

The background features a series of undulating, particle-based waves in shades of green and gold against a dark background. The particles are densely packed and create a shimmering, textured effect.

**CIQ**

## **Fuzzball: New Features and What's Next**

Jonathon Anderson | HPC Product Engineer

# CIQ software ecosystem

## Solutions



### Fuzzball

Build and deploy AI workloads  
with ease & efficiency

ORCHESTRATION



### Warewolf Pro

Turnkey, stateless provisioning,  
built for massive scale

ORCHESTRATION



### Ascender Pro

Downstream, enterprise-ready  
Ansible AWX

AUTOMATION

## Infrastructure



### RLC Pro

Rocky Linux with security  
enhancements

LINUX OS



### RLC Pro | Hardened

Rocky Linux with security  
enhancements

LINUX OS



### RLC Pro | AI

Rocky Linux with  
AI optimization

LINUX OS

# The CIQ software ecosystem is *built on open source*

## Infrastructure



Rocky Linux  
from CIQ



RLC-H



RLC-AI



Rocky Linux™

## Automation



Ascender  
Pro



Ascender



Ansible AWX

## Orchestration



Warewulf  
Pro



Warewulf



Fuzzball

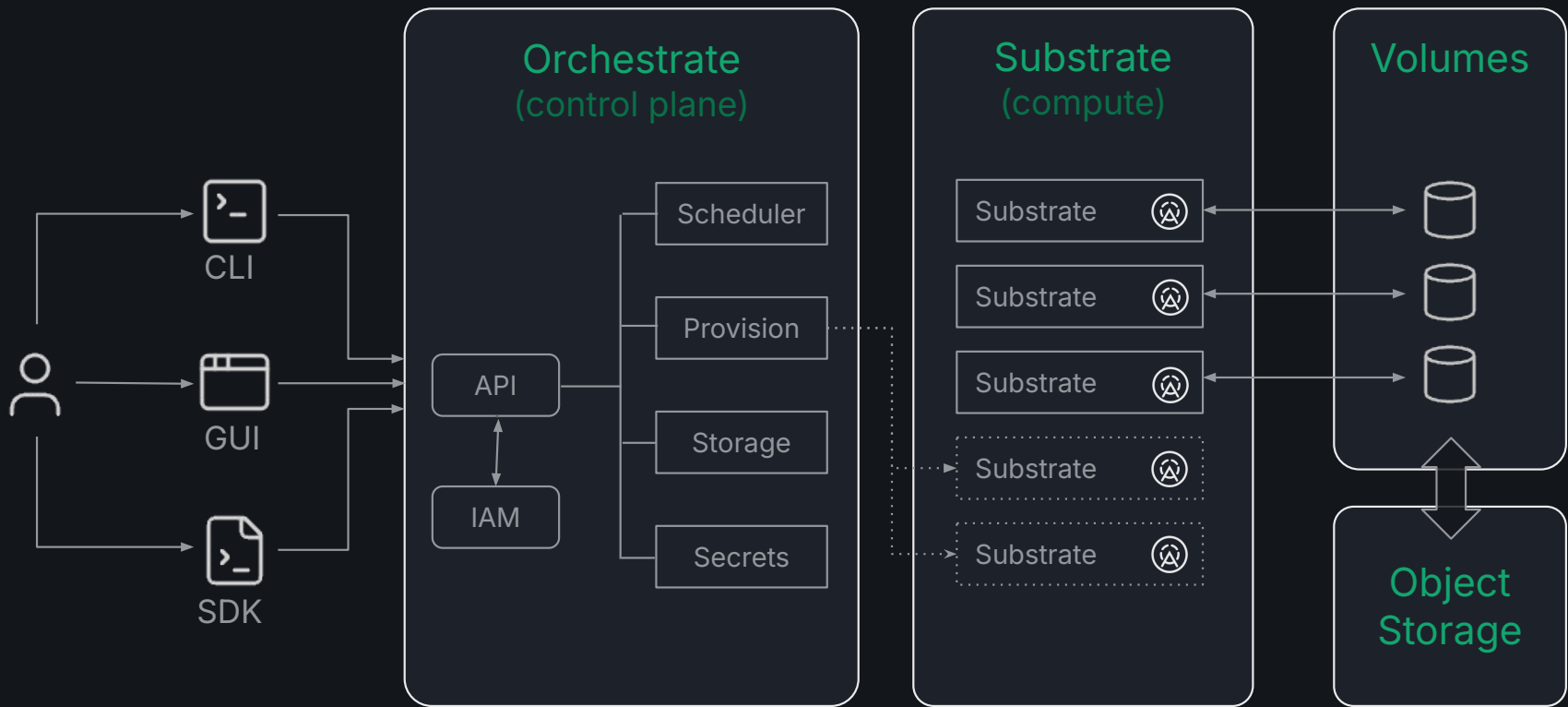


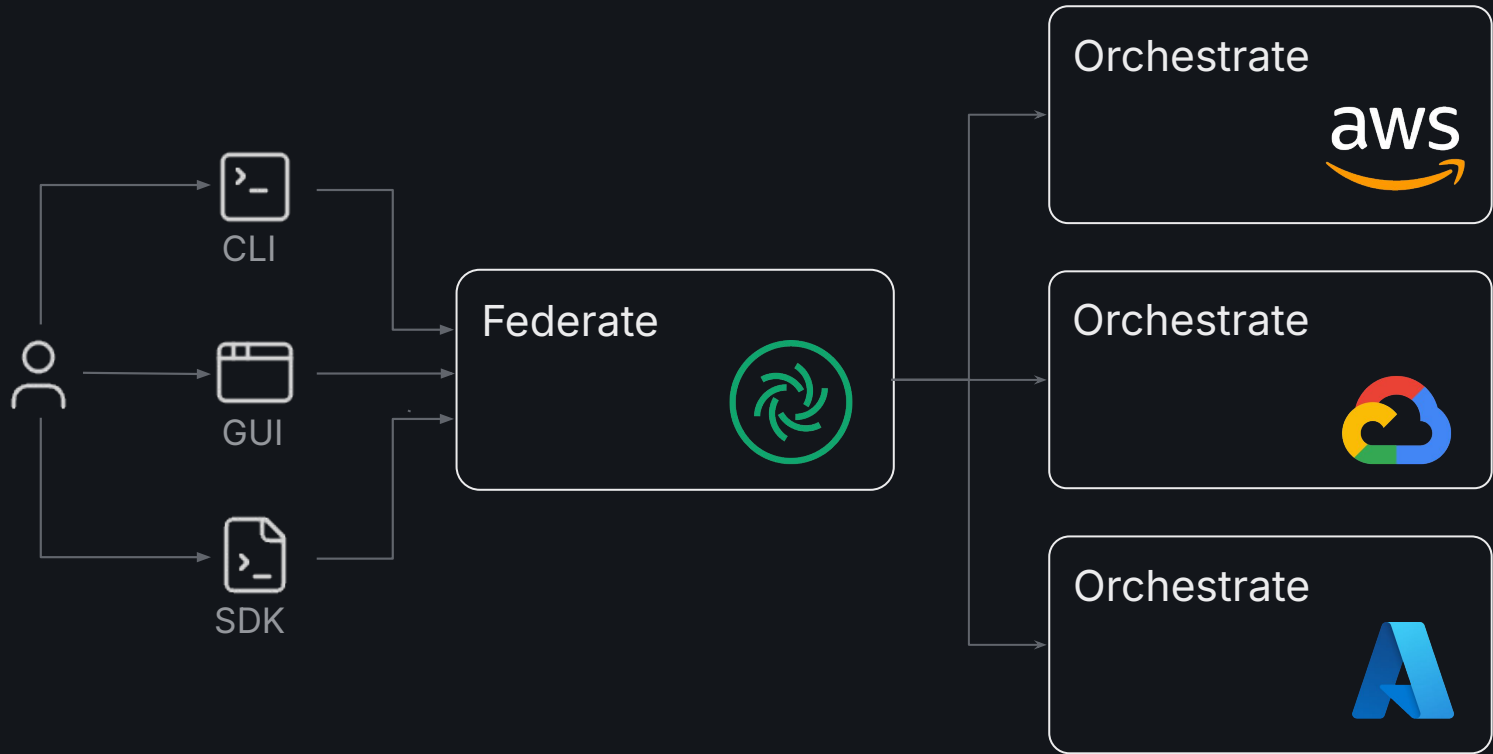
Apptainer



# Fuzzball

Moving past "serial number 1"







