LAPP
Laboratoire d'Annecy de Physique des Particules

Introduction
Pixi (and a bit MUST)

Pierre Aubert

Anaconda ...

Anaconda ...

ANACONDA.

Rootless Installer

Anaconda ...

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Rootless Installer

Generic package format for all languages

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Generic package format for all languages

big security issue

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CONDA

Open-Source
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Generic package format

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CONDA-FORGE

All imaginable packages here

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Killer of **distributed file systems**

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- **Fast**
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- Simple **package builder**

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prefix.dev

Mirror of conda-forge

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Pixi

Pixi

Sources

Pixi

Pixi Config

Sources

Pixi

- Dependencies
- Environments
- Tasks

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- Tasks

Pixi Config

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Pixi Lockfile

Pixi

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Pixi Lockfile

Full envs description

Pixi


git
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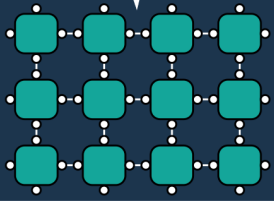
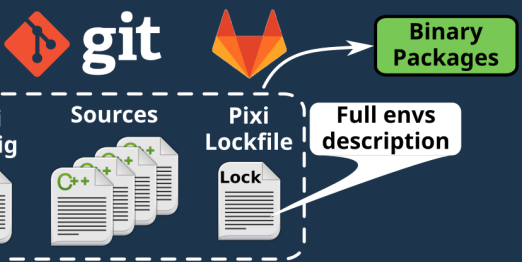


Pixi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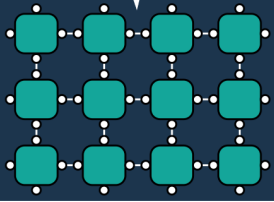

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Splitting Environment ?

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Example Gray Scott lecture
C++17/C++20

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Production
- final executable
- hdf5
- libpng
- tbb

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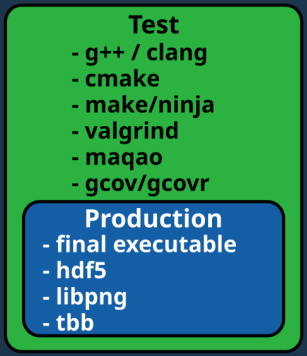

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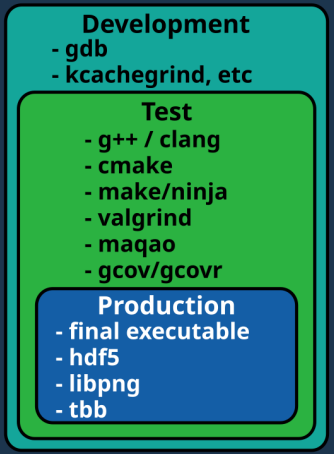

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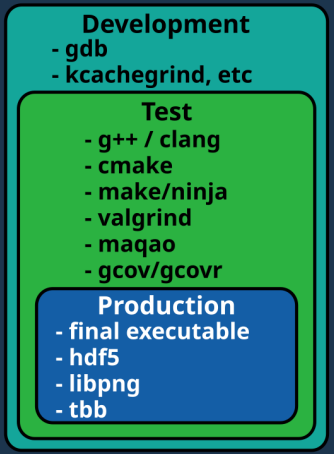

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C++17/C++20

- 42 691 files
- 1.3 GB

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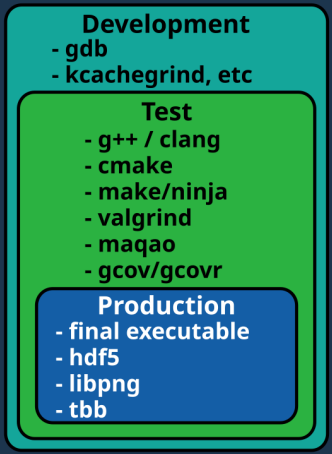
- Nice to debug



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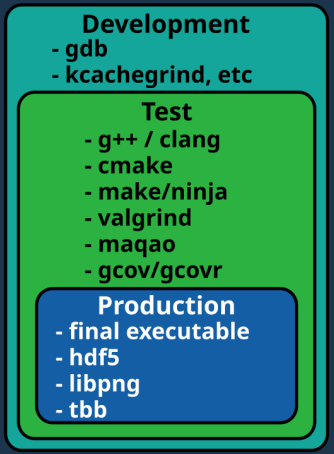

- Nice to debug

- Heavy
- Complex (Graphic Interface)
- Slows down distributed file system

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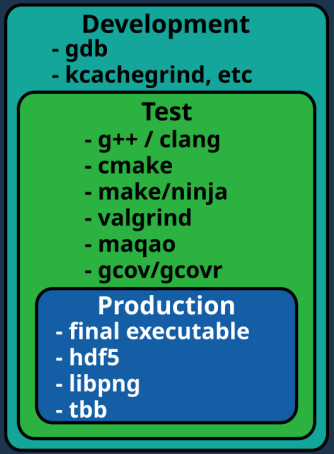

Example Gray Scott lecture
C++17/C++20

- 42 691 files
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- 18 253 files
- 1.1 GB

- Nice to debug

- Heavy
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Splitting Environment ?

Example Gray Scott lecture
C++17/C++20

- Nice to debug

Development
- gdb
- kcachegrind, etc

- 42 691 files
- 1.3 GB

- Heavy
- Complex (Graphic Interface)
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Test
- g++ / clang
- cmake
- make/ninja
- valgrind
- maqao
- gcov/gcovr

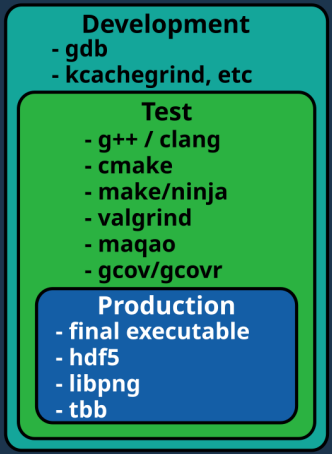
- 18 253 files
- 1.1 GB

Production
- final executable
- hdf5
- libpng
- tbb

- 5 545 files
- 141.7 MB

Splitting Environment ?

Laboratoire d'Annecy de Physique des Particules



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- Nice to debug

- Heavy
- Complex (Graphic Interface)
- Slows down distributed file system

- Fastest to deploy
- Less complexity
- Less vulnerabilities

Using MUST

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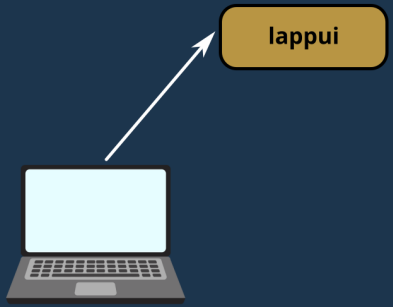

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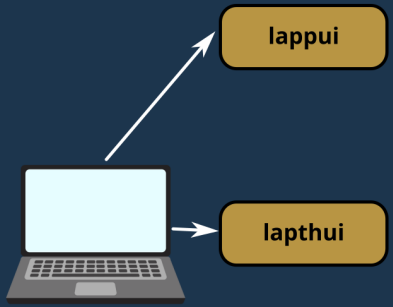

