Unlock the Power of Dev Containers: Build a Consistent Python Development Environment in Seconds!

Thomas Fraunholz

Smart
Cyber Security

Reproduction

~/myproject/main.py

```python
from fastapi import FastAPI

app = FastAPI()


@app.get("/")
async def root():
    return {"message": "Hello World"}
```

FastAPI

console

```console
~/myproject$ pip install \
                    fastapi uvicorn

~/myproject$ uvicorn main:app
```

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`~/myproject/main.py`

```python
from fastapi import FastAPI

app = FastAPI()


@app.get("/")
async def root():
    return {"message": "Hello World"}
```

FastAPI

`console`
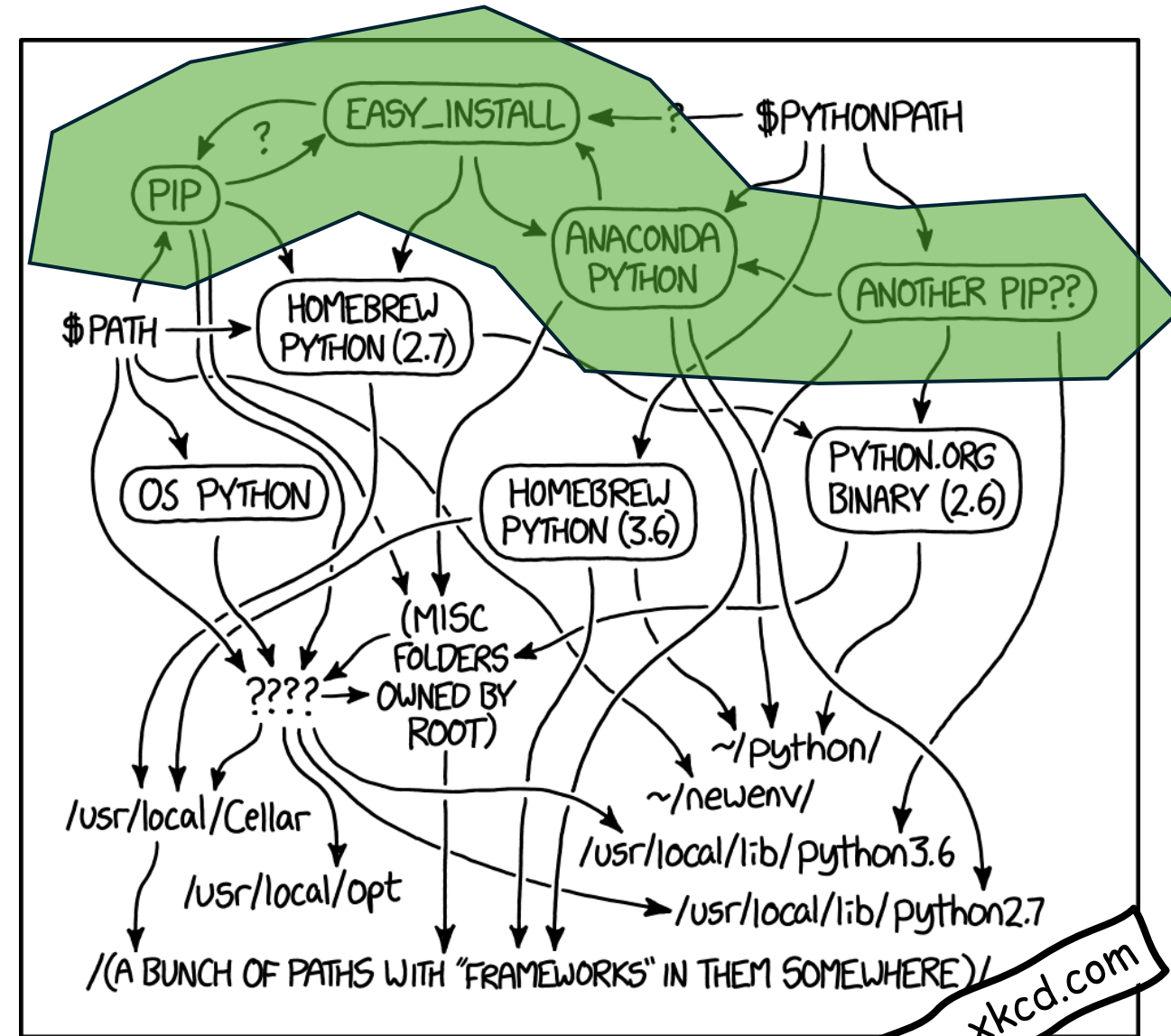
```
~/myproject$ pip install \
                    fastapi uvicorn

~/myproject$ uvicorn main:app
```
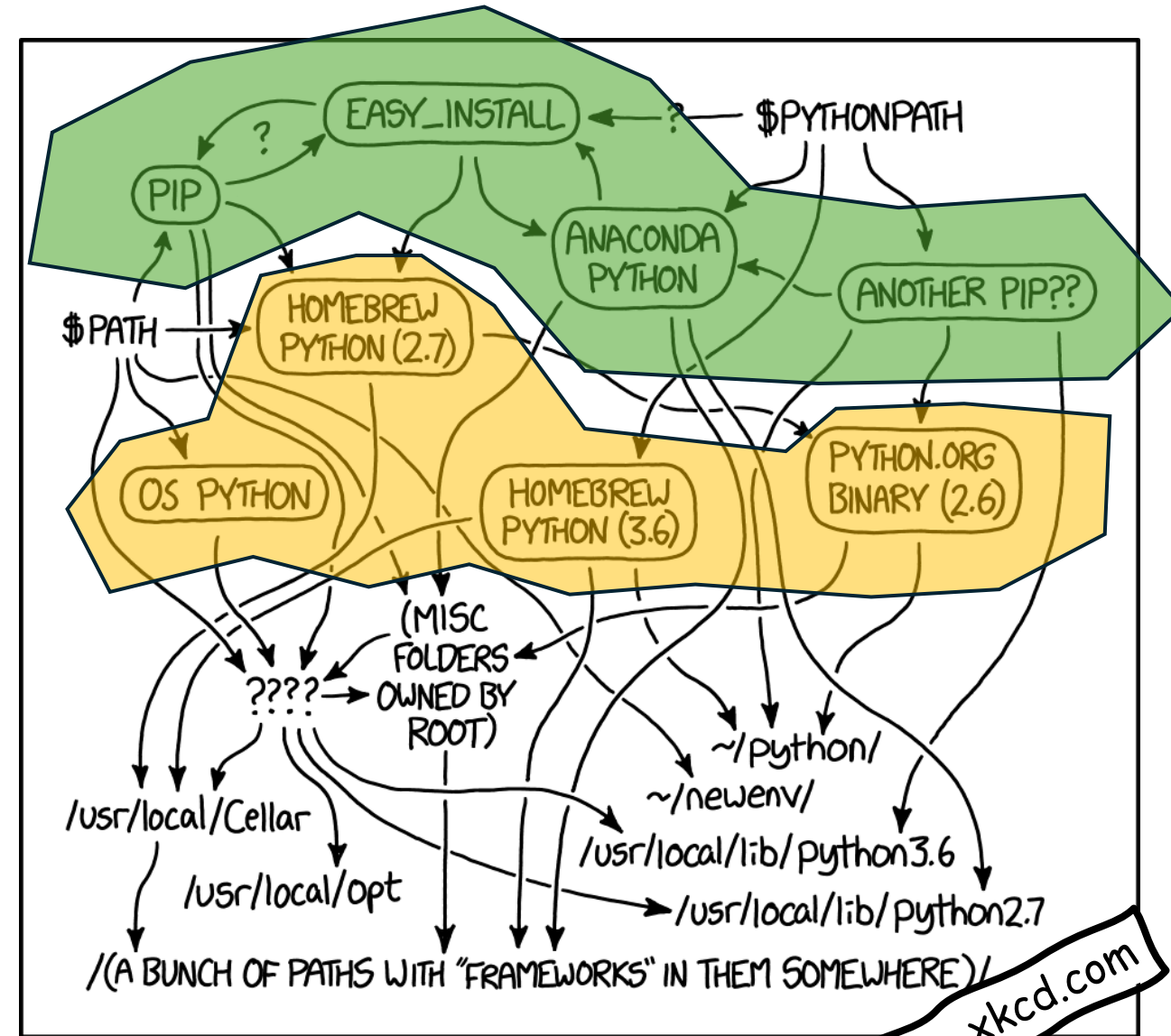
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MY PYTHON ENVIRONMENT HAS BECOME SO ~~CLUTTERED~~
THAT MY LAPTOP HAS BEEN DECLARED ~~A SUPERFUND~~ SITE.

