LUMI AI Factory

LUMI AI containers

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LUMI AI Factory

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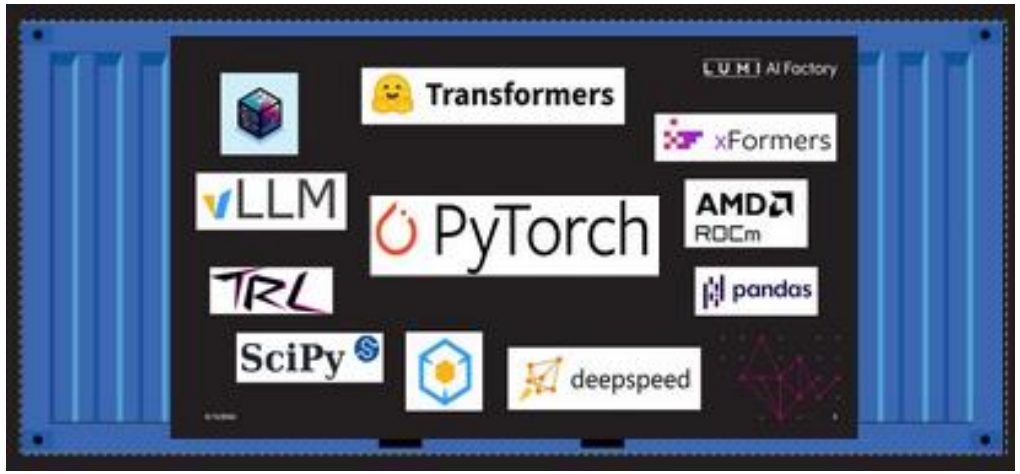
Introduction to containers

- We are not going to cover that today
- https://coderefinery.github.io/hpc-containers/
- https://docs.lumi-supercomputer.eu/software/containers/singularity/



Why to use (LUMI AI Factory) containers on LUMI

LUMI AI Factory

- Optimized for LUMI's MI250x GPUs and Slingshot interconnect
- Enables full RDMA support for MPI and RCCL using open-source components
- Fast communication between nodes and within a node from GPU-to-GPU

- You do not need to worry about installing PyTorch or other libraries on LUMI

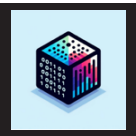
0. 

