Deployment to Pi-Cluster