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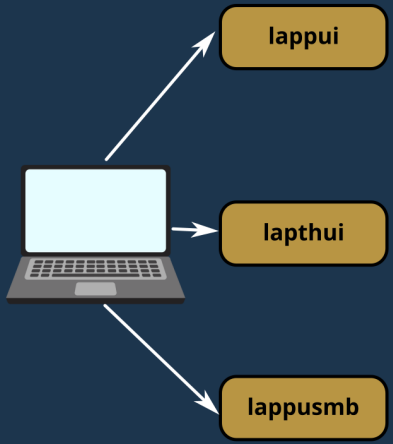

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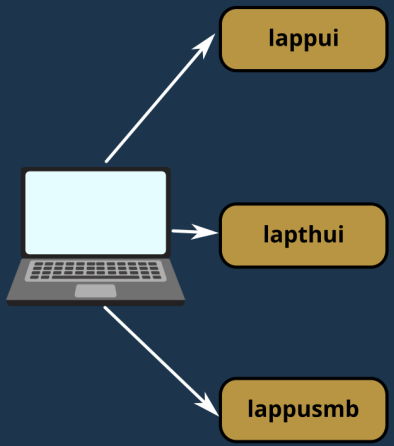
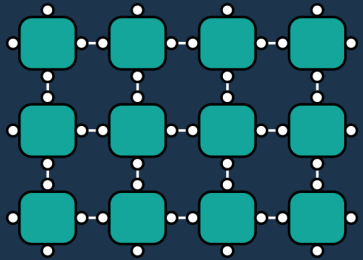

lappui
lapthui
lappusmb


HTCondor
Software Suite


Worker Nodes

Using MUST

lappui

lapthui

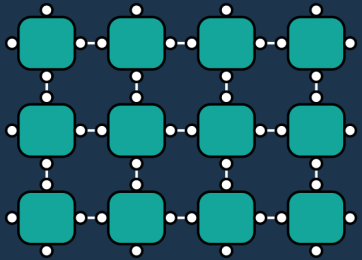
lappusmb

/home3

/lapp_data/...

HTCondor Software Suite

Worker Nodes



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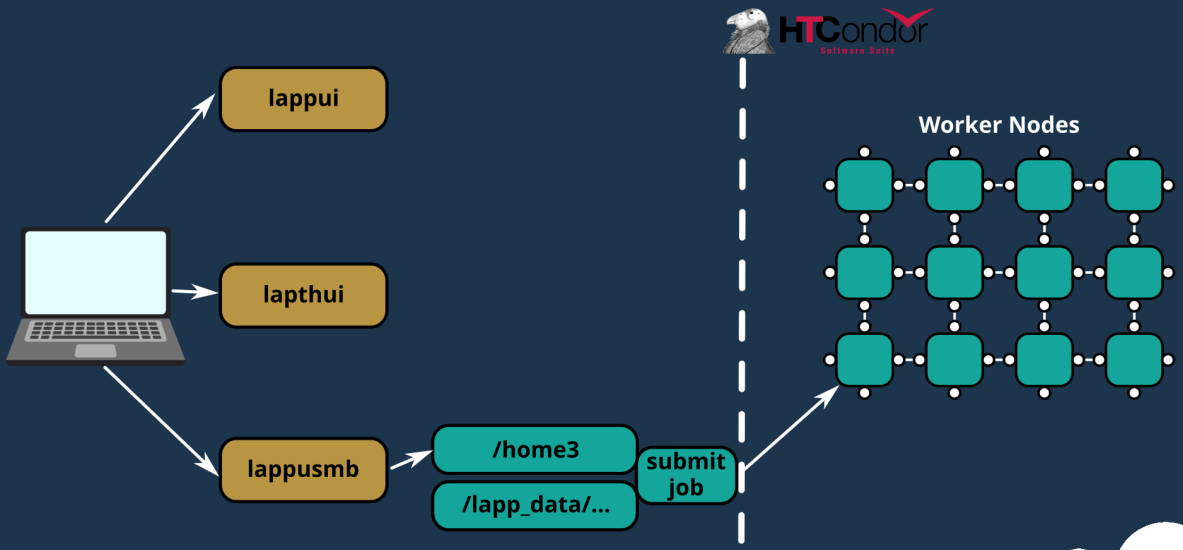
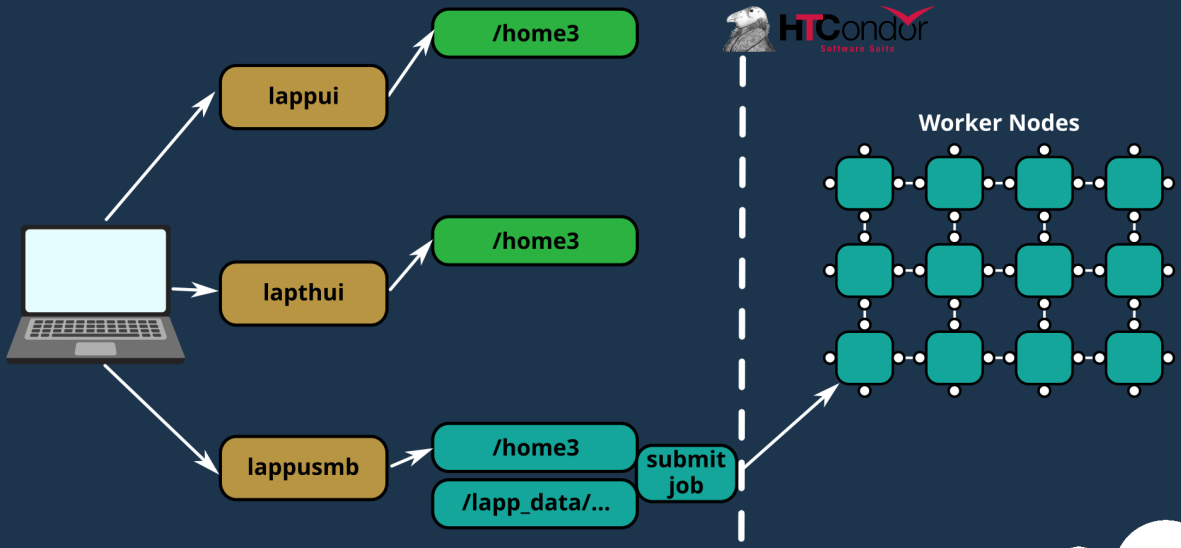

HTCondor
Software Suite
Worker Nodes
lappui
lapthui
lappusmb
/home3
/lapp_data/...
submit job