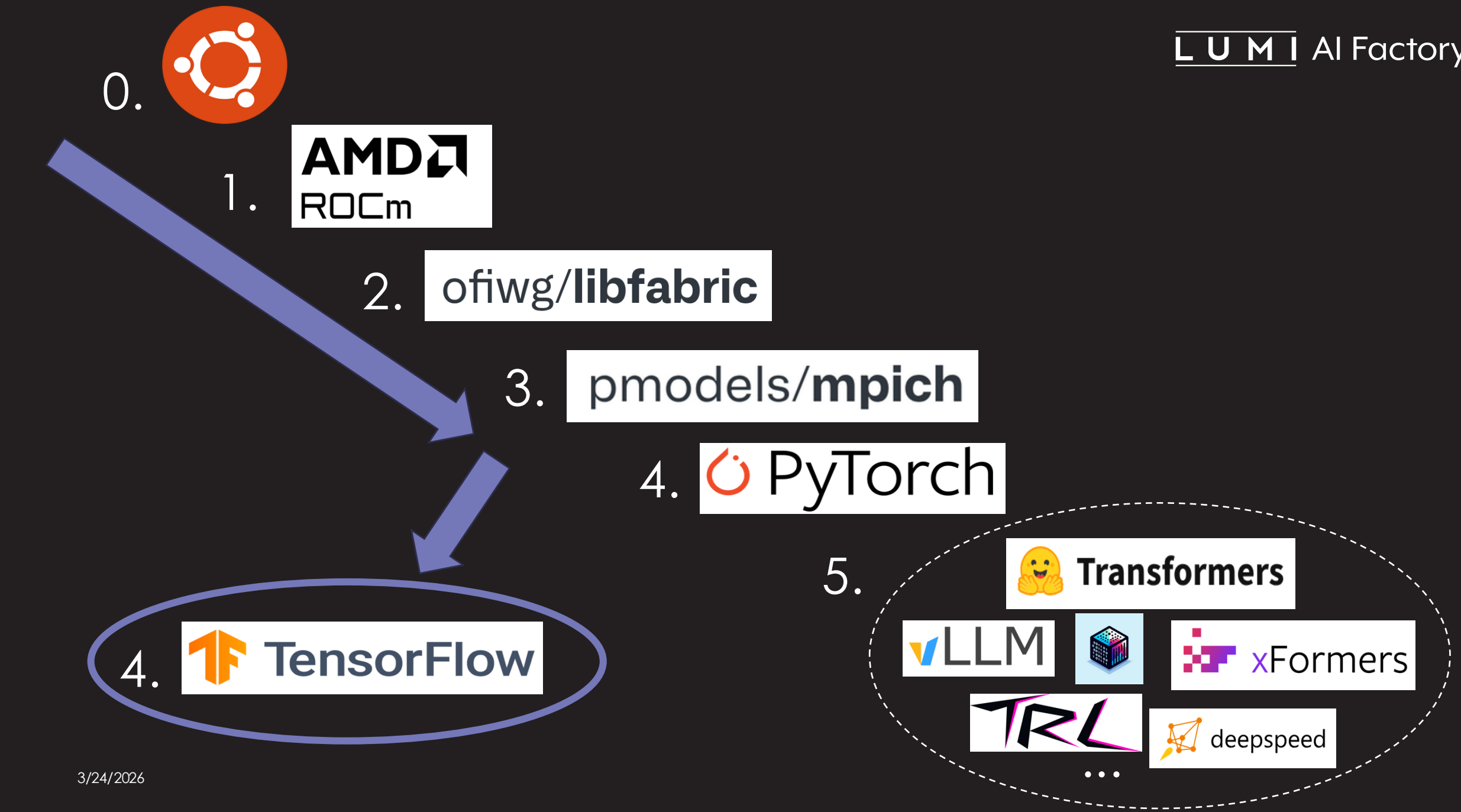
1. AMD ROCm

2. ofiwg/**libfabric**

3. pmodels/**mpich**

4. PyTorch

5. Transformers, vLLM,  , xFormers, TRL, deepspeed, ...


0.
1.
AMD
ROCm
2.
ofiwg/libfabric
3.
pmodels/mpich
4.
PyTorch
4.
TensorFlow
5.
Transformers
vLLM
xFormers
TRL
deepspeed
...

Where to find the containers on LUMI


```
mitjasai@uan01:~> ls /appl/local/laifs/containers
archive                                  lumi-multitorch-u24r64f21m43t28-20251128_145346
laifs-lumi-multi-20250728_103251.sha256  lumi-multitorch-u24r64f21m43t29-20251209_134408
laifs-lumi-multi-20250728_103251.sif     lumi-multitorch-u24r64f21m43t29-20260124_092648
laifs-lumi-multi-latest.sif              lumi-multitorch-u24r64f21m43t29-20260216_093549
lumi-multitorch-latest.sif               lumi-multitorch-u24r64f21m43t29-20260225_144743
```

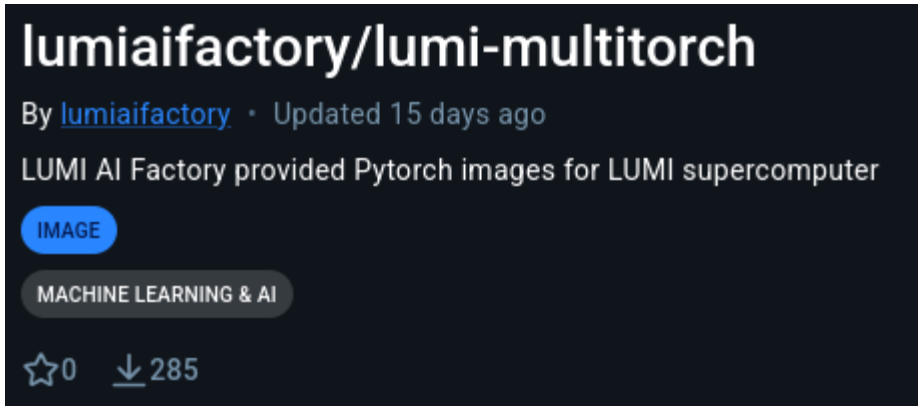
```
mitjasai@uan04:/appl/local/laifs/containers/lumi-multitorch-u24r64f21m43t29-
20260225_144743> ls *.sif
lumi-multitorch-full-u24r64f21m43t29-20260225_144743.sif
lumi-multitorch-libfabric-u24r64f21m43t29-20260225_144743.sif
lumi-multitorch-mpich-u24r64f21m43t29-20260225_144743.sif
lumi-multitorch-rocm-u24r64f21m43t29-20260225_144743.sif
lumi-multitorch-torch-u24r64f21m43t29-20260225_144743.sif
```

