Mountain Rocky Linux Apptainer Warewulf Fuzzball Ascender

Fuzzball for portable, reproducible workflows

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CIQ supported tools

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Rocky Linux

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Ascender

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Mountain

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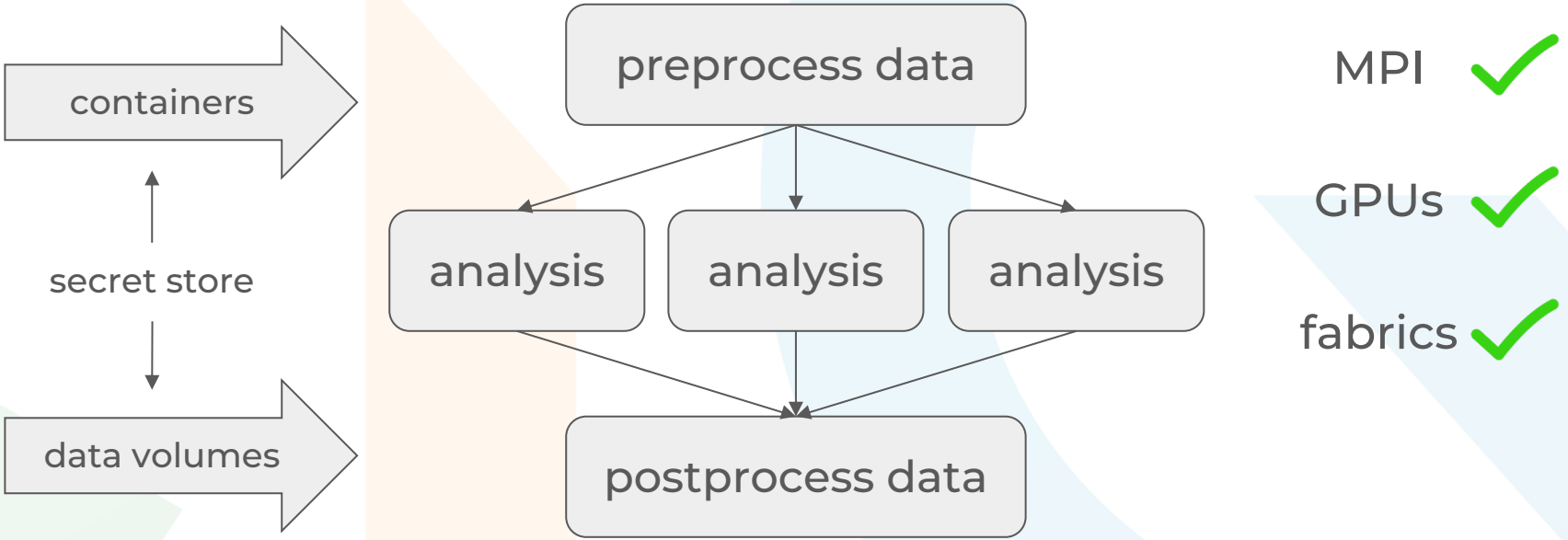
Fuzzball