Packages

MY PYTHON ENVIRONMENT HAS BECOME SO [...]
THAT MY LAPTOP HAS BEEN DECLARED [...] SITE.

Randall Munroe, xkcd.com

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Packages

Interpreter

EASY_INSTALL ← ? ← $PYTHONPATH

PIP

? → ?

ANACONDA PYTHON

ANOTHER PIP??

$PATH →

HOMEBREW PYTHON (2.7)

OS PYTHON

HOMEBREW PYTHON (3.6)

PYTHON.ORG BINARY (2.6)

(MISC FOLDERS OWNED BY ROOT)

???? →

/usr/local/Cellar

/usr/local/opt

~/python/

~/newenv/

/usr/local/lib/python3.6

/usr/local/lib/python2.7

/(A BUNCH OF PATHS WITH "FRAMEWORKS" IN THEM SOMEWHERE)/

MY PYTHON ENVIRONMENT HAS BECOME SO _____
THAT MY LAPTOP HAS BEEN DECLARED ____ ____ SITE.

Randall Munroe, xkcd.com

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Interpreter

System

MY PYTHON ENVIRONMENT HAS BECOME SO ~~CLUTTERED~~
THAT MY LAPTOP HAS BEEN DECLARED ~~A BEYOND~~ SITE.

Randall Munroe, xkcd.com

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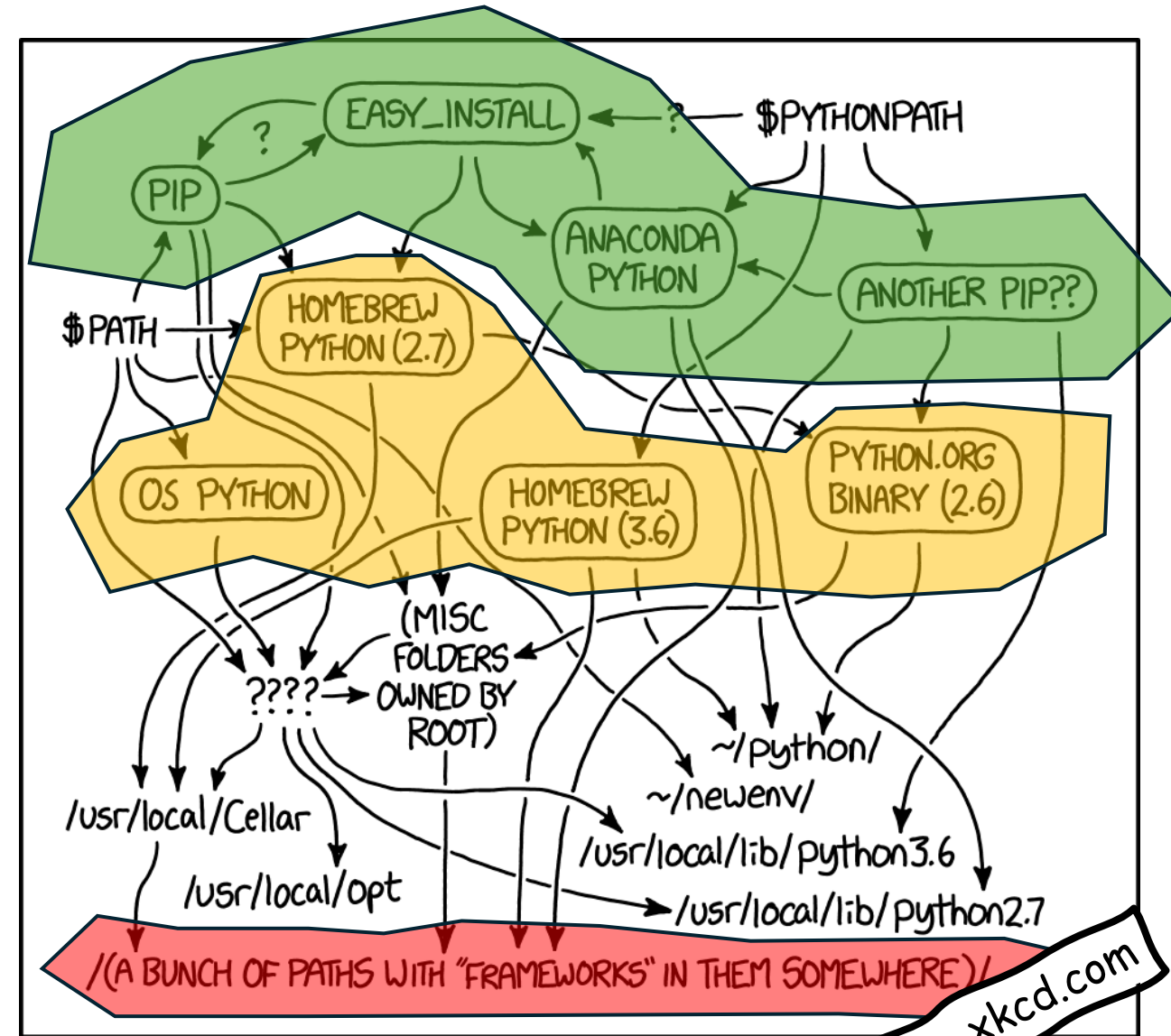
Packages