Using MUST


/home3
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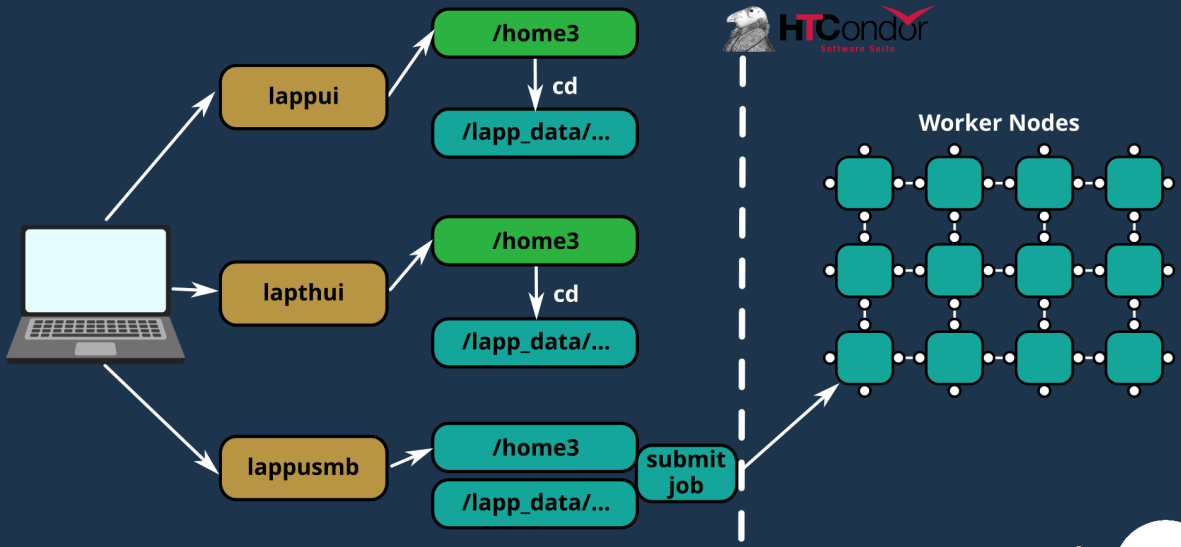
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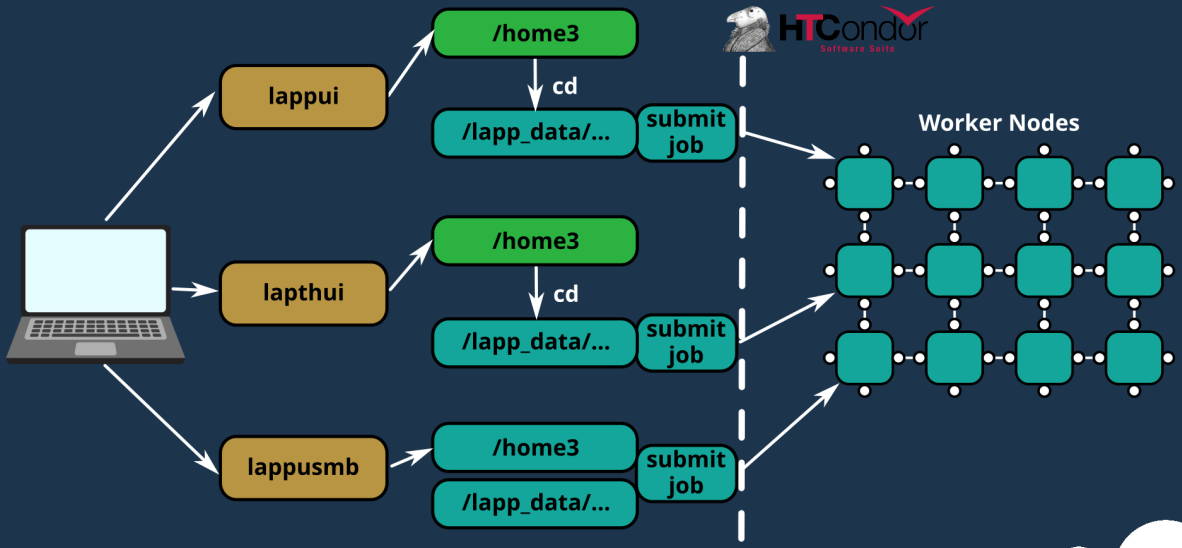
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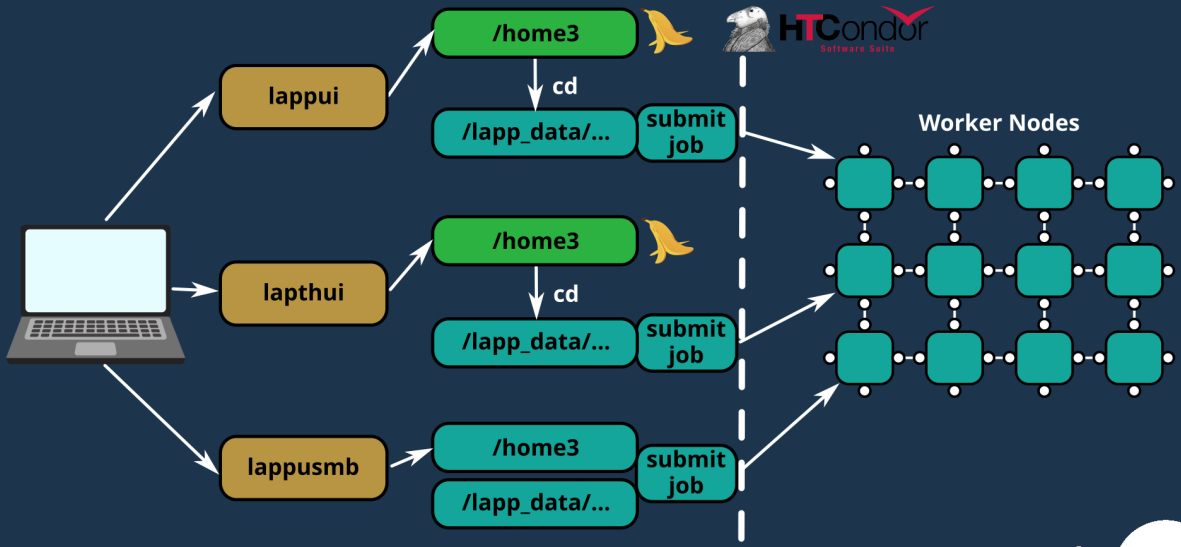
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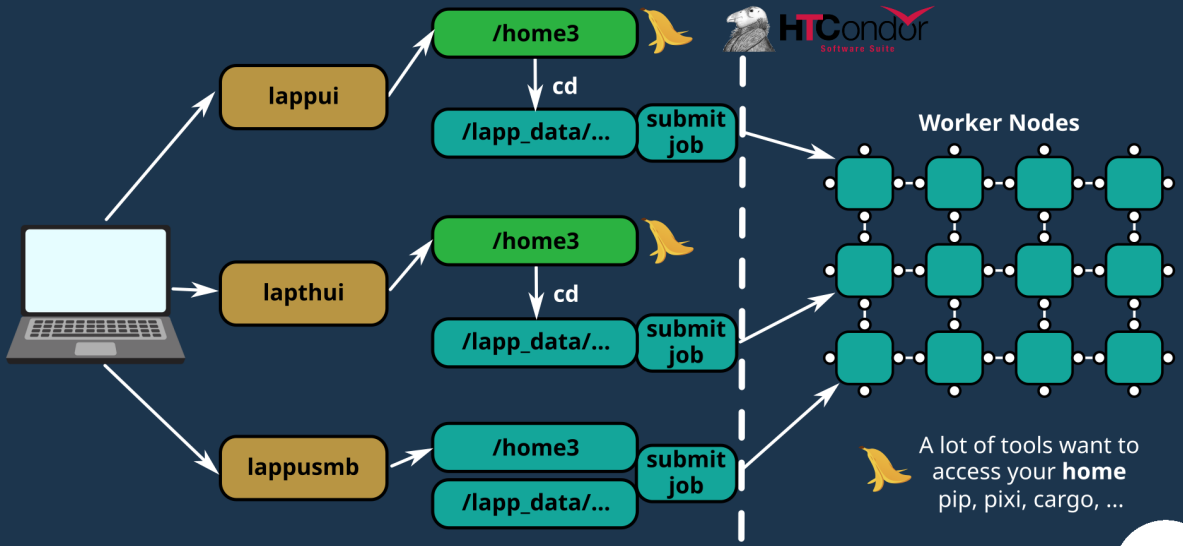
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submit job
lappusmb
HTCondor
Software Suite
Worker Nodes
A lot of tools want to access your **home**
pip, pixi, cargo, ...