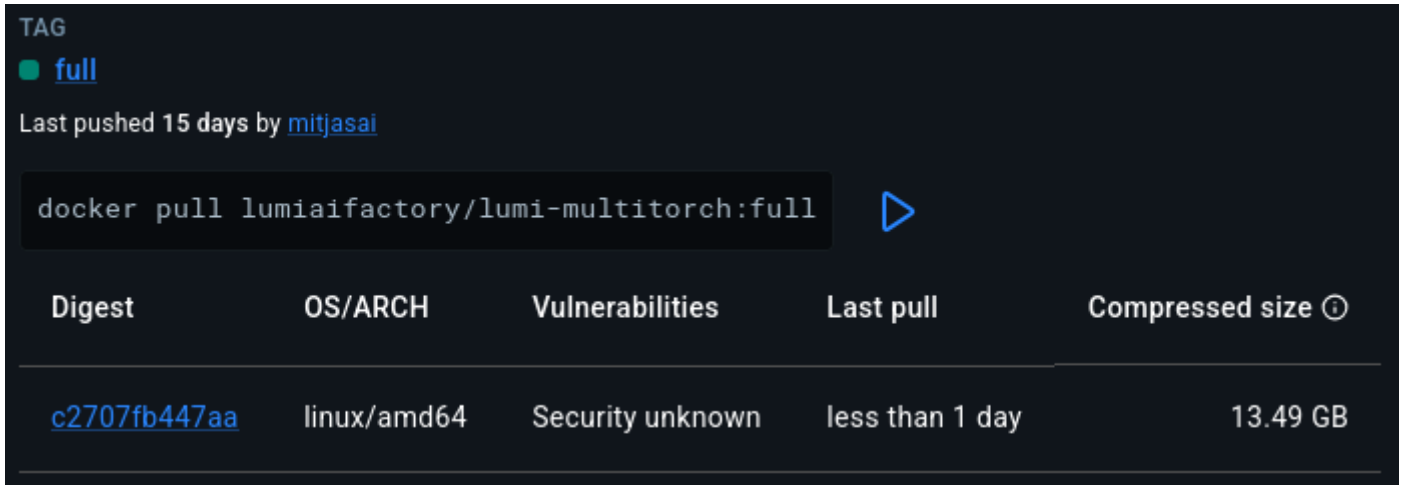
```
module purge
module use /appl/local/laifs/modules
module load lumi-aif-singularity-bindings
export SIF=/appl/local/laifs/containers/lumi-multitorch-u24r64f21m43t29-20260124_092648/lumi-multit
srun -A <your-project-id> -p small-g -n 1 --gpus-per-task=1 singularity run $SIF python -c "import
```

Where to find the containers on

LUMI AI Factory

https://hub.docker.com/r/lumiaifactory/lumi-multitorch






```
Bootstrap: docker
From: docker.io/lumiaifactory/lumi-multitorch:torch

%post
    . /opt/venv/bin/activate
    pip install scikit-learn
```