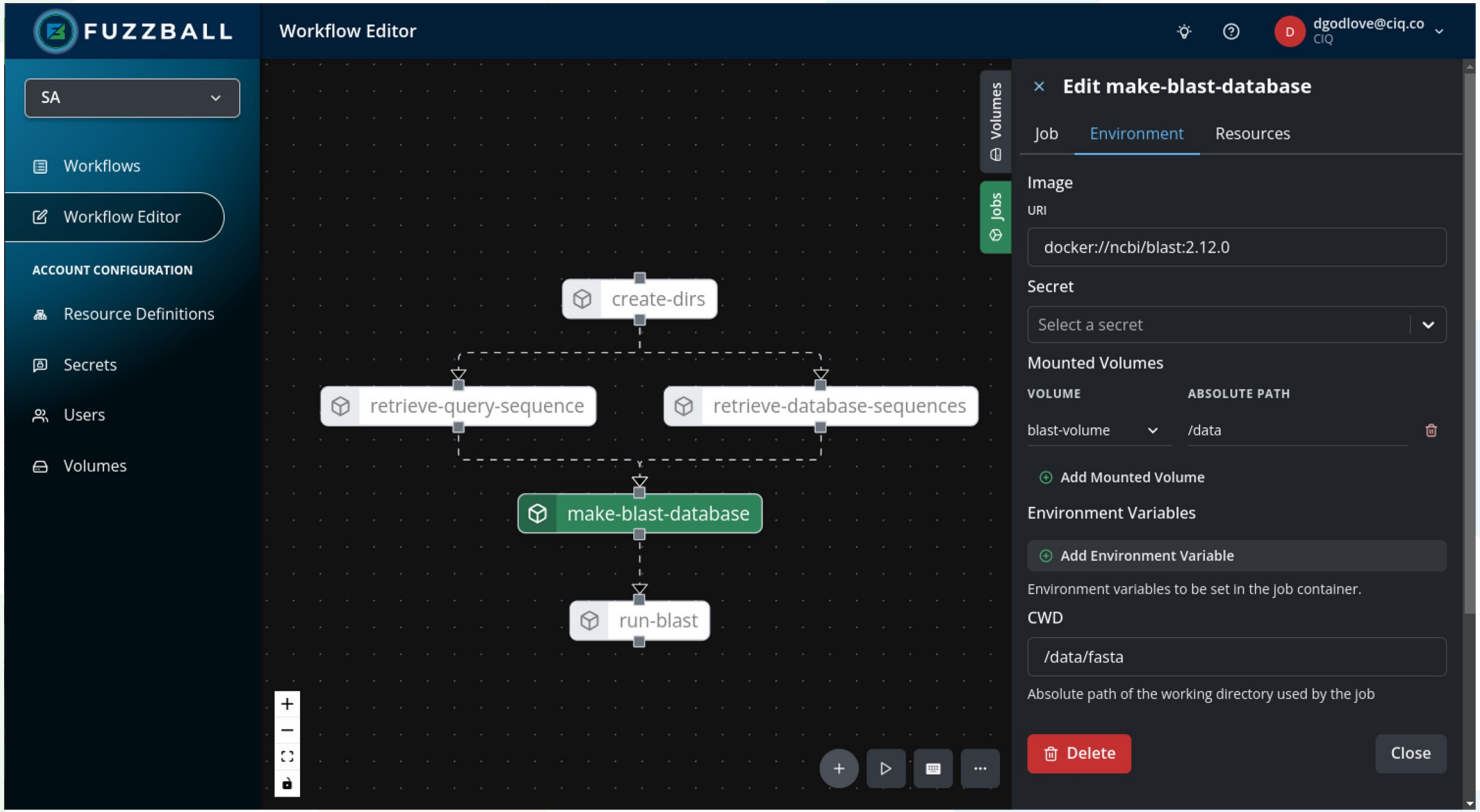
Fuzzball workflows



Fuzzball is a Modern and Container-Based Solution

- container orchestration for *jobs*
- jobs run in a lightweight container runtime (called *Substrate*) with virtually no overhead
- approach blends the best aspects of *cloud*, *enterprise*, and *HPC* providing a solution for all 3