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System
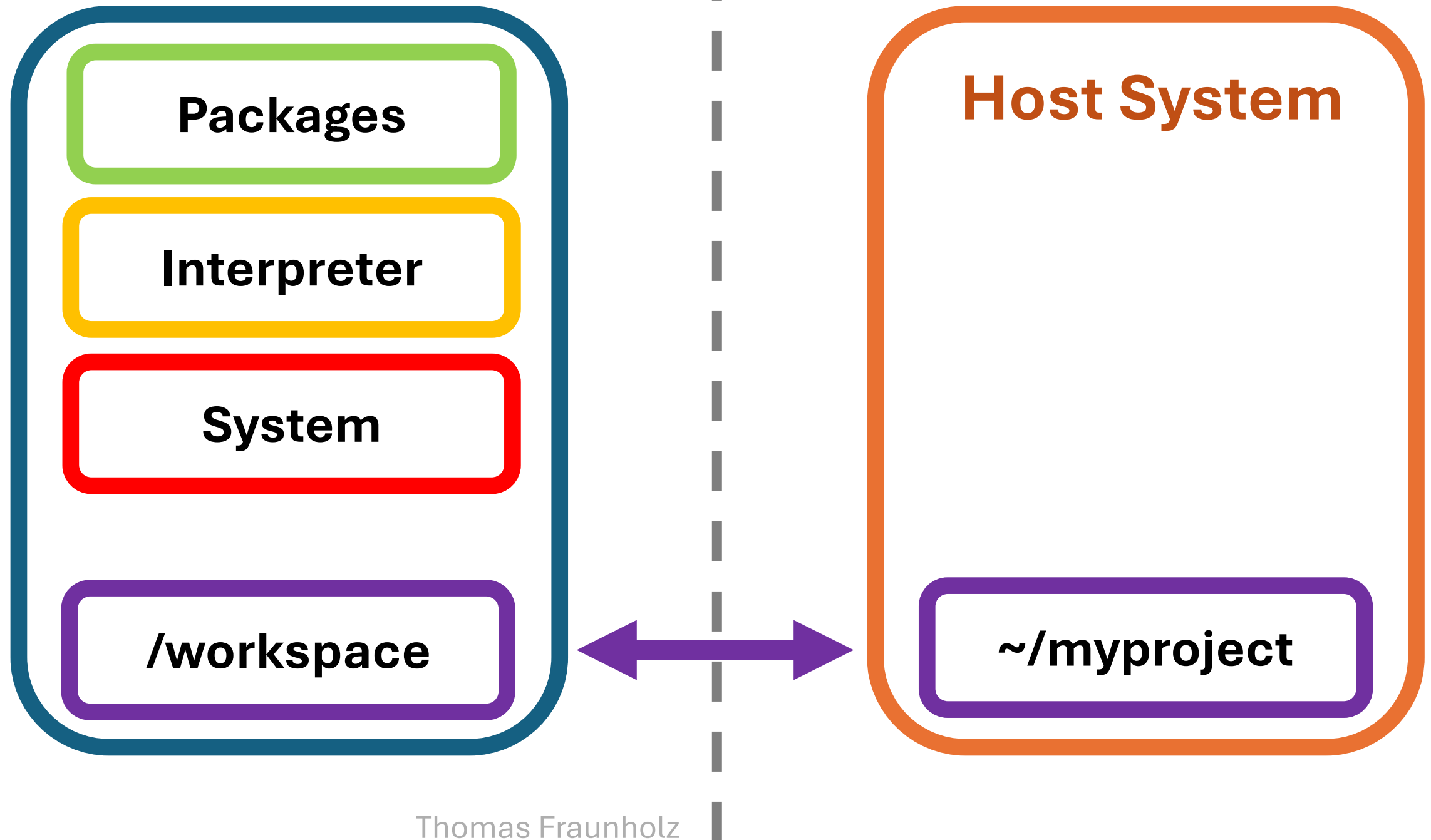
Packages