MUST Modules

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```
module avail
```

MUST Modules

List Modules

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MUST Modules

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```
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```
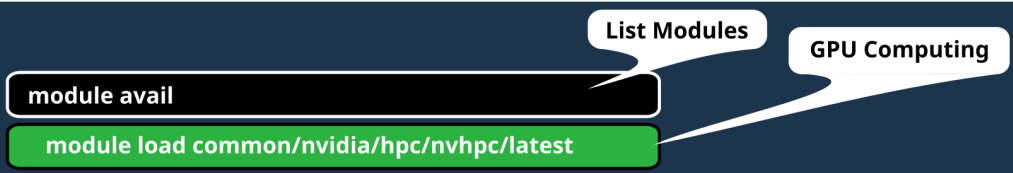

```
module load common/nvidia/hpc/nvhpc/latest
```

MUST Modules



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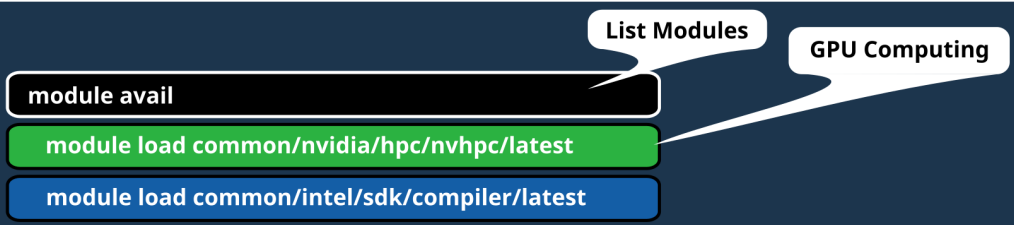

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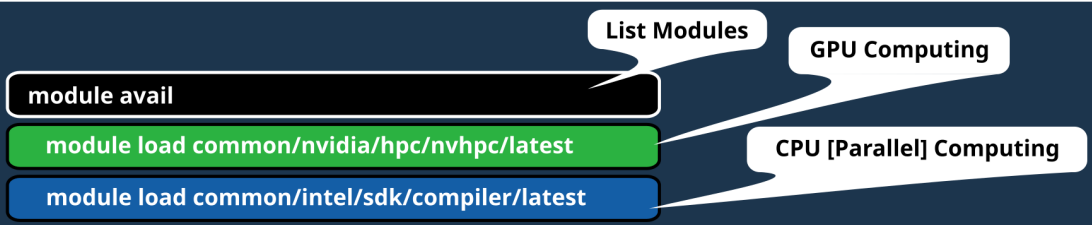

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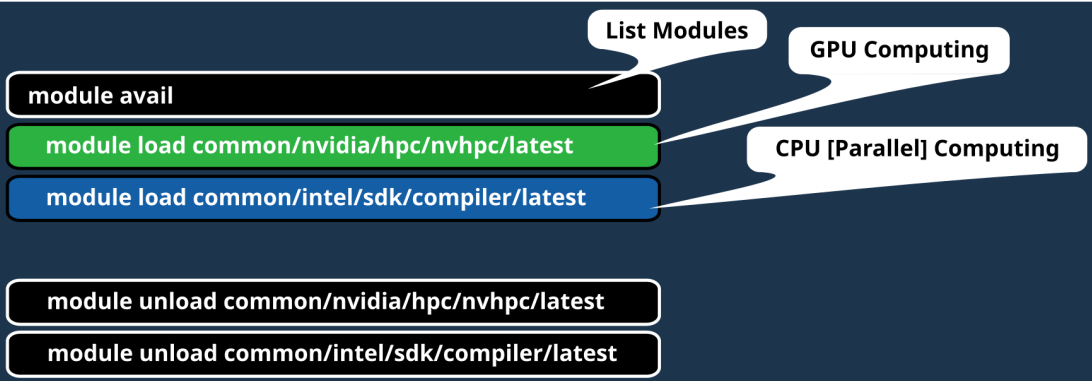