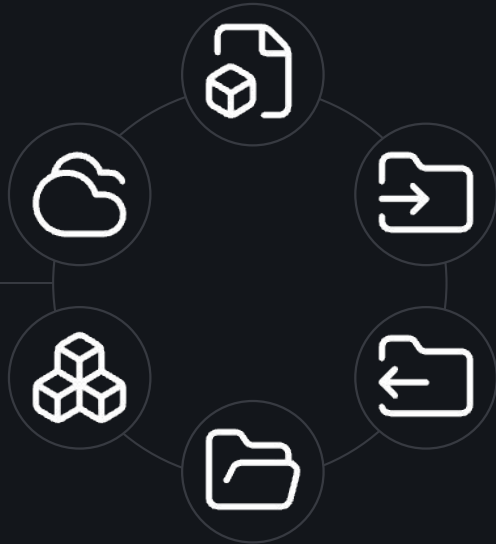
Fuzzball

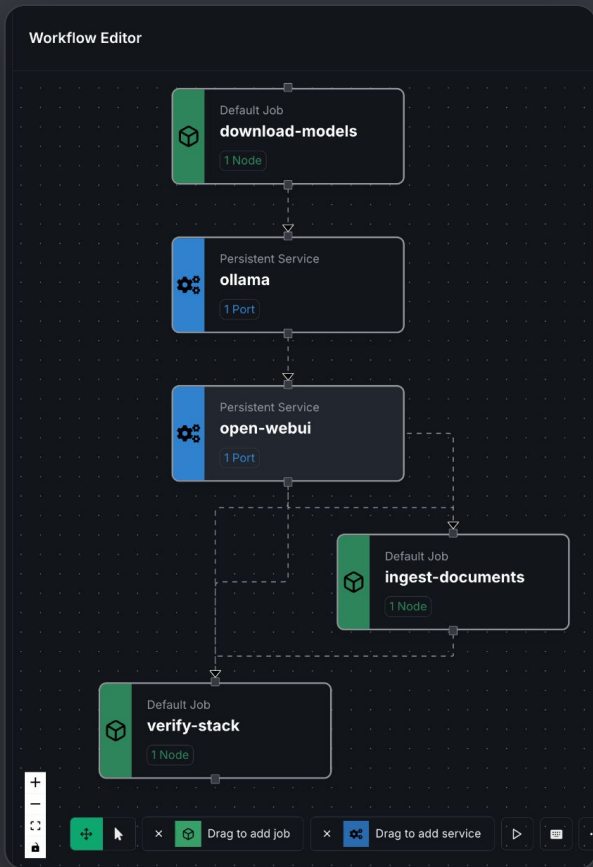


Google Cloud



CoreWeave





```

volumes:
  data:
    reference: volume://user/persistent
  docs-to-ingest:
    reference: volume://user/ephemeral
  ingress:
    - destination:
        uri: file://example.com
      source:
        uri: http://example.com
  
```

```

jobs:
  download-models:
    image:
      uri: docker://ollama/ollama:0.15.0
    env:
      - OLLAMA_HOST=0.0.0.0:11434
      - OLLAMA_MODELS=/data/ollama
  
```

```

mounts:
  data:
    location: /data
  
```

```

script: |
  #!/bin/bash
  set -e
  
```

```

echo "Downloading Ollama Models"
  
```

[ . . . ]

**Fuzzball** Workflows

Rows per page: 20 100 Page 1

Only my workflows 1 status selected

Workflow Catalog

Workflows

Workflow Editor

Group Configuration

Definitions

Secrets

Users

Volumes

Nodes

Engineering

ID	Actions
3041e715-5a78-452a-a8a5-bb72f6793c98	[User] [Folder] [Refresh]
a19efd3b-de61-4f85-a305-54345eca3a76	[User] [Folder] [Refresh]
5c3a890d-788d-4dcd-bf53-d3df94ceb05b	[User] [Folder] [Refresh]
54b81c1e-02c8-428d-885e-d8caec7c136a	[User] [Folder] [Refresh]
14abf4da-a168-4fa3-9440-0e3f1ed5137d	[User] [Folder] [Refresh]
0165d644-ac9e-4b5e-ae54-f1ea0dd00211	[User] [Folder] [Refresh]
4189003d-b6e3-4884-a2a3-2a61ab0dda75	[User] [Folder] [Refresh]
d2b4aaf5-5586-4667-8e12-b6191e8eb09f	[User] [Folder] [Refresh]
7a19cec5-543f-4cdf-b545-dad367ed24f8	[User] [Folder] [Refresh]
7b49095f-9e55-4c56-b6e8-a9afae13a0e2	[User] [Folder] [Refresh]
b143657a-4530-4a40-9197-ef988d7b9c00	[User] [Folder] [Refresh]
8b175bc8-c8e6-4c5c-bf14-9651195ffa66	[User] [Folder] [Refresh]

**Fuzzball** Workflow Editor

Workflow Catalog

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```

graph TD
    A[download-models] --> B[ollama]
    B --> C[open-webui]
    C --> D[ingest-documents]
    D --> E[verify-stack]
  
```

**Edit open-webui**

Service Environment Resources

Name: open-webui

Dependencies: Jobs or services that must reach specific states before this service may be started.

Depends On: ollama (service)

Wait Until: [Dropdown]

The status the dependency must reach before this can start  
Description (optional): Open WebUI requires Ollama for inference and embeddings

Add Dependency

Script: #!/bin/sh  
set -e  
mkdir -p /data/open-webui

Args: Add Arg

Persist: Keep service running even when all jobs are completed

Network Ports: NAME PORT PROTOCOL

```
fuzzball --zsh --80x24
janderson@galabook fuzzball % fuzzball context login
Logging into current cluster context...
Using a secure browser, open the link to complete login:
https://auth.integration.fuzzball.ciq.dev/auth/realms/e700253c-8ce8-4e36-a420-1e4cab4cb7ef/d
```

