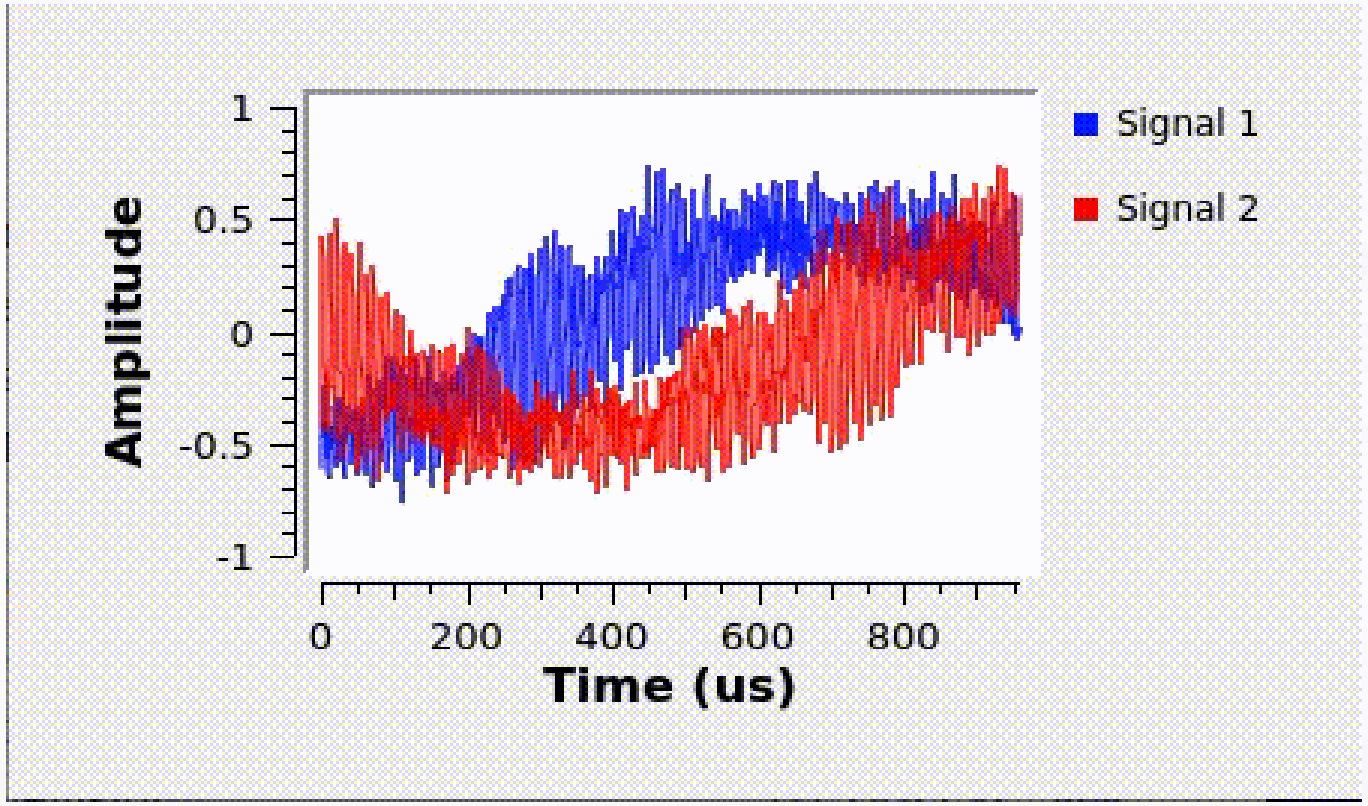
Observe the spectrum in rx



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References

- Accessing Colosseum Servers:
  - https://colosseumneu.freshdesk.com/support/solutions/articles/61000253362-accessing-colosseum-resources
- SSH configuration and File Proxy access setup
  - https://colosseumneu.freshdesk.com/support/solutions/articles/61000253369-ssh-proxy-setup
- File transfer using scp and rsync:
  - https://colosseumneu.freshdesk.com/a/solutions/articles/61000253365
- Transferring base image from NAS to local machine:
  - https://colosseumneu.freshdesk.com/support/solutions/articles/61000253371-transferring-the-base-lxc-image-from-the-nas
- Details on LXD commands and configuration:
  - https://colosseumneu.freshdesk.com/a/solutions/articles/61000253368
- Local container creation:
  - https://colosseumneu.freshdesk.com/a/solutions/articles/61000253428
- File proxy upload:
  - https://colosseumneu.freshdesk.com/support/solutions/articles/61000253372-upload-an-lxc-container
- Installing Colosseum CLI and taking a snapshot of your container
  - https://colosseumneu.freshdesk.com/support/solutions/articles/61000253397-colosseum-cli

Thanks for the attention!
Questions?