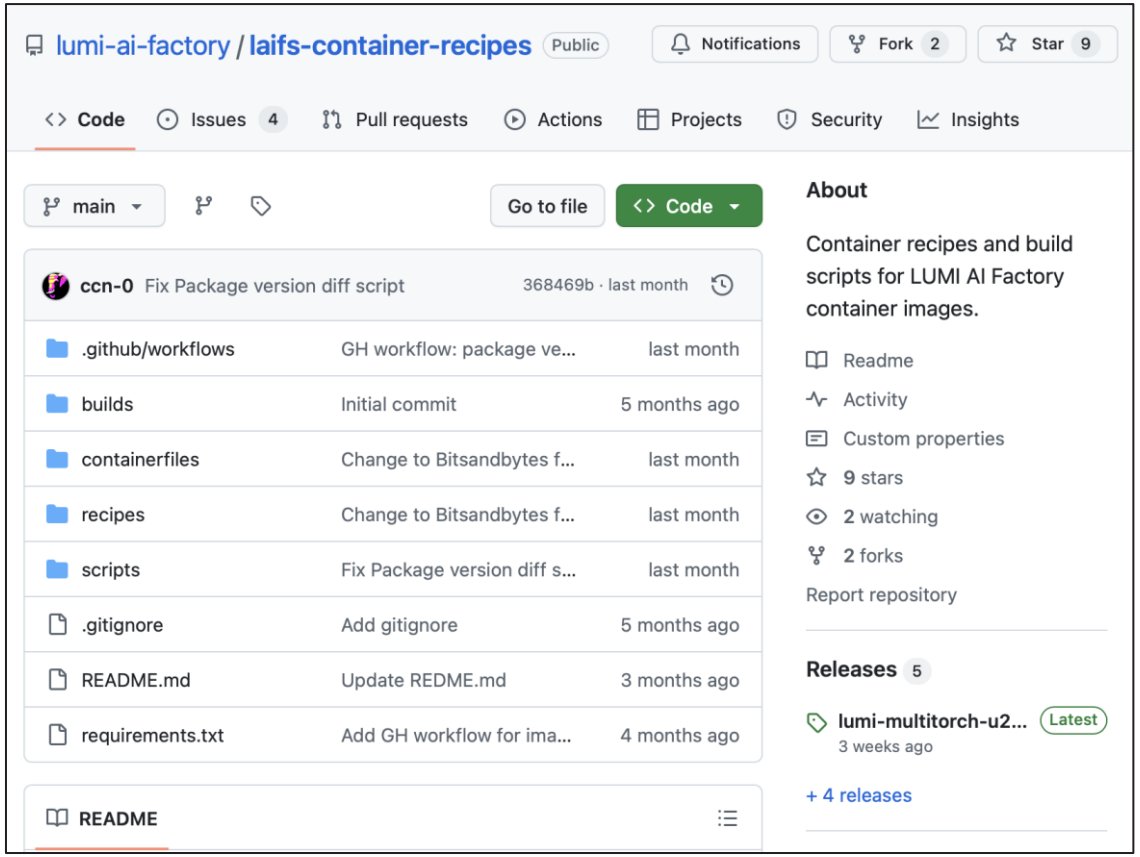
```
Bootstrap: docker
From: docker.io/lumiaifactory/lumi-multitorch:full

%post
    apt-get install -y nvtop
```

GitHub page

- Subscribe to releases
- See known issues
- More information
  - Detailed description of contents
  - Build logs
  - Container files
  - Test results

https://github.com/lumi-ai-factory/laifs-container-recipes



How does this affect you?

```
81        - module use /appl/local/containers/ai-modules
82        - module load singularity-AI-bindings
      99  + module use /appl/local/laifs/modules
     100  + module load lumi-aif-singularity-bindings
```

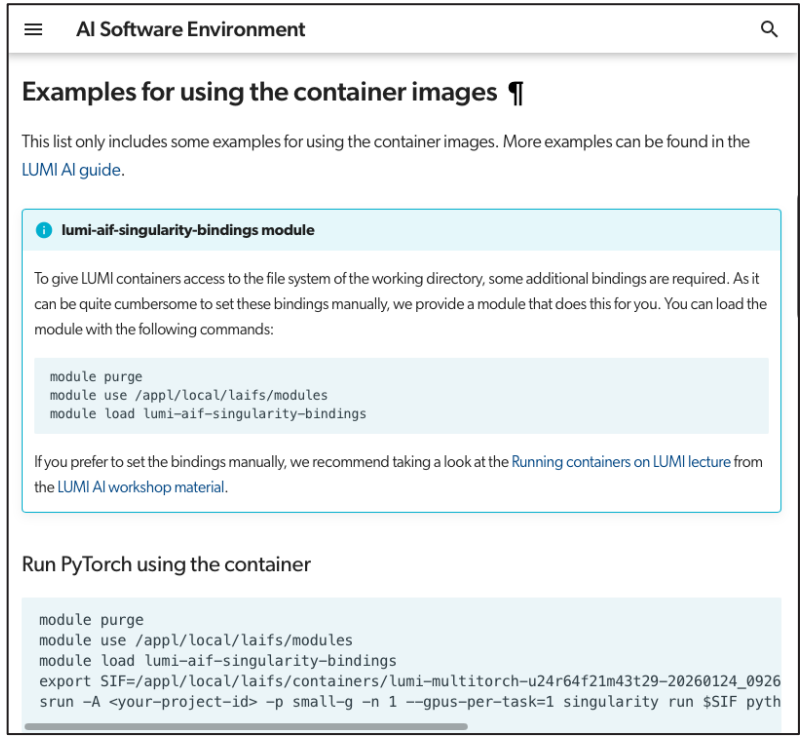
```
83        - export SIF=/appl/local/containers/sif-images/lumi-pytorch-rocm-6.2.1-python-3.12-pytorch-20240918-
            vllm-4075b35.sif
     101  + export SIF=/appl/local/laifs/containers/lumi-multitorch-u24r64f21m43t29-20260225_144743/lumi-multitorch-
            full-u24r64f21m43t29-20260225_144743.sif
```

```
94        - singularity exec $SIF bash -c '$WITH_CONDA && source h5-env/bin/activate && python my-script.py'
     112  + singularity run $SIF bash -c 'source h5-env/bin/activate && python my-script.py'
```