```
fuzzball --zsh --107x24
janderson@galabook fuzzball % fuzzball workflow describe b60f36bf-05f2-4f13-b462-46859b4c666f
Name:      run
Email:     janderson@ciq.com
UserId:    0b825c4f-a699-455e-8c5e-dfe08fc25db6
Status:    STAGE_STATUS_FINISHED
Cluster:   fuzzball-aws-integration
Created:   2026-02-19 04:00:29PM
Started:   2026-02-19 04:03:40PM
Finished:  2026-02-19 04:03:41PM
Error:

Stages:

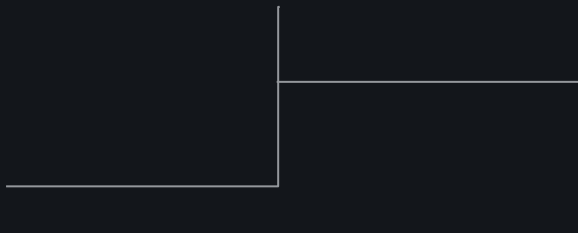

| KIND     | STATUS   | NAME                                 | STARTED               | FINISHED              |
|----------|----------|--------------------------------------|-----------------------|-----------------------|
| Workflow | Finished | b60f36bf-05f2-4f13-b462-46859b4c666f | 2026-02-19 04:03:40PM | 2026-02-19 04:03:41PM |
| Image    | Finished | docker://docker.io/alpine:latest     | 2026-02-19 04:03:40PM | 2026-02-19 04:03:40PM |
| Job      | Finished | run                                  | 2026-02-19 04:03:40PM | 2026-02-19 04:03:41PM |


janderson@galabook fuzzball %
```



Fuzzball

gRPC



OPENAPI  
INITIATIVE

# New features in v3



Fuzzball





Fuzzball



```
janderson@galabook fuzzball % fuzzball cluster docker-compose deploy --up
```

### INFO Deployment Configuration

```
Domain: fb.local  
Registry User (leave empty to skip registry login):  
Organization Name: fuzzball  
Database Name: fuzzball  
Database User: postgres  
Database Password (leave blank to auto-generate):  
Keycloak Admin: admin  
Keycloak Password (leave blank to auto-generate):  
Owner Email: admin@fb.local  
Owner Password (leave blank to auto-generate):
```

```
SUCCESS Deployment 'default' configured successfully.
```

```
INFO Add the following host entries to /etc/hosts:
```

```
echo '127.0.0.1 ui.fb.local api.fb.local keycloak.fb.local endpoints.fb.local  
nats.fb.local' | sudo tee -a /etc/hosts
```

```
INFO Starting the stack...
```

```
[+] up 13/14  
✓ Image depot.ciq.com/fuzzball/fuzzball-images/fuzzball-substra... Pulled 0.6s  
✓ Image depot.ciq.com/fuzzball/fuzzball-images/fuzzball-orchest... Pulled 0.6s  
✓ Network default_fuzzball Created 0.0s  
✓ Volume default_substrate-shared-fs Created 0.0s  
✓ Volume default_substrate-configs Created 0.0s  
✓ Volume default_postgres-data Created 0.0s  
✓ Volume default_fuzzball-local Created 0.0s  
✓ Volume default_jetstream-data Created 0.0s  
⋮ Container default-postgres-1 Waiting 1.9s  
✓ Container default-keycloak-1 Created 0.0s  
✓ Container default-fuzzball-orchestrate-1 Created 0.0s  
✓ Container default-nginx-1 Created 0.1s  
✓ Container default-substrate-localnode-1-1 Created 0.1s  
✓ Container default-substrate-localnode-2-1 Created 0.1s
```



Workflows

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Engineering

+ CREATE TEMPLATE

↑ UPLOAD TEMPLATE

Search workflows by name...

Featured Workflows

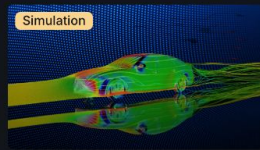


AlphaFold2

AI-powered protein structure prediction tool for both monomers and multimers. AlphaFold2 uses deep learning to predict highly ...

CIQ

▶ RUN



Ansys Fluent Example

An example application template executing a simulation using the Ansys Fluent simulation software.

CIQ

▶ RUN



Ansys LS-DYNA Example

An example application template executing a simple internal 3D flow simulation using ANSYS LS-DYNA.

CIQ

▶ RUN



BLAST

The BLAST example workflow provides a Fuzzball template to retrieve query sequences and either:

...

CIQ

▶ RUN

Page 1

MORE WORKFLOWS

**AE** Ansys CFX Example  
 An example application template executing a simulation using the Ansys CFX ...  
 CIQ

**A(** Ansys CFX (VDI)  
 An application template providing access to the Ansys CFX simulation software in a...  
 CIQ

**A(** Ansys Fluent (VDI)  
 An application template providing access to the Ansys Fluent simulation software in...  
 CIQ

**A(** ANSYS LS-DYNA (VDI)  
 An application template providing access to the Ansys LS-DYNA simulation softwar...  
 CIQ

Ansys Mechanical Example

Bases2Fasto

Boltz-2 virtual affinity screen of a...

BWA Alignment

**Fuzzball Workflow Editor**

Workflow Catalog

- Workflow Editor

Group Configuration

- Definitions
- Secrets
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- Volumes
- Nodes

Workflow Diagram:

```

    graph TD
      A[Multinode Job: snappy-hex-mesh] --> B[Multinode Job: topset]
      B --> C[Default Job: set-initial-conditions]
      C --> D[Multinode Job]
  
```

**Edit snappy-hex-mesh**

Job Environment Resources

Name: snappy-hex-mesh

Dependencies

Depends On: preprocess-model (job)

Wait Until: Finished

Advanced Exec

```

/bin/bash
-c
source /usr/lib/openfoam/openfoam2412/etc/bashrc;
  
```

Policy

Timeout Duration: e.g. 2m

Retry Attempts

- UNear
- k
- nut
- omega
- p
- U
- UNear
- k
- nut

**ParaView 6.0.1**

Time: 500 | max is 5

Surface

RenderView1

MultiBlock Inspector

vtkMultiBlockDataSet

- internal
- boundary
  - frontAndBack
  - inlet
  - outlet
  - lowerWall
  - upperWall
  - motorBike\_frt-fairing:001%1
  - motorBike\_windshield:002%2
  - motorBike\_rr-wh-rim:005%5
  - motorBike\_fr-wh-rim:010%10
  - motorBike\_fr-wh-rim:011%11
  - motorBike\_fr-wh-brake-disk:012%12
  - motorBike\_frame:016-shadow%13
  - motorBike\_rear-susp:014%14
  - motorBike\_frame:016%16
  - motorBike\_rear-susp:014-shadow%15
  - motorBike\_fr-wh-rim:005-shadow%17
  - motorBike\_fr-wh-chain-hub:022%22
  - motorBike\_rearseat%24

Block Coloring: Solid Color

paraview: 2.5 GiB/91.9 GiB 2.7%

**Fuzzball** Workflow Editor

Workflows

- Workflow Catalog
- Workflows
- Workflow Editor**

Group Configuration

- Definitions
- Secrets
- Users
- Volumes
- Nodes

Engineering

Workflow Editor Canvas:

- download-models** (Default Job, 1 Node)
- ollama** (Persistent Service, 1 Port)
- open-webui** (Persistent Service, 1 Port)
- ingest-documents** (Default Job, 1 Node)
- verify-stack** (Default Job, 1 Node)

Workflow Flow:

```

graph TD
    download-models --> ollama
    ollama --> open-webui
    open-webui --> ingest-documents
    ingest-documents --> verify-stack
  
```

Bottom Bar:

- Drag to add job
- Drag to add service
- Play button
- Help icon
- More options icon

b-instruct-q4\_K\_M +

**llama3.1:8b-instruct-q4\_K\_M**

How can I help you today?

+ 🔊

👉 Suggested

- Tell me a fun fact**  
about the Roman Empire
- Give me ideas**  
for what to do with my kids' art
- Show me a code snippet**  
of a website's sticky header

Workflows

Workflow Catalog

Workflows

Workflow Editor

Group Configuration

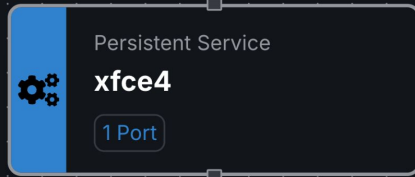
Definitions

Secrets

Users

Volumes

Nodes



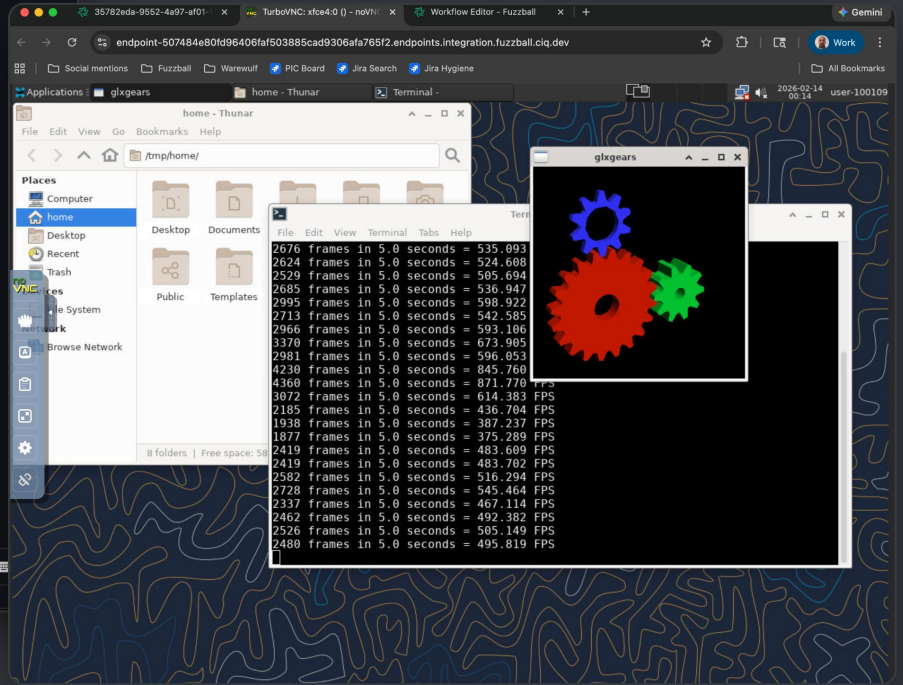
Engineering



Drag to add job



Drag to add service



**Fuzzball** Workflow Editor

Workflows

- Workflow Catalog
- Workflows
- Workflow Editor**

Group Configuration

- Definitions
- Secrets
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- Volumes
- Nodes

Engineering

Persistent Service

**jupyter**

1 Port

Drag to add job

Drag to add service

JupyterLab

endpoints.stable.fuzzball.ciq.dev/endpoints/accounts/b95f6f1b-1c70-491f-b83c-24eb89382f29/...

File Edit View Run Kernel Git Tabs Settings Help

Launcher

Notebook

Python 3 (ipykernel)

Console

Python 3 (ipykernel)

Other

Terminal

Text File

Markdown File

Python File

Show Contextual Help

Name	Modified
benchmark_resul...	6h ago
blobs	3d ago
cache	3d ago
datasets	6h ago
hub	19h ago
manifests	3d ago
models	19h ago
ollama	6h ago
open-webui	22m ago
uploads	3d ago
vector_db	yesterday
xet	20h ago
webui.db	yesterday

Simple 0 Launcher 1

Workflows

Workflow Catalog

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Workflows

WORKFLOW OVERVIEW 2m 53s

**jupyter\_service**

3 minutes ago

admin@ciq.com

---

PULL IMAGE 589ms

docker://alpine:latest

---

PULL IMAGE 314ms

docker://quay.io/jupyter/scipy-notebook:latest

---

PERSISTENT SERVICE 2m 52s

**jupyter**

docker://quay.io/jupyter/scipy-notebook:latest

---

SERVICE 46s

**jupyter2**

docker://quay.io/jupyter/scipy-notebook:latest

---

RUN JOB 31s

**test-jupyter-services**

docker://alpine:latest

Details Fuzzfile Events

Cancel Rerun Open in Workflow Editor

Time	Job	Event
2/17/2026, 3:06:56 PM	test-jupyter-services	Waiting on dependency: test-jupyter-services-image
2/17/2026, 3:06:56 PM	test-jupyter-services	Waiting on dependency: jupyter
2/17/2026, 3:06:56 PM	test-jupyter-services	Waiting on dependency: jupyter2
2/17/2026, 3:06:56 PM	SERVICE jupyter2	Waiting on dependency: jupyter-image
2/17/2026, 3:06:56 PM	SERVICE jupyter	Waiting on dependency: jupyter-image
2/17/2026, 3:06:56 PM	IMAGE docker://quay.io/jupyter/scipy-notebook:latest	Resources allocated on node: 172.20.0.5/7334
2/17/2026, 3:06:56 PM	IMAGE docker://quay.io/jupyter/scipy-notebook:latest	Stage started: jupyter-image
