Containers-as-a-Service: Spin

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Spin's Origin Story

" How can I run services alongside HPC that can…

… access file systems   … outlive jobs (persistence)
… access HPC networks   … schedule jobs / run workflows
… scale up or out   … stay up when HPC is down
… use custom software   … be available on the web

and are managed by my project team? "

databases
data archives

workflow
managers

web sites
science gateways

Many Projects Need More Than HPC

Spin answers this need.

Deploy your own **science gateways, workflow managers, databases, and other network services** using containers.

- Cloud-style flexibility
- Access to HPC file systems and networks
- Well-suited for workflow orchestration
- Secure, scalable, managed platform

docker   RANCHER®   kubernetes

Some projects using Spin:

Track and compare analyses of nightly sky surveys	science gateway
Classify and store reusable earth sciences data	data repository
Manage production genomic workflows and data at scale	science gateway
Process real-time events for dark matter detection	workflow manager
Explore materials properties or build simulated materials	science gateway

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Use a UI, Dockerfile, YAML Declarations…


```yaml
my-project.yml

baseType: workload
containers:
  name: ap
  image: f
  imagePul
  environm
    TZ: US
  volumeMo
  - mountP
    name:
    type:
    readOn
...
```

```dockerfile
Dockerfile

FROM ubuntu:18.04
RUN apt-get update  --quiet -y && \
    apt-get install --quiet -y \
    python-flask
WORKDIR /app
COPY app.py /app
ENTRYPOINT ["python"]
CMD ["app.py"]
```

…to create running services.
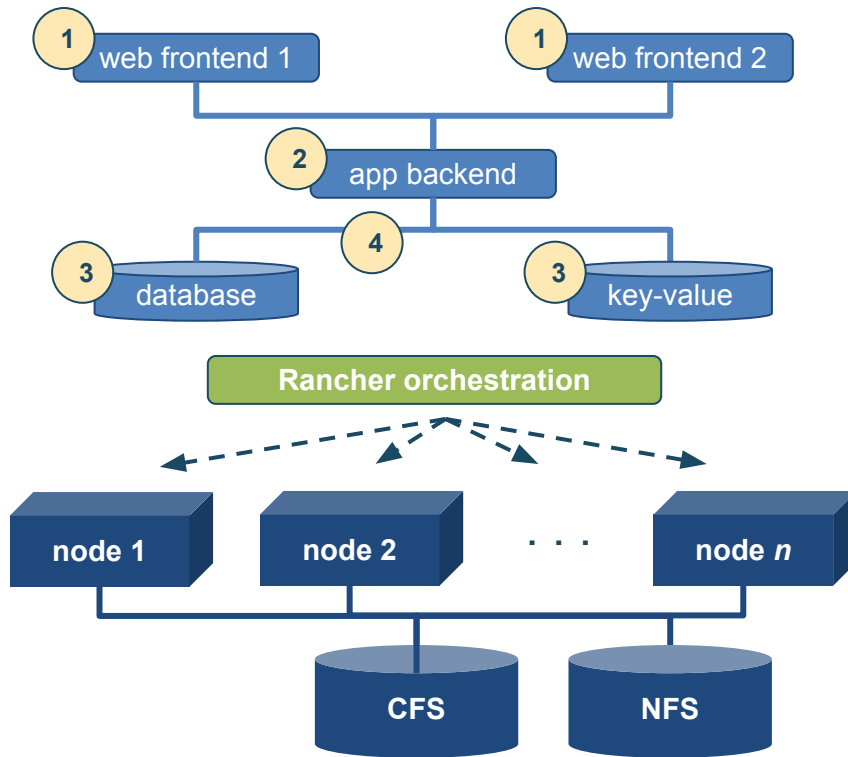
A typical example:

1. **multiple nginx frontends**
2. **custom Flask backend**
3. **database or key-value store (dedicated, not shared)**

automatically plumbed into a

4. **private overlay network.**

Rancher starts all the containers and ensures they stay running.
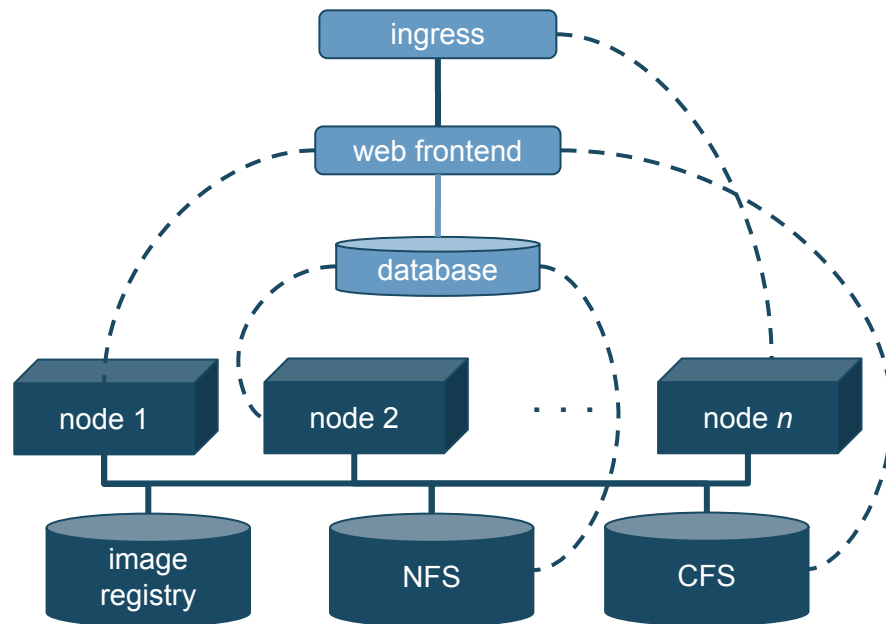
Let's Deploy an App in Five Minutes!

Our example app:
- Python-based
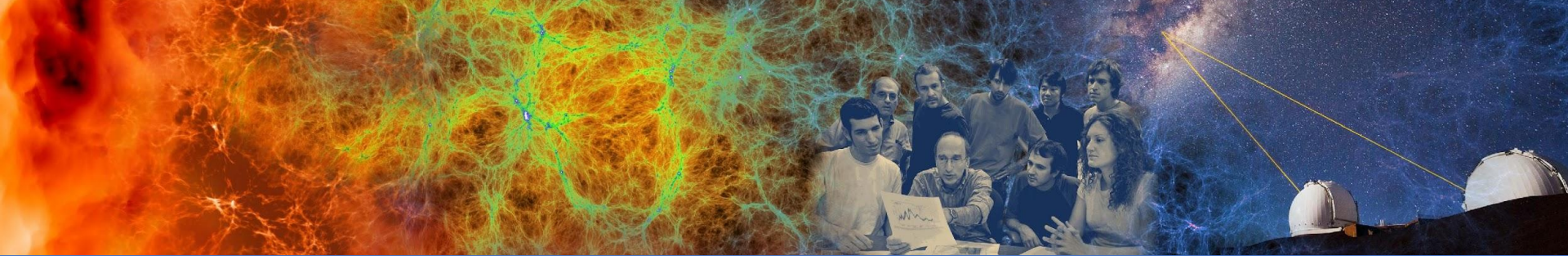- Uses static files in CFS
- Database backend

We will build the app from the bottom up, database first.

This example is typical, but there are many variations:
- Just the database
- API rather than UI
- Something completely different

Demo

What Will Be Different For Me in Spin?

Conventional Environment	Spin Environment
• Iterating code changes and testing on a development VM	• Iterating code changes and testing on a **local container deployment**
• Commit, test, release	• Commit, test, **rebuild, push,** release
• Maybe CI	• Maybe CI
• Open a help desk ticket to upgrade a database or change configuration	• **Redeploy the database** workload with a new image or configuration
• ssh to the VM and tail logs	• Tail logs using the **UI or CLI**
• ssh to the VM and bring a crashed web application back up	• Rely on Kubernetes to **reschedule the crashed web application** workload
• Document the deployment	• **Commit** the deployment YAML

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Interested in Using Spin?

- New Projects: Attend a SpinUp Workshop
  - Instructor-led seminar with interactive exercises
  - Hack-a-thon with NERSC staff
  - Six held per year

- Established Projects: Self-Guided Exercises
  - Work through the exercises and schedule office hours for help
  - Subject to NERSC approval

  Learn more at http://www.nersc.gov/systems/spin/