Interpreter

System

```console
~/myproject$ pip freeze >  \
requirements.txt
```

~/myproject/Dockerfile

```dockerfile
FROM python:3.11-bullseye
COPY . .
RUN pip install -r requirements.txt
CMD ["uvicorn", "main:app"]
```

```console
~/myproject$ docker build -t my-image .
~/myproject$ docker run my-image
```

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Interpreter

System

/workspace ↔ ~/myproject

Host System

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System

/workspace

```console
~/myproject$ docker run -it \
              --mount .:/worksapce \
              --workdir /workspace \
              python:3.11-bullseye bash
/workspace# pip install -r requirements.txt

/workspace# uvicorn main:app
```

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System

/workspace

```console
~/myproject$ docker run -it \
              --mount .:/worksapce \
              --workdir /workspace \
              python:3.11-bullseye bash
/workspace# pip install -r requirements.txt

/workspace# uvicorn main:app
```

🥳

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System

/workspace

```
~/myproject/.devcontainer.json

{
    "name": "PyConDevContainer",

    "image": "python:3.11-bullseye",

    "postCreateCommand":
        "pip install -r requirements",
}
```

Development Containers

An open specification for enriching containers with development specific content and settings.

☆ Star 2,783

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Interpreter
System
/workspace

~/myproject/.devcontainer.json

```json
{
    "name": "PyConDevContainer",

    "image": "python:3.11-bullseye",

    "postCreateCommand":
        "pip install -r requirements",
}
```

ⓘ Folder contains a Dev Container configuration file. Reopen ⚙ ✕
folder to develop in a container (learn more).

Source: Dev Containers   Reopen in Container   Don't Show Again...

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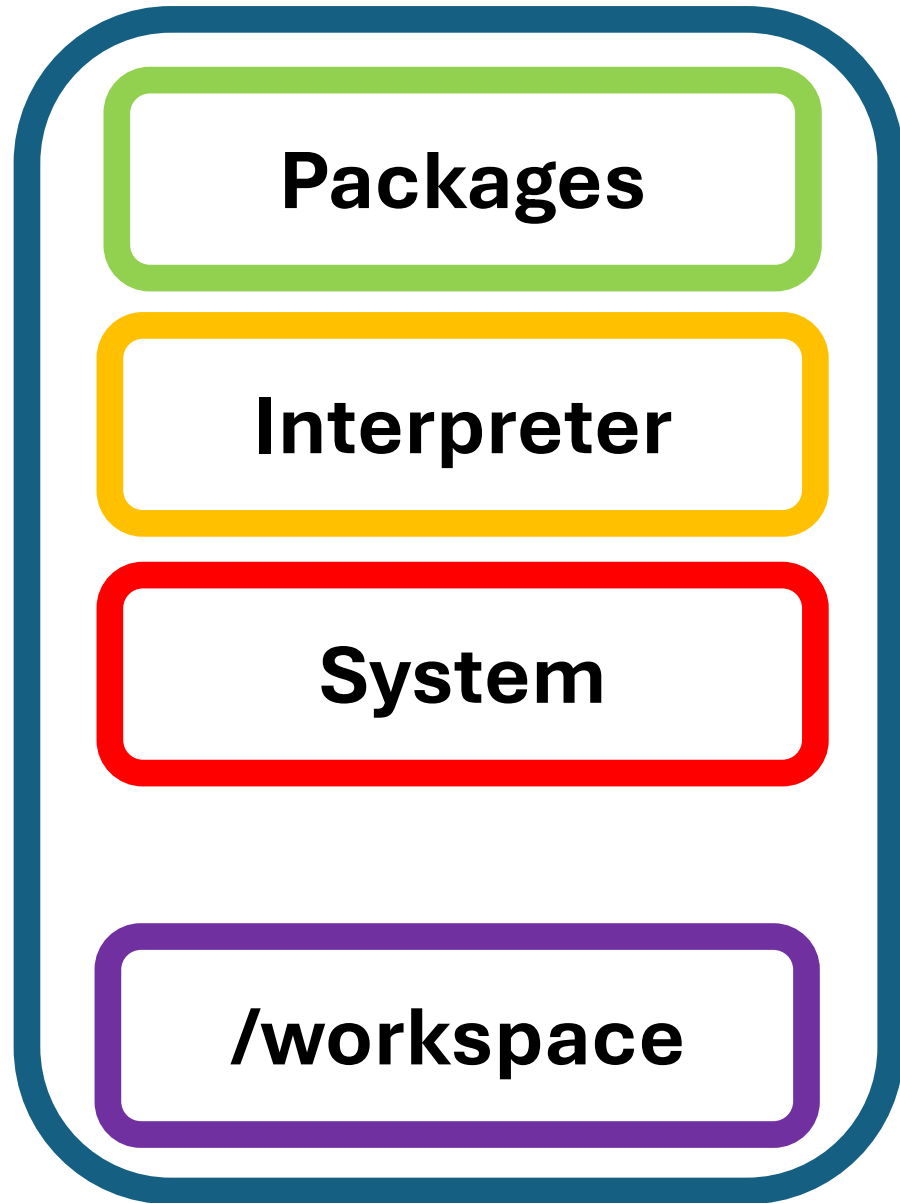|	
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Interpreter	
System	
/workspace	