2/17/2026, 3:06:56 PM	IMAGE docker://quay.io/jupyter/scipy-notebook:latest	Pulling image: docker://quay.io/jupyter/scipy-notebook:latest
2/17/2026, 3:06:56 PM	IMAGE docker://alpine:latest	Resources allocated on node: 172.20.0.5/7334
2/17/2026, 3:06:56 PM	IMAGE docker://alpine:latest	Stage started: test-jupyter-services-image
2/17/2026, 3:06:56 PM	IMAGE docker://alpine:latest	Pulling image: docker://alpine:latest
2/17/2026, 3:06:57 PM	IMAGE docker://quay.io/jupyter/scipy-notebook:latest	Image pull complete: 1.2 GB, 304ms
2/17/2026, 3:06:57 PM	IMAGE docker://quay.io/jupyter/scipy-notebook:latest	Stage finished: jupyter-image
2/17/2026, 3:06:57 PM	SERVICE jupyter2	dependency_satisfied
2/17/2026, 3:06:57 PM	SERVICE jupyter	dependency_satisfied
2/17/2026, 3:06:57 PM	SERVICE jupyter2	Resources allocated on node: 172.20.0.6/7333
2/17/2026, 3:06:57 PM	SERVICE jupyter	Resources allocated on node: 172.20.0.6/7333
2/17/2026, 3:06:57 PM	SERVICE jupyter2	Stage started: jupyter2
2/17/2026, 3:06:57 PM	SERVICE jupyter2	Container started on node: 172.20.0.6/7333
2/17/2026, 3:06:57 PM	SERVICE jupyter	Stage started: jupyter
2/17/2026, 3:06:57 PM	SERVICE jupyter	Container started on node: 172.20.0.6/7333
2/17/2026, 3:06:57 PM	IMAGE docker://alpine:latest	Image pull complete: 4.1 MB, 582ms
2/17/2026, 3:06:57 PM	IMAGE docker://alpine:latest	Stage finished: test-jupyter-services-image
2/17/2026, 3:07:12 PM	SERVICE jupyter2	readiness_probe_passed
2/17/2026, 3:07:12 PM	SERVICE jupyter2	stage_ready
2/17/2026, 3:07:12 PM	SERVICE jupyter	readiness_probe_passed
2/17/2026, 3:07:12 PM	SERVICE jupyter	stage_ready
2/17/2026, 3:07:12 PM	JOB test-jupyter-services	dependency_satisfied
2/17/2026, 3:07:12 PM	JOB test-jupyter-services	Resources allocated on node: 172.20.0.5/7334
2/17/2026, 3:07:12 PM	JOB test-jupyter-services	Stage started: test-jupyter-services
2/17/2026, 3:07:12 PM	JOB test-jupyter-services	stage_ready
2/17/2026, 3:07:12 PM	JOB test-jupyter-services	Container started on node: 172.20.0.5/7334
2/17/2026, 3:07:43 PM	JOB test-jupyter-services	Container exited with code: 0
2/17/2026, 3:07:44 PM	JOB test-jupyter-services	Stage finished: test-jupyter-services
2/17/2026, 3:07:44 PM	SERVICE jupyter2	Container exited with code: N/A (service)
2/17/2026, 3:07:44 PM	SERVICE jupyter2	Stage finished: jupyter2

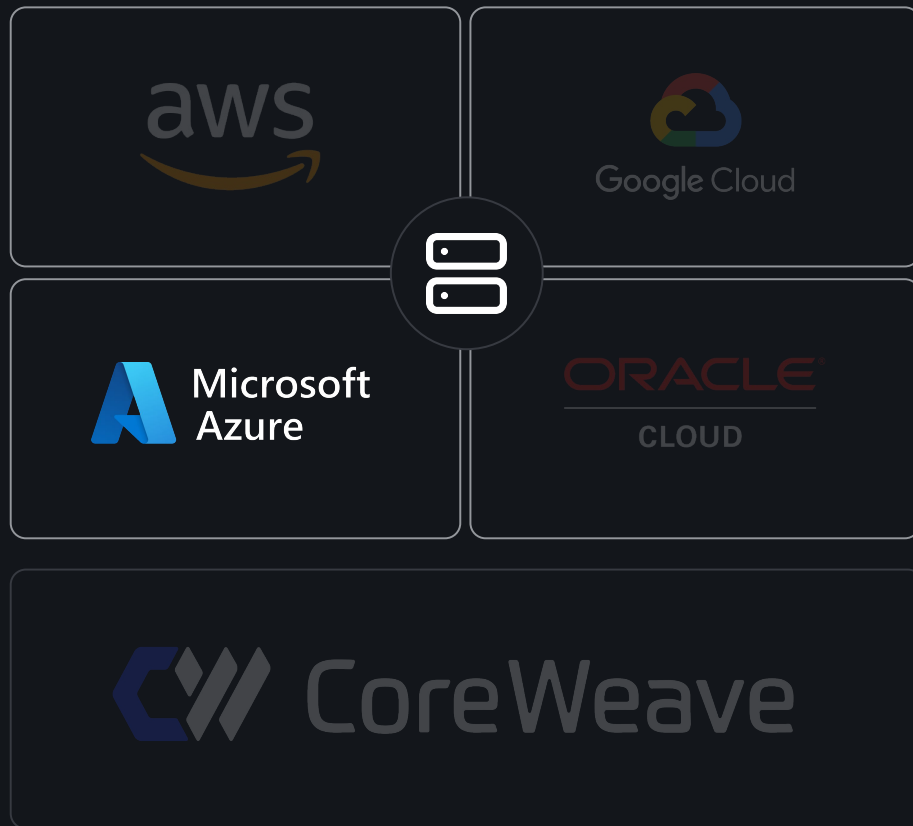
```
fuzzball — fuzzball run — 80x24
janderson@galabook fuzzball % fuzzball run
Workflow "621aab49-cea6-473e-8221-68464ebfd8ff" started.
Waiting for job to start...
(fuzzball:~)$ env | grep FB_
FB_JOB_NAME=shell
FB_ACCOUNT_ID=ca0b4f53-88c4-4a6b-ad36-d59efd0cc2d8
FB_JOB_KIND=single
FB_JOB_ID=calf407f-5439-570f-a52b-5a307c61ffb3
FB_JOB_IMAGE=uri:"docker://docker.io/alpine:latest"
FB_WORKFLOW_ID=621aab49-cea6-473e-8221-68464ebfd8ff
(fuzzball:~)$
```

