[Hands-on Session]

Research Reproducibility

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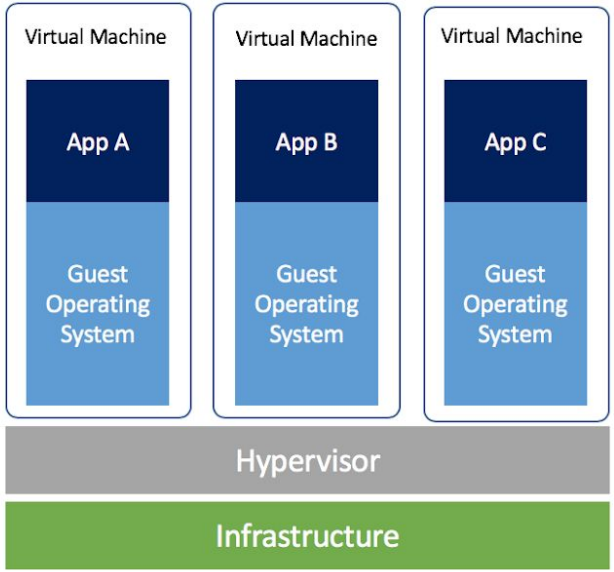
Objectives

- Create a VM instance on Google Cloud
- Install Docker
- Launch Jupyter Lab
- Review steps and potential variations



Docker Hub

- Container image registry: https://hub.docker.com/search
- Jupyter Lab/Notebook images: https://hub.docker.com/u/jupyter
- Variations are explained here: https://jupyter-docker-stacks.readthedocs.io/en/latest/using/selecting.html
- We will use this: https://hub.docker.com/r/jupyter/scipy-notebook
- Unique image version tag: jupyter/scipy-notebook:dc57157d6316

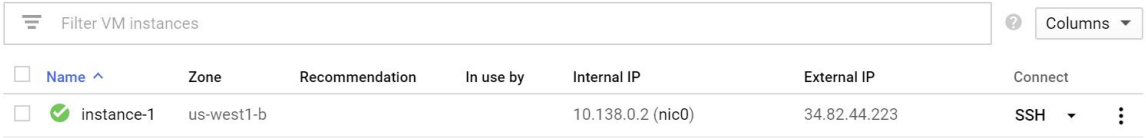
Creating VM and Installing Docker Demo

Creating a VM on Google Cloud Platform

- Get $50 credit here: https://edu.google.com/programs/students
- Start here: https://console.cloud.google.com

Install Docker and Utilities

- After VM starts, connect using SSH



- Install Docker, Docker-compose, and git:

```
sudo apt-get update && \
sudo apt-get install git docker.io docker-compose && \
sudo usermod -aG docker $USER
```

- Exit and reconnect using SSH

- Test Docker installation:

```
docker pull hello-world && docker run hello-world
```

Start Jupyter Docker Image Demo

Start Jupyter Docker Image

- Clone git repository:

```
git clone https://github.com/dddlab/reproducibility-demo && \
Cd reproducibility-demo && ls
```

- Install wget and run setup.sh:

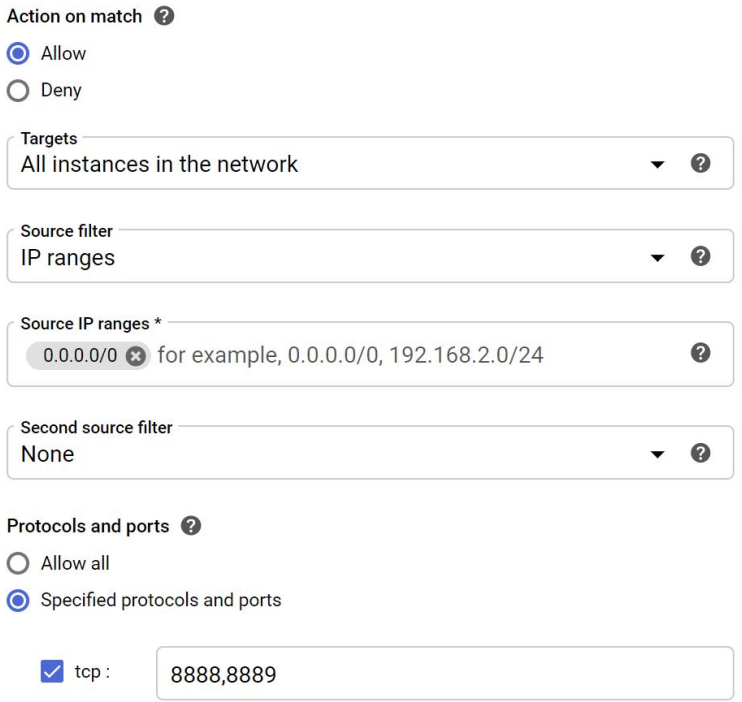
```
sudo apt-get install -y wget && ./setup.sh
```

- Run docker-compose:

```
IMAGE=first-env docker-compose up --build
```

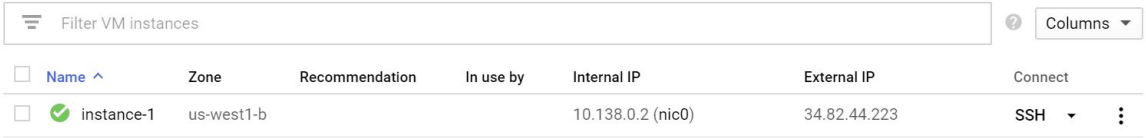
Setup Firewall Rules (Google Cloud Console)

- Name: jupyterlab (or some other name)
- Targets: All instances in the network
- Source IP ranges: 0.0.0.0/0
- Protocols and ports:
  check “tcp” and type “8888, 8889”



Connect to your VM instance

- Note the External IP address of your VM:



- Open a browser and enter as URL (including https):
  https://[External IP]:8889

- Congratulations!
  You successfully launched Jupyter Lab environment on the Cloud

Binder Compatibility Demo

Binder

- https://mybinder.org
- Creates computational environment from reproducible sources: e.g. GitHub, Gist, GitLab.com, Zenodo DOI, Figshare DOI, Dataverse DOI
- Minimal example repository: https://github.com/binder-examples/jupyter-stacks
- Let's make our repository compatible with Binder

Modifications

- Dockerfile
  - (Binder only) Add compatibility for Binder session
  - (Binder only) Copy repository content to `/home/jovyan/work`
  - Install `cvxpy` module
- Docker-compose.yml
  - Only used for starting Jupyter notebook on VM (Google Cloud)
  - Mount repository directory to `/home/jovyan/work` inside container