Examples for using the container images

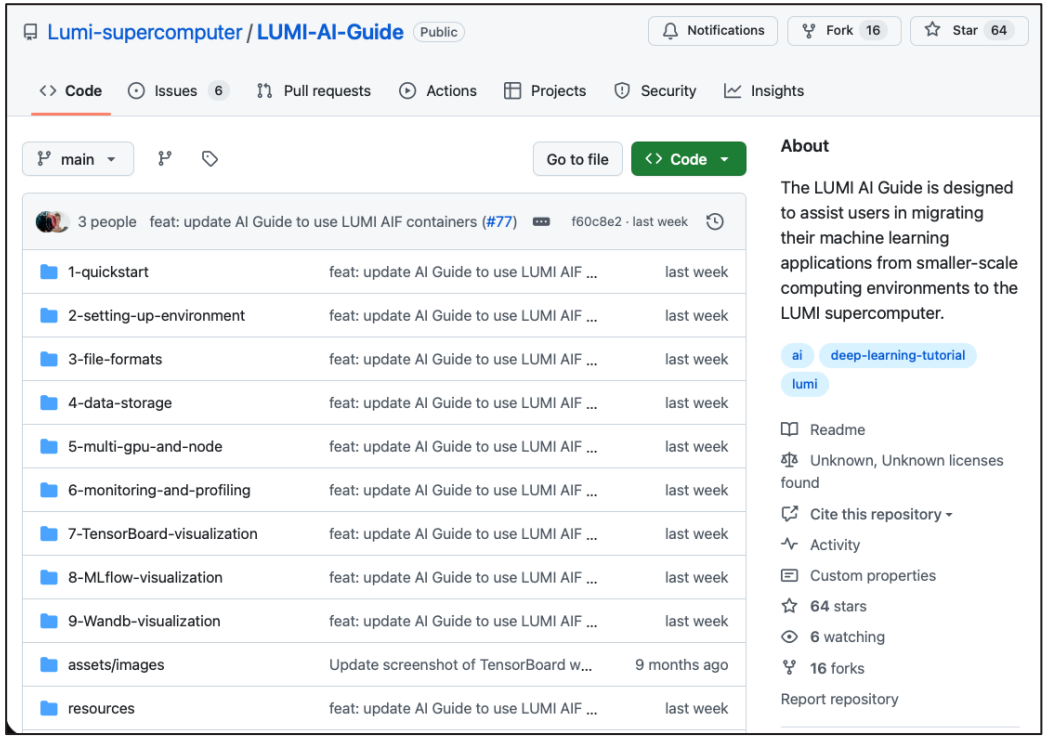
LUMI AI Factory

LUMI Documentation



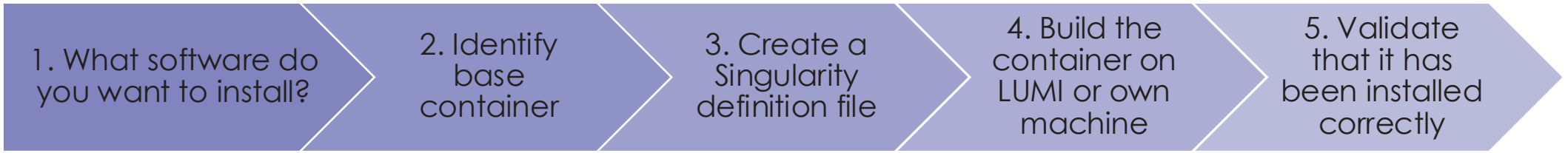
https://docs.lumi-supercomputer.eu/laif/software/ai-environment