```
fuzzball — -zsh — 87x8
janderson@galabook fuzzball % fuzzball run --image=docker://python --script=hello.py
Workflow "f53f15c6-bb30-4eb4-9c12-68f168bc4b22" started.
Waiting for job to start...
3.13.5 (main, Jun 25 2025, 18:55:22) [GCC 14.2.0]: Hello, world!
janderson@galabook fuzzball %
```

**coming soon**  
**(v4)**



# Fuzzball



Workflows > Jupyter Server run 01

Gregory Kurtzer  
olivia@untitledul.com

← Jupyter Server run 01

Infrastructure ready: 4 CPU 1 GPU 50GB storage

STATUS: Running 100% PROGRESS: 100% CREATED: 4/2/26 6:23 PM STARTED: 4/2/26 6:23 PM FINISHED: -- DURATION: 5m

CONNECTED CPU 4 32% MEM 16G 32% GPU 1 11% STO 50G 11%

COST \$0.03 (\$2.15/hr)

Output Files 18 files

NAME	MODIFIED	TYPE	LOCATION
stdout.log	4/2/26, 6:2	Log	/logs/
stderr.log	4/2/26, 6:2	Log	/logs/
simulation...	4/2/26, 6:2	NetCDF/out...	
metrics_s...	4/2/26, 6:2	JSON/out...	
report.html	4/2/26, 6:2	HTML/out...	
residuals...	4/2/26, 6:2	CSV /out...	
energy_ti...	4/2/26, 6:2	CSV /out...	

Workflow diagram: home (VOLUME) → pytorch-notebook (IMAGE) → jupyter (SERVICE)

(also an updated CLI)

Diffusion Image Generation

Default job  
Image Generation  
1 node

Ephemeral volume  
Generated Images  
10GB