~/myproject/.devcontainer.json

```json
{
    "name": "PyConDevContainer",

    "image": "python:3.11-bullseye",

    "postCreateCommand":
        "pip install -r requirements",

    "runArgs": ["--env-file",".env"]
}
```
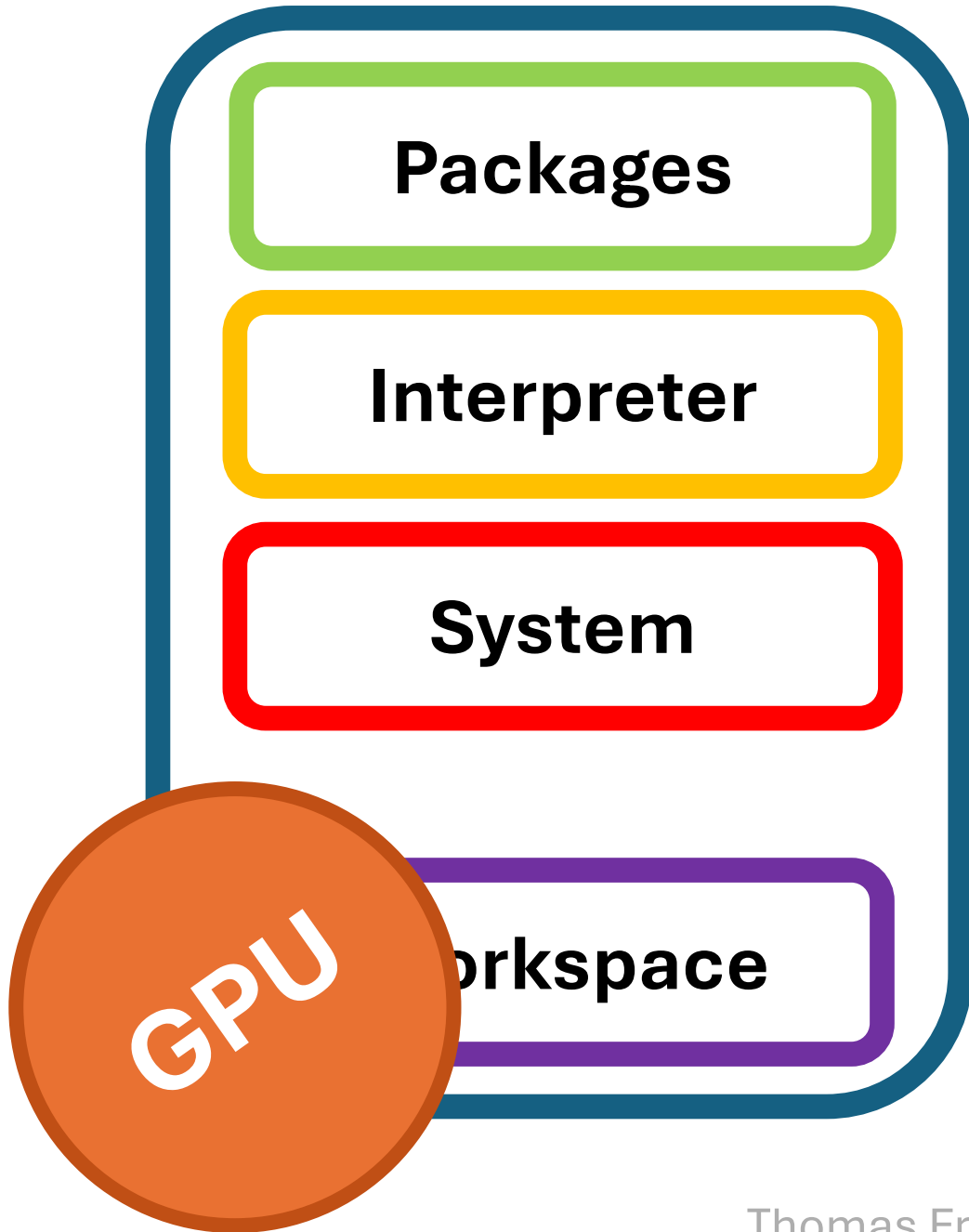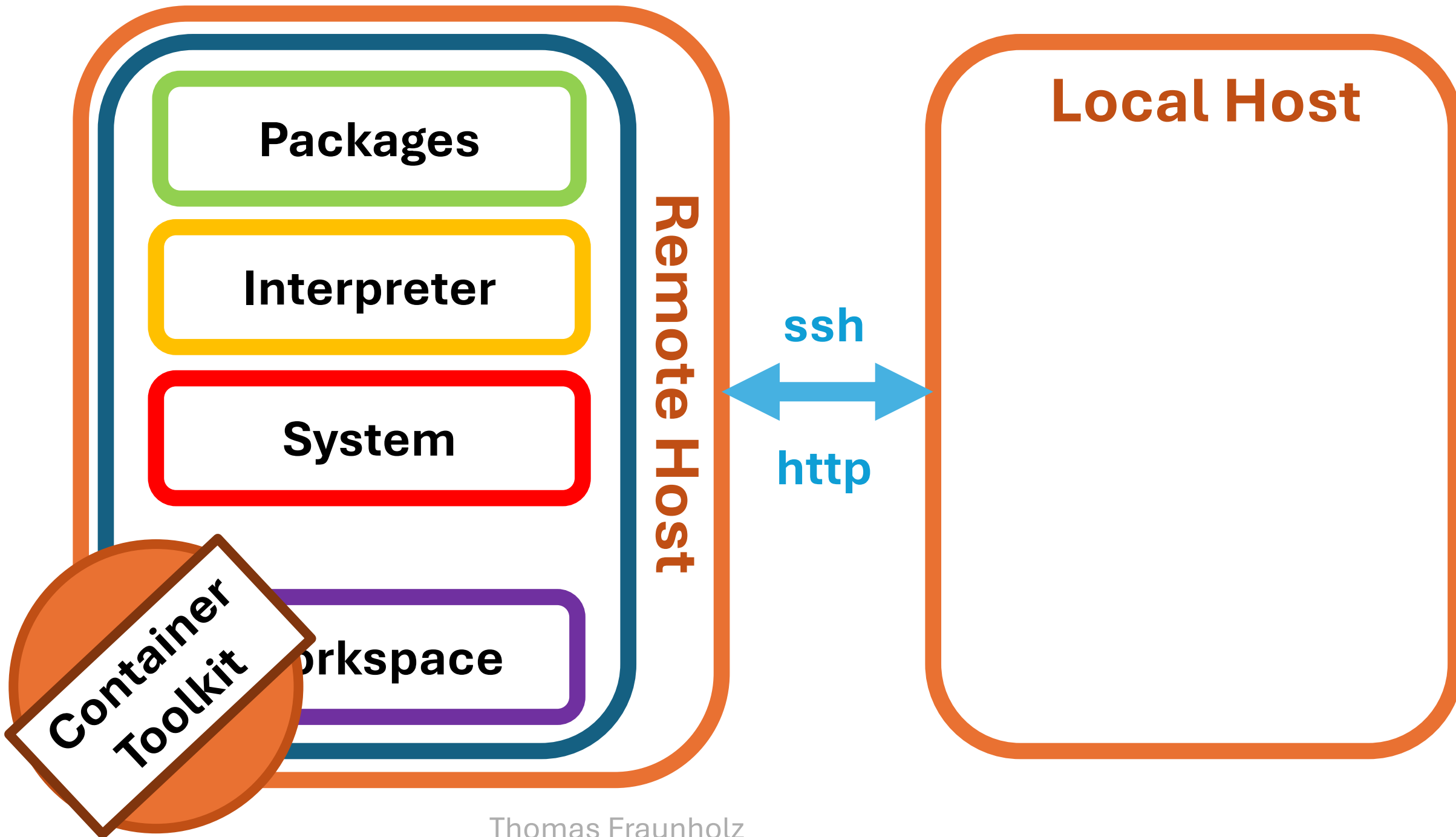
.env

```
API_KEY=123456
```