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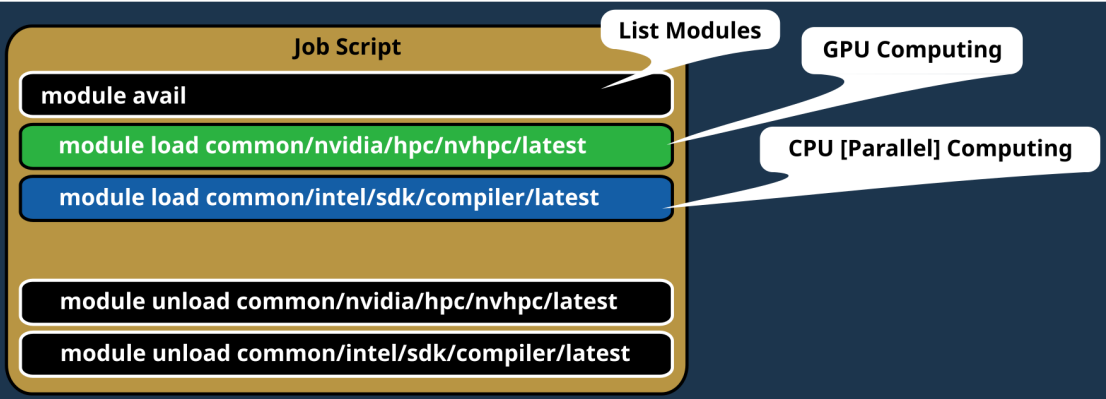

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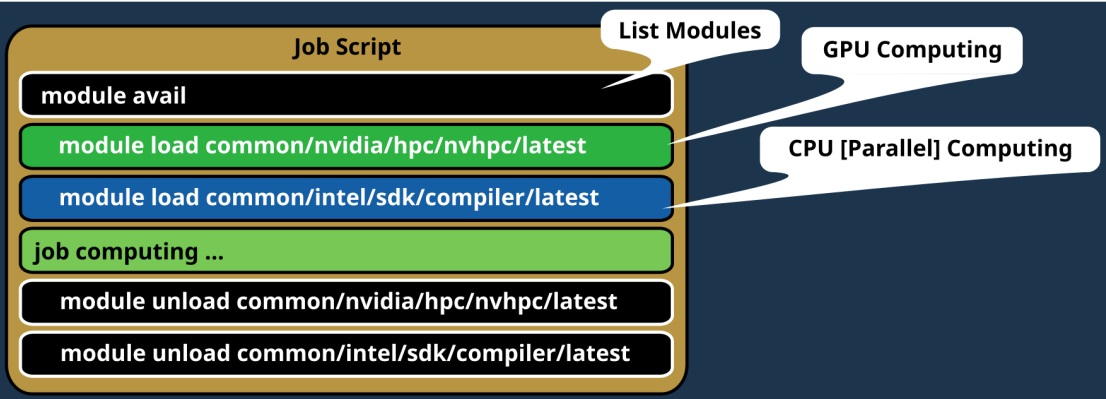

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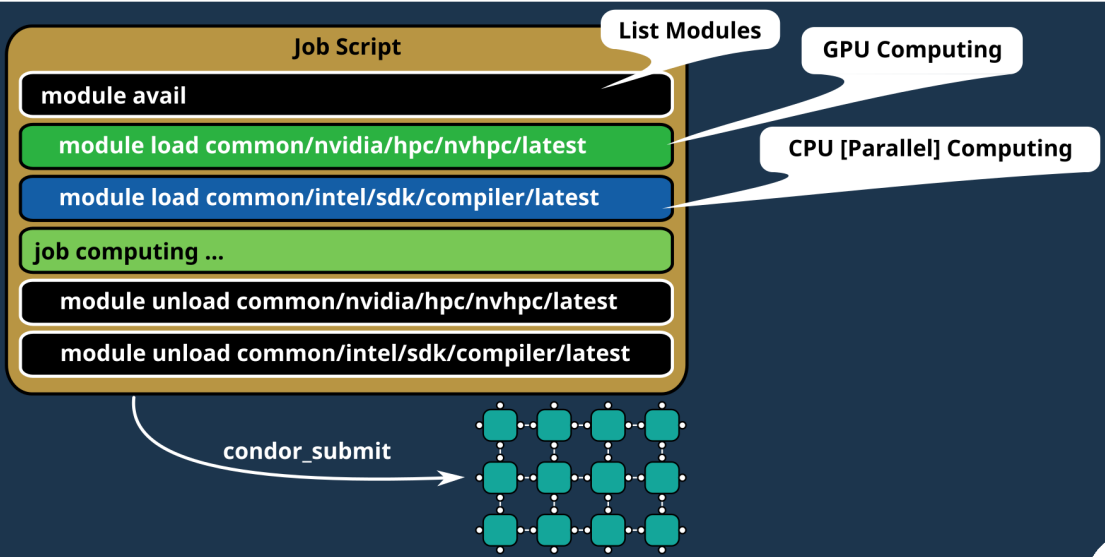

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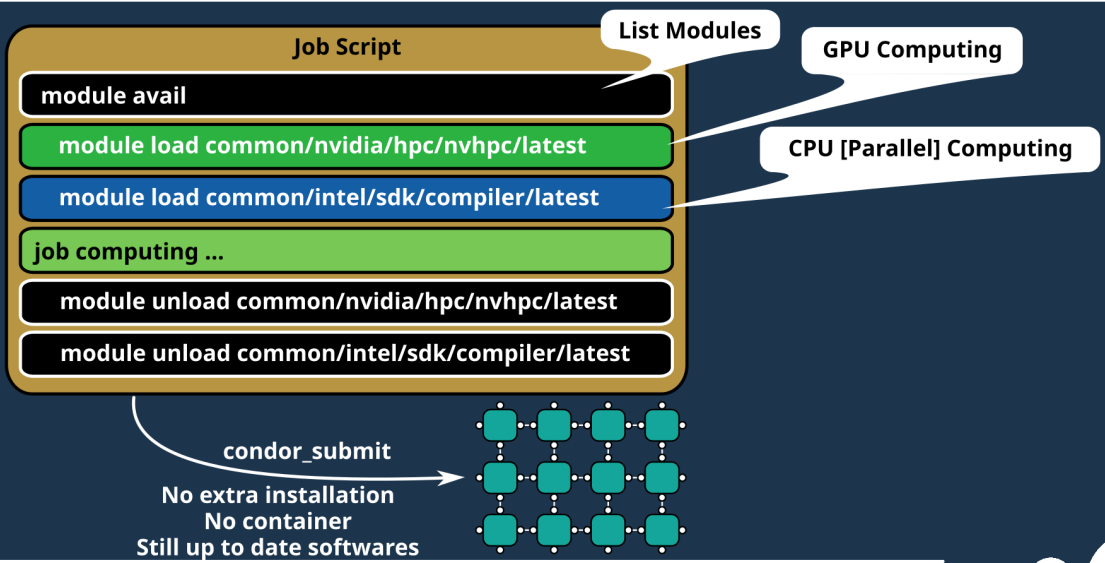

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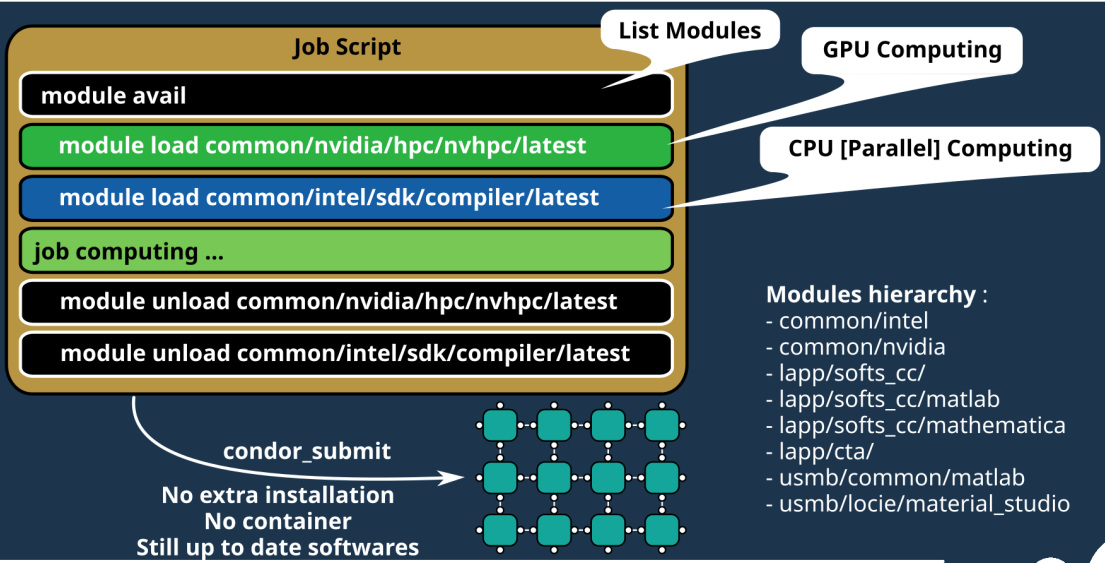


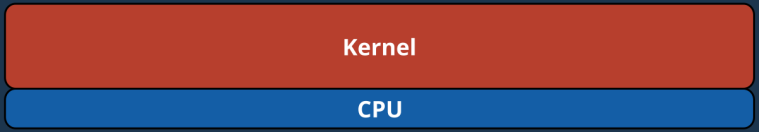
Modules hierarchy :
- common/intel
- common/nvidia
- lapp/softs_cc/
- lapp/softs_cc/matlab
- lapp/softs_cc/mathematica
- lapp/cta/
- usmb/common/matlab
- usmb/locie/material_studio