```

Hey, what are we building?
> Make me a Fuzzball workflow.
That sounds like it could be a batch job or a long-running service. Which is it?
> batch job
Got it - what container image do you need?
> stable diffusion
I'll use the standard Stable Diffusion image with 1 A100 on gpu-dev. What prompt or command should it run?
>
A cityscape in the background, with a datacenter in the foreground, enclosed in a glass box building.
Designing workflow...
Ready to run.
version: v1
volumes:
  generated-images:
    reference:
      volume://user/ephemeral
      size: 10GB
jobs:
  image-generation:
    image:
      uri: docker://runpod/stable-diffusionweb-ui-10.0.0
    command:
      - /bin/sh
      - -c
      - >
        python scripts/txt2img.py --
  > Jupyter notebook with GPU
  access...
```

🔍 > Objects
Gregory Kurtzer  
olivia@untitledui.com

FILTER
↻
UPLOAD OBJECT

NAME ↑	MODIFIED	TYPE	TTL	UPDATED BY	
📁 cache <small>3 objects</small>	Mar 31, 2026, 6:00 PM	Folder	—	—	⋮
📁 datasets <small>6 objects</small>	Apr 2, 2026, 8:00 AM	Folder	—	—	⋮
📁 logs <small>3 objects</small>	Apr 12, 2026, 9:15 PM	Folder	—	—	⋮
📁 models <small>4 objects</small>	Apr 4, 2026, 5:00 AM	Folder	—	—	⋮
📁 results <small>5 objects</small>	Apr 8, 2026, 9:00 AM	Folder	—	—	⋮
📄 config.json <small>4.0 KB</small>	Apr 1, 2026, 10:45 AM	JSON	No expiry	agarcia	⋮
📄 pipeline-manifest.yaml <small>1.5 KB</small>	Apr 5, 2026, 3:15 AM	YAML	30d 0h	mchen	⋮
📄 README.md <small>2.0 KB</small>	Mar 15, 2026, 8:30 AM	Log	No expiry	jsmith	⋮

📄 config.json
JSON
✕

📄 DOWNLOAD
📄 COPY REFERENCE

🕒 VIEW DETAILS
🔗 OPEN IN NEW TAB

```

{
  "project": "genomics-pipeline",
  "version": "2.1.0",
  "cluster": "fuzzball-prod-us-west",
  "defaults": {
    "gpu": "A100",
    "memory": "64Gi",
    "timeout": 7200
  },
  "storage": {
    "backend": "s3",
    "bucket": "acme-data-lake",
    "region": "us-west-2"
  }
}

```

/design

home directories  
project storage



external  
volumes



Fuzzball



hostpath  
volumes

Lustre  
GPFS



Fuzzball

LLM, API & chat  
interfaces

Agentic AI service  
infrastructure

AI-driven  
co-development

CIQ

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