LUMI AI Guide



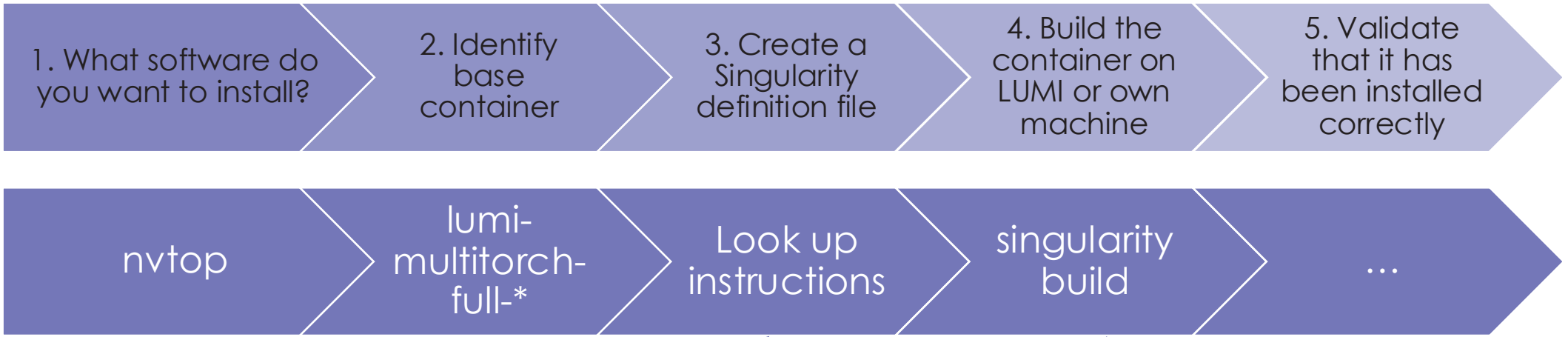
https://github.com/Lumi-supercomputer/LUMI-AI-Guide

Build new containers based on the images



https://docs.lumi-supercomputer.eu/laif/software/ai-environment/#build-new-containers-based-on-the-images

Example: Build new containers based on the images




```
Bootstrap: docker
From: docker.io/lumiaifactory/lumi-multitorch:full

%post
    apt-get install -y nvtop
```