Containers Introduction

Containers Introduction

CPU

Containers Introduction



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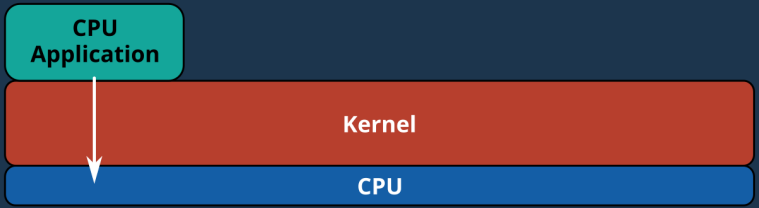

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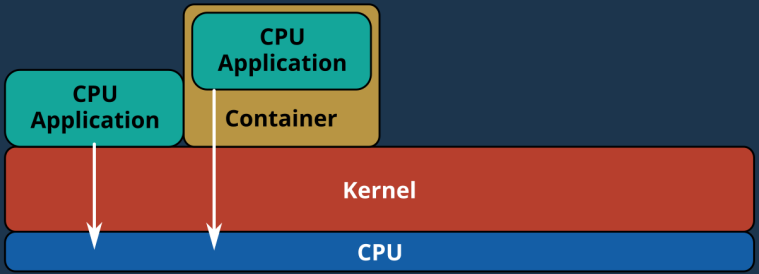

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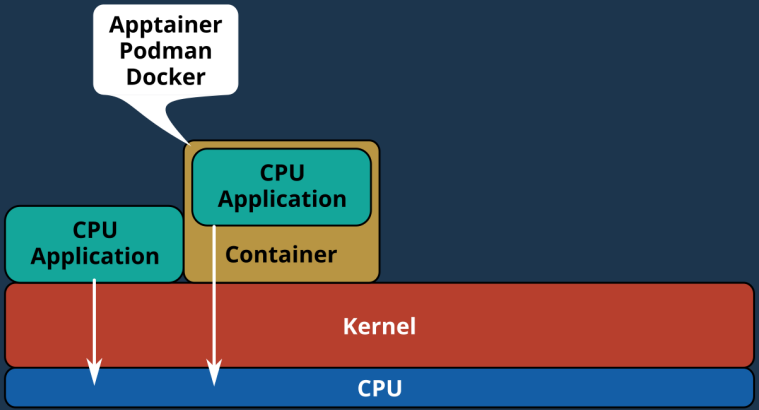

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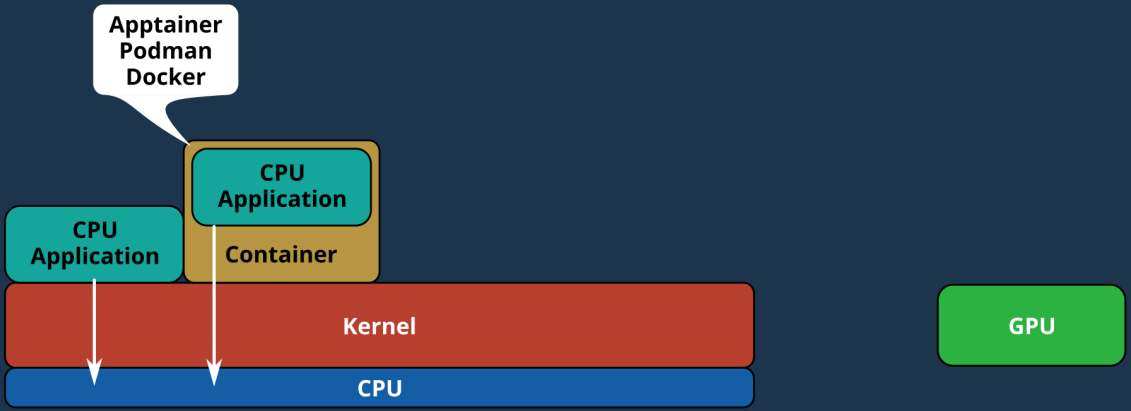
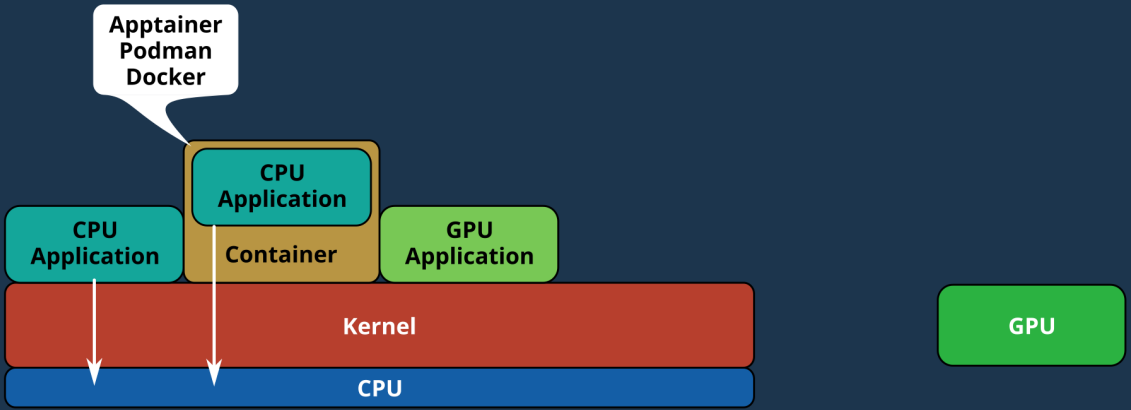
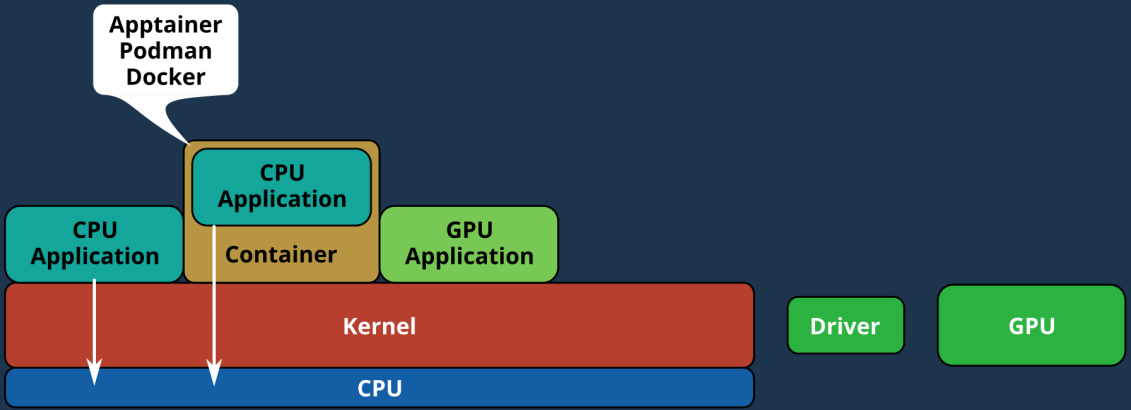


Containers Introduction



Containers Introduction



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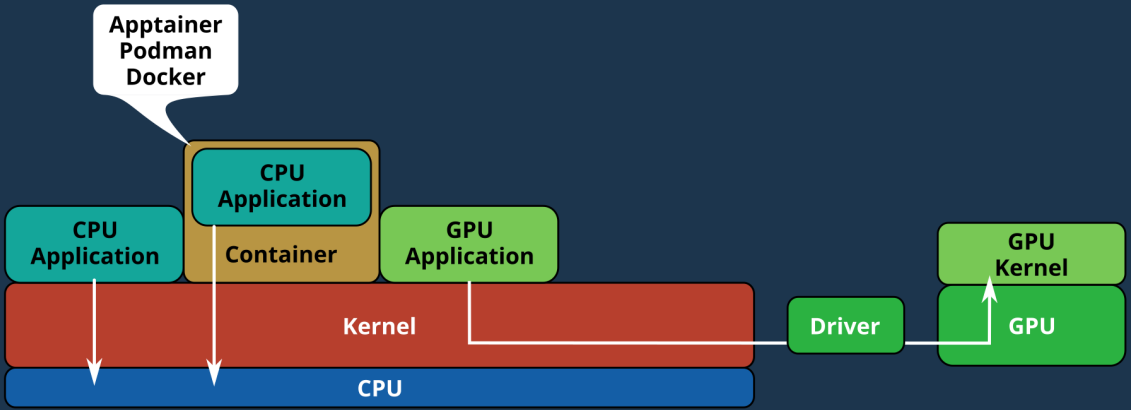