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System

/workspace

Why should I use DevContainers?

- **Reproduction**
- **Documentation**
- **Security**
- **Remote Computing**

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Packages

Interpreter

System

GPU

orkspace

Why should I use DevContainers?

- **Reproduction**

- **Documentation**

- **Security**

- **Remote Computing**

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Packages

Interpreter

System

Remote Host

Workspace

Container Toolkit

ssh

http

Local Host

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Interpreter

System

Workspace

Container Toolkit

~/myproject/Dockerfile

```
FROM nvidia/cuda:11.7.1-base-ubuntu22.04
RUN apt install -y python3 python3-pip
```

~/myproject/.devcontainer.json

```json
{
    "name": "PyConGPUDevContainer",

    "build": {
        "dockerfile": "Dockerfile",
        "context": "."
    },

    "postCreateCommand":
        "pip install -r requirements",

    "runArgs": ["--gpus","all",
                "--shm-size=1gb"]
}
```

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Interpreter

System

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Container Toolkit

~/myproject/Dockerfile

```
FROM nvidia/cuda:11.7.1-base-ubuntu22.04
RUN apt install -y python3 python3-pip
```

~/myproject/.devcontainer.json

```
{
    "name": "PyConGPUDevContainer",

    "build": {
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        "context": "."
    },

              teCommand":
                           irements",
    pip                    rements",

    "runArgs": ["--gpus","all",
                "--shm-size=1gb"]
}
```

pip3 install torch --index-url https://download.pytorch.org/whl/cu118

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System

...rkspace

Container Toolkit

~/myproject/Docker...

```dockerfile
FROM nvidia/cuda:11...
RUN apt install -y...
```
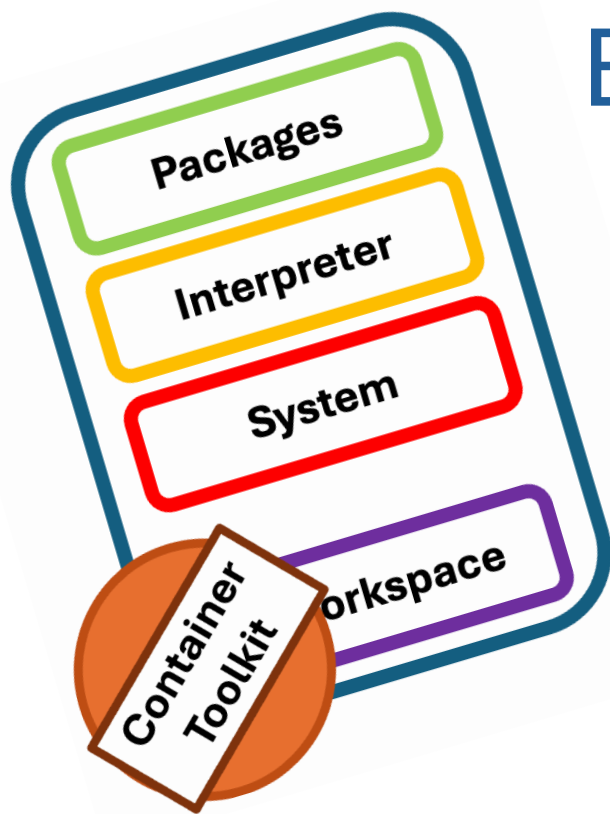
11:40 AM 30min

How to Improve the Python Development Experience for Millions of Ubuntu Users

Jürgen Gmach

PyCon: Python Language & Ec...

~/myproject/.devcont...

```json
{
    "name": "PyConGPUDevContainer",

    "build": {
        "dockerfile": "Dockerfile",
        "context": "."
    },

        ...teCommand":
        pip ...        irements",

    "runArgs": ["--gpus","all",
                "--shm-size=1gb"]
}
```

`pip3 install torch --index-url https://download.pytorch.org/whl/cu118`

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