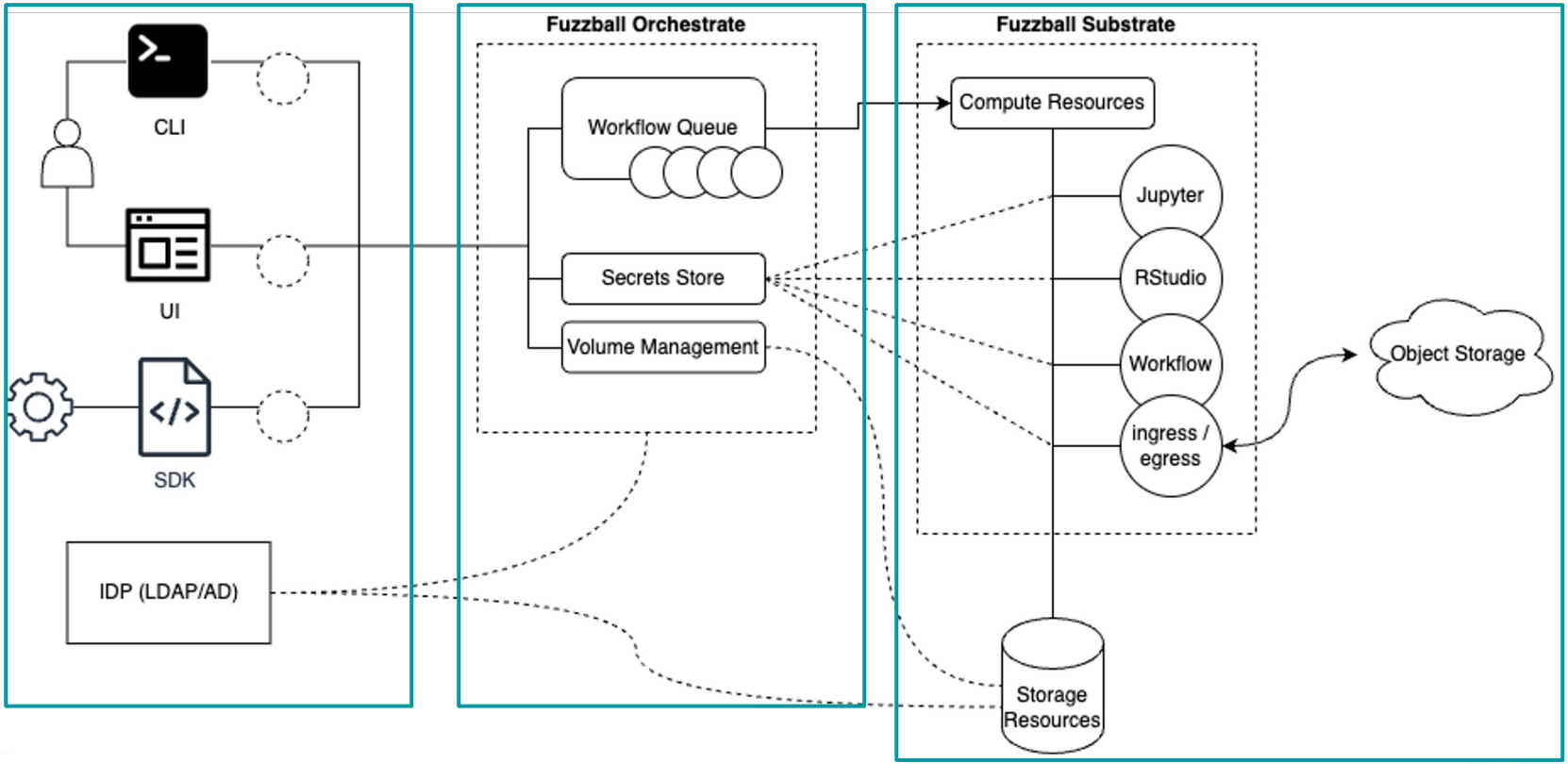
Fuzzball is API driven with a clean web GUI and CLI



Fuzzball Allows Each User to Focus on their Specialty

- no need to open a terminal and `ssh` into a login node
- can forget about using `scp`, `rsync`, etc to move data
- permissions and file ownership no longer an issue
- can simply use containers instead of worrying about installing software
- also eliminates administrative tasks like user management and software installation

Fuzzball Architecture



Fuzzball: Proven Use Cases

GenAI / Tech

- *Meta's Llama 2/3 (LLM), Stable Diffusion (image gen), GPT-like models (LLMs)*
- *Training/inference with major AI frameworks*
  - PyTorch
  - Tensorflow
  - JAX-based models
  - Hyperparameter tuning with W&B
- *Interactive Jupyter notebooks*
- *Salmon and similar Python-based bioscience tools*
- *Specialized Use Cases*
  - GasNET/Chapel language support
  - Exascale Computing Project apps
  - Remote GPU profiling via NVIDIA tools
  - Satellite signal processing submitted via Fuzzball SDK
  - VNCs into programming language debuggers/interfaces like R

Industry Examples

- *Life Sciences / Pharma*
  - GROMACS (drug discovery)
  - LAMMPS (drug discovery, NL nuclear apps)
  - STAR genomic alignment (genomics)
- *Simulation / Manufacturing*
  - MATLAB
  - Ansys tools
  - Altair OpenRadioss (FEM, structural simulation, etc.)
  - WRF (weather simulation for public power utilities)
  - OpenFOAM w/ Paraview visualization (CFD, aerodynamics, fluid flow)
  - QMCPACK (quantum dynamics)
  - Quantum ESPRESSO (quantum dynamics)
  - Arkouda - Exploratory Data Analysis

THANK YOU

Mountain

Rocky Linux

Apptainer

Warewulf

Fuzzball

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