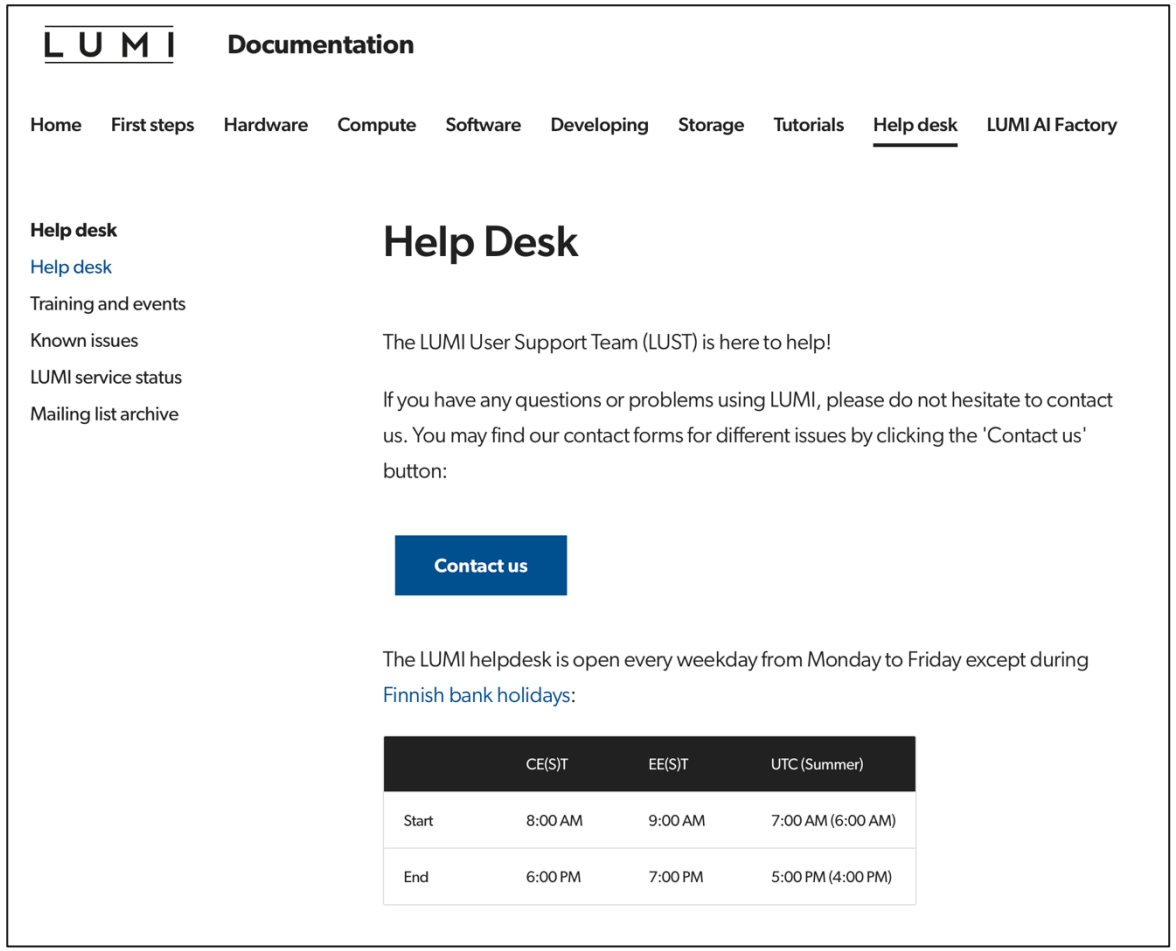
Follow instructions from LUMI Documentation

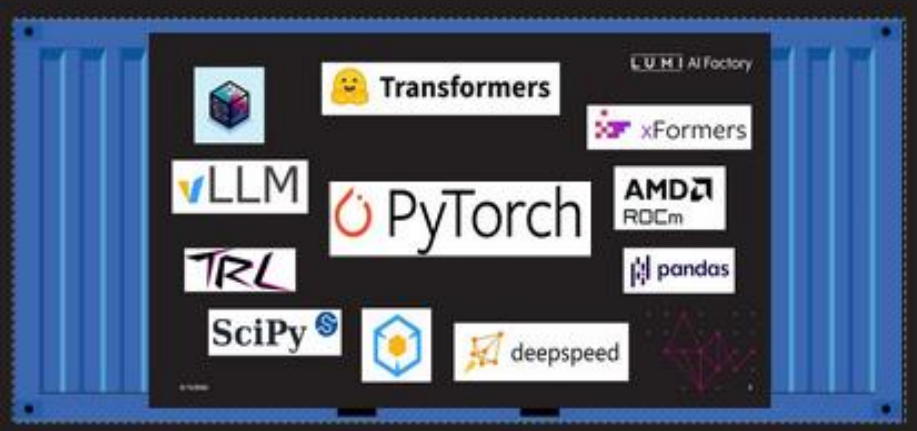
https://docs.lumi-supercomputer.eu/laif/software/ai-environment/#build-new-containers-based-on-the-images

Support

- LUMI User Support (LUST) is the first contact point
  - LUST knows about the system status and other issues
  - LUST can escalate tickets to container maintainers
  - A potential problem with the containers could be an issue that is independent of the containers

https://lumi-supercomputer.eu/user-support/need-help/




Transformers
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AMD ROCm
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AMD ROCm
LAMMPS
TRL
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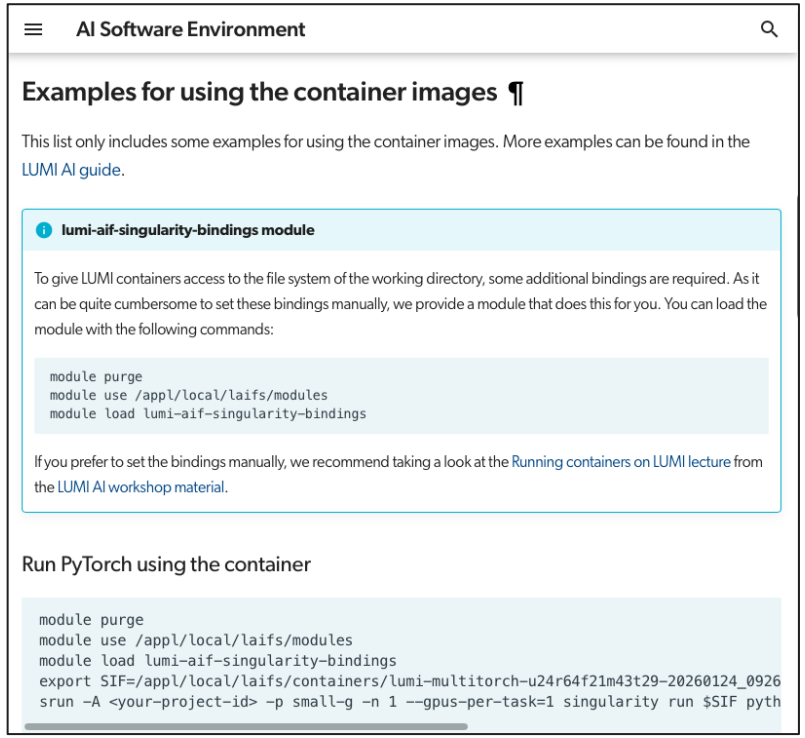
SciPy
deepspeed

Questions?

LUMI Documentation



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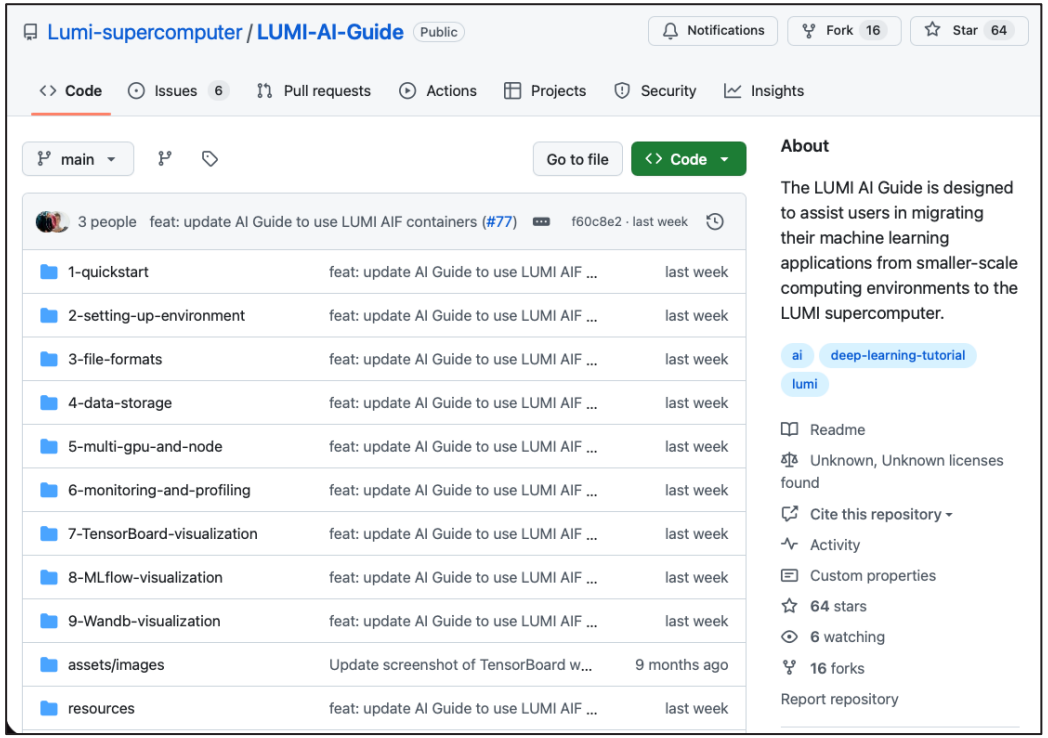
LUMI AI Guide



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