Introduction to EIC/ePIC Software

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Day 1

First Steps

- Fill out the pre-workshop survey
- Join the EIC github organization

Setting up the eic-shell container environment

1) MacOS:

- Download docker for Mac
- Launch docker
- Download eic-shell:

```
curl -L https://github.com/eic/eic-shell/raw/main/install.sh | bash
```

Alternatively, you can directly pull the docker container and set up custom bind path:

```
docker pull eicweb/eic_xl:nightly
docker run --platform=linux/amd64 \
           -v /your/local/path:/container/path \
           -w="$PWD" -it --rm eicweb/eic_xl:nightly
```

Setting up the eic-shell container environment

2) Linux (Ubuntu):

- Install apptainer
  - Inside WSL terminal:

```
sudo apt update
sudo apt install -y software-properties-common
sudo add-apt-repository -y ppa:apptainer/ppa
sudo apt update
sudo apt install -y apptainer
```

- Install eic-shell

```
curl -L https://github.com/eic/eic-shell/raw/main/install.sh | bash
```

If you see the error “singularity not found”, try doing it in 2 steps

```
curl -L https://github.com/eic/eic-shell/raw/main/install.sh > install.sh
sed  -i ‘s/singularity/apptainer/g’ install.sh
bash install.sh
```

Setting up the eic-shell container environment

3) WSL for Windows:

- Install WSL
  - Open a powershell terminal and type
    `wsl --install`
  - Restart machine and open WSL terminal

Follow the steps of installation in linux in slide 4 after opening WSL terminal

Run a simple ePIC Geant4 simulation with DD4hep geometry

https://eic.github.io/tutorial-analysis/04-full_chain_analysis/index.html

- Start eic-shell

```
./eic-shell
```

- Set detector geometry every time you start the simulation

```
source /opt/detector/epic-main/bin/thisepic.sh
```

- List potential input files. We will use Deep Inelastic Scattering Neutral Current events as an example:

```
xrdfs root://dtn-eic.jlab.org ls /volatile/eic/EPIC/EVGEN/DIS/NC/18x275/minQ2=1
```

- Run a simulation by streaming over input data from the remote rootfile

```
npsim --compactFile $DETECTOR_PATH/epic_craterlake.xml --numberOfEvents 10 --inputFiles
root://dtn-eic.jlab.org//<input_file_path> --outputFile output.edm4hep.root
```

Run a simple ePIC Geant4 simulation with DD4hep geometry

https://eic.github.io/tutorial-analysis/04-full_chain_analysis/index.html

Alternatively, you can first download the input rootfile locally and then run the simulation

xrdcp root://dtn-eic.jlab.org//volatile/eic/EPIC/EVGEN/<input_file> $PWD

```
npsim --compactFile $DETECTOR_PATH/epic_craterlake.xml --numberOfEvents 10 --inputFiles
<local_input_file_path> --outputFile output.edm4hep.root
```

Resources

- ePIC Landing Page
- ePIC Tutorials
- Rucio for ePIC Simulation Campaign Data

Day 2

Skills

Geant4
ROOT
DD4hep
C++
Python
Apptainer/Docker