Infra 101 - Lesson 1

Sample App: REST API

- Deployed on a server
- Accessible via HTTP
- Returns "Hello World"
- Runs in a container

Languages

- Python
- Go (ideal for small containers and simplicity)
- Javascript

Cloud

What?

Someone else's infrastructure (usually paid)

How?

Use a UI, CLI, or code to provision/manage resources and tear them down when needed.

Why?

- Pay-as-you-go
- Reliability
- Scaling
- Security

Examples

AWS, Azure, Google Cloud, Hetzner

Infrastructure as Code

Scenario 1: Expensive, complex deployment; ensure complete teardown and recovery. **Scenario 2:** Team work with repetitive resources; minimize manual errors. **Solution:**

- Declarative language for desired state
- State logging
- Version control
- Self documenting and modularized

Terraform example:

test.tf

```
resource "hcloud_server" "honigmelone" {
  name        = "honigmelone"
  image       = "debian-12"
  server_type = "cx32"
  datacenter  = "fsn1-dc14"
}
```

Containerization

Problem: "But it works on my machine!"

Solution: Ship your whole machine. Docker:

- Builds a container from your code
- Runs on any Docker-enabled machine
- Easy to deploy and remove

Dockerfile example:

Dockerfile

```
FROM python:3.8-slim
COPY . /code
WORKDIR /code
RUN pip install -r requirements.txt
CMD [ "python", "./main.py" ]
```

CI/CD

- Frequent deployments for smaller changes
- Reliable deployment process
- Reduces manual errors

GitHub Actions example:

action.yml

```yaml
name: Docker Image CI
on:
  push:
    branches: [ main ]
  pull_request:
    branches: [ main ]
jobs:
  build:
    runs-on: ubuntu-latest
    steps:
    - uses: actions/checkout@v2
    - name: Build the Docker image
      run: docker build . --file Dockerfile --tag my-image-name:$(date +%s)
    - name: Docker Login
      env:
        DOCKER_USER: ${{secrets.DOCKER_USER}}
        DOCKER_PASSWORD: ${{secrets.DOCKER_PASSWORD}}
      run: |
        echo "$DOCKER_PASSWORD" | docker login --username "$DOCKER_USER" --password-stdin
    - name: Docker Push
      run: docker push my-image-name:$(date +%s)
```

Exercise

1. Write a simple REST API
2. Deploy a server with Terraform
3. Containerize your API with Docker
4. Build a pipeline to build (and deploy) your application