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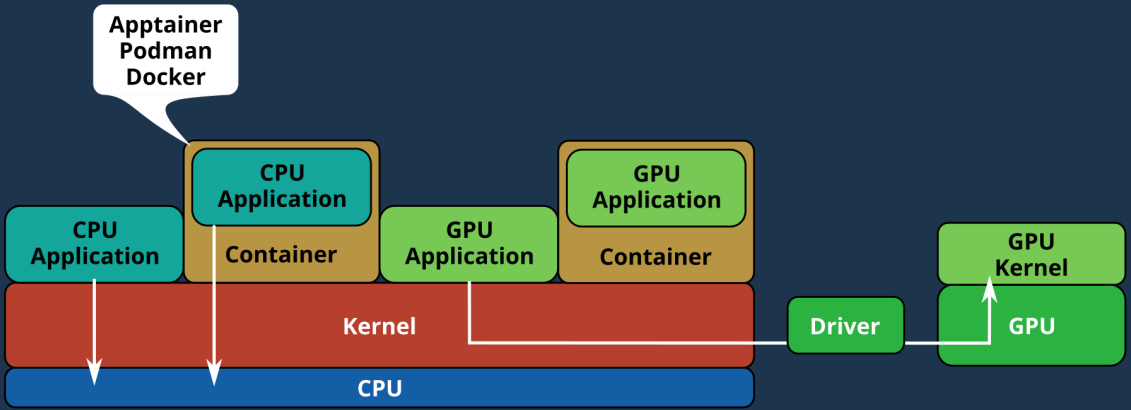

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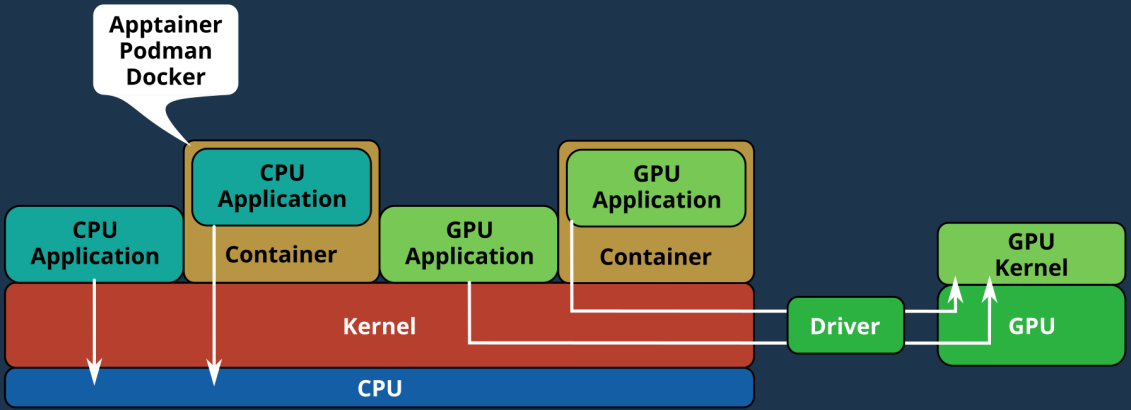

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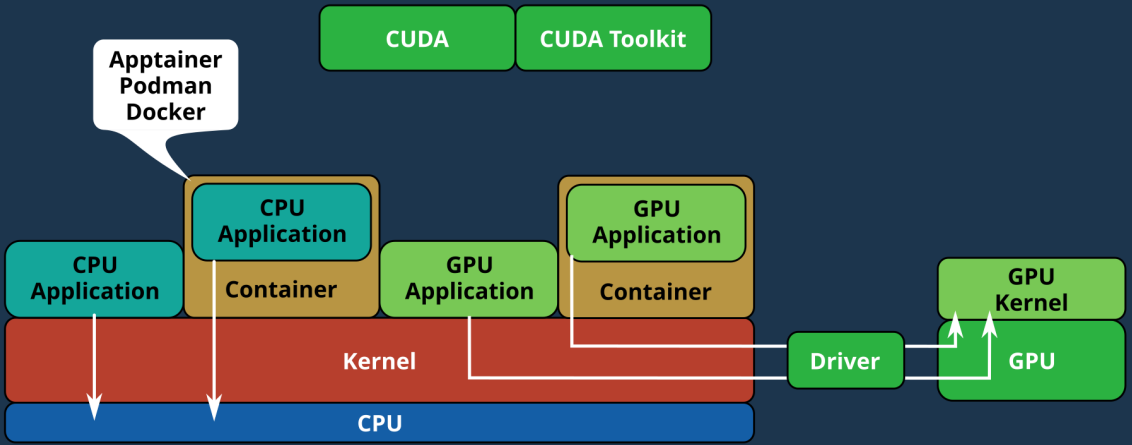

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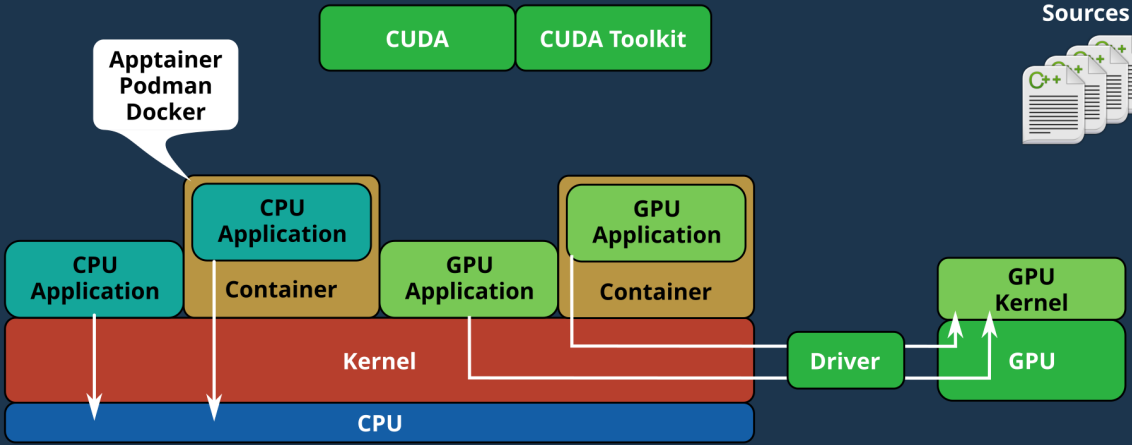

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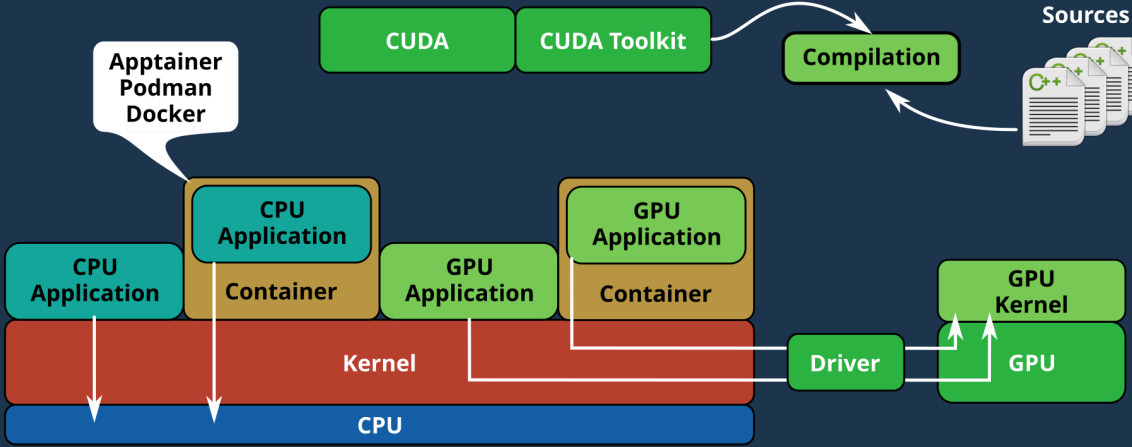

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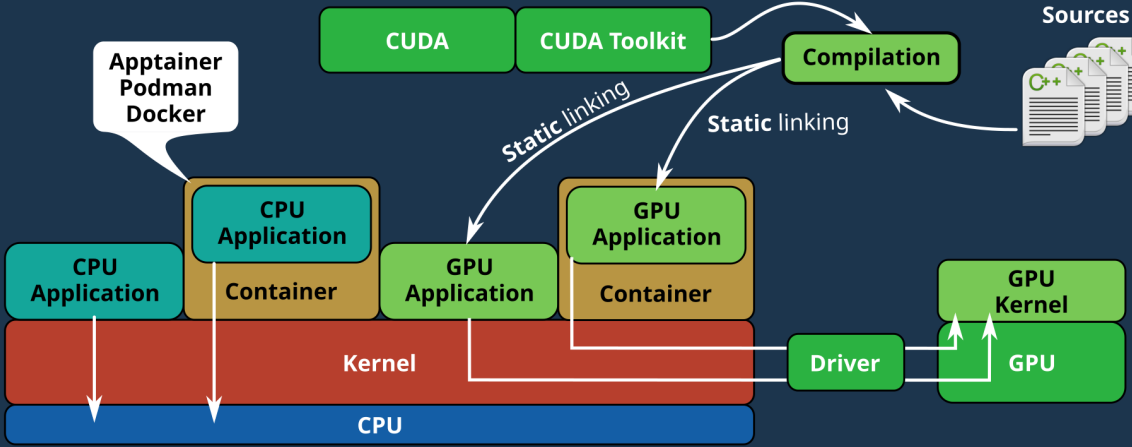

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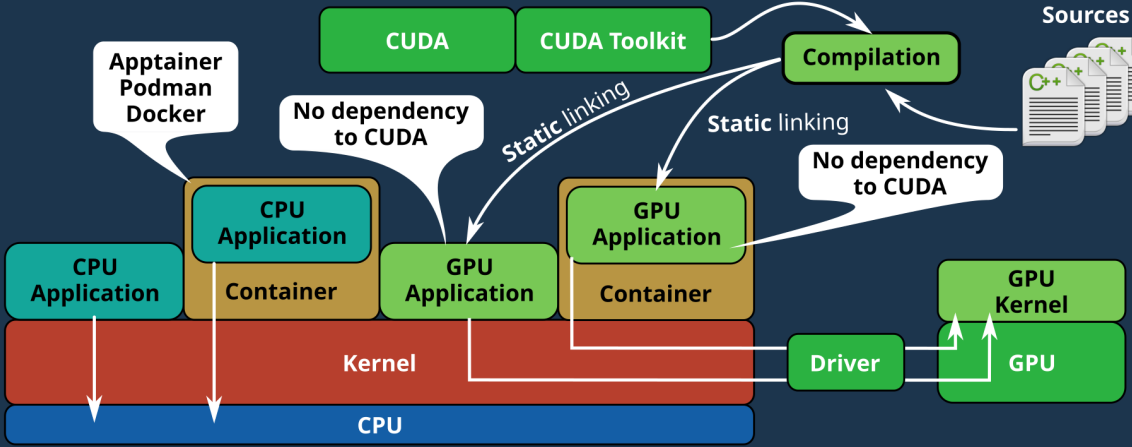
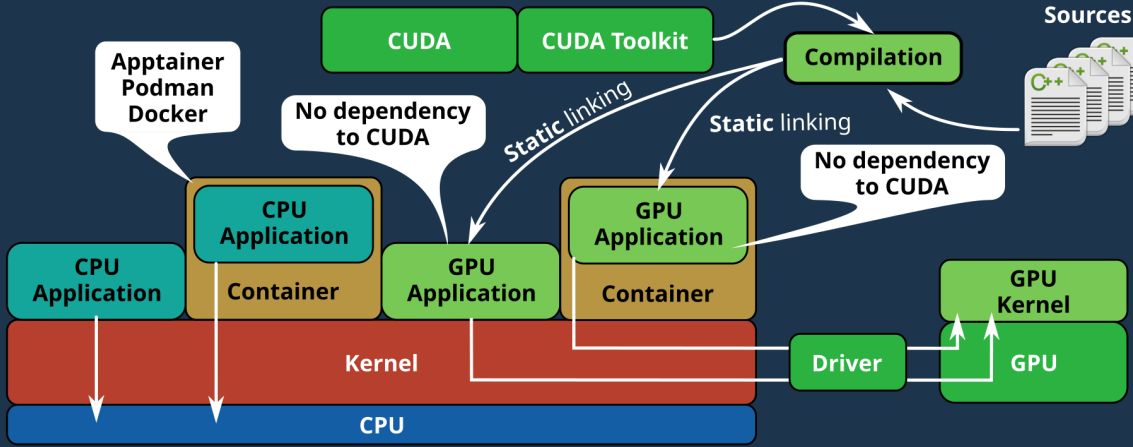
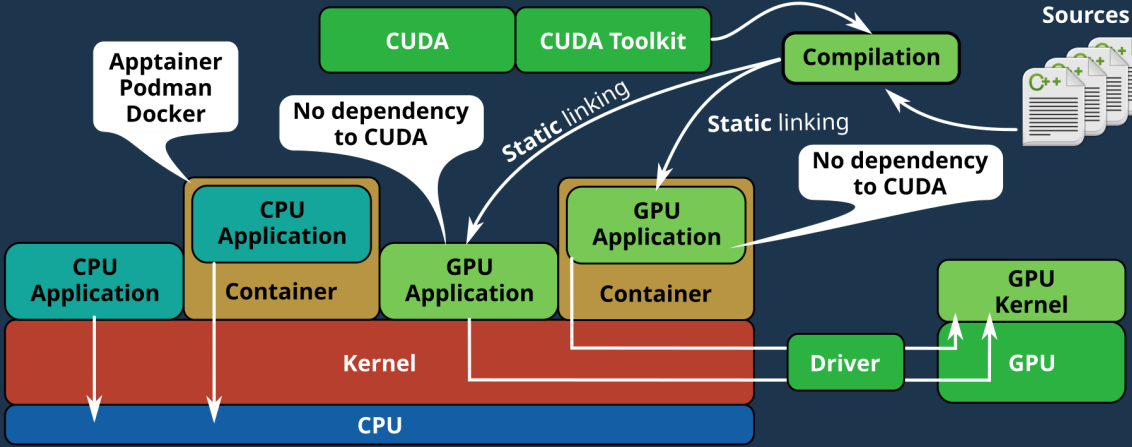


Containers Introduction



No need for CUDA/HIP in containers and production environments

Containers Introduction



No need for CUDA/HIP in containers and production environments

Gray Scott CUDA example container -> **106** MB | **HPCSDK** container -> **9.1** GB

Conclusion

- **pixi** : `https://pixi.sh/latest/`
  - Replace installers (apt, packman, dnf, yum, pip, apk, brew, uv, conda, mamba, ...)
  - **Versioned** and **reproductible** environments
  - Still in **alpha**

- Lecture **INTRODUCTION_MUST**
  - Job submission with **HT_Condor**
  - With **modules**
  - With **GPU**s
  - How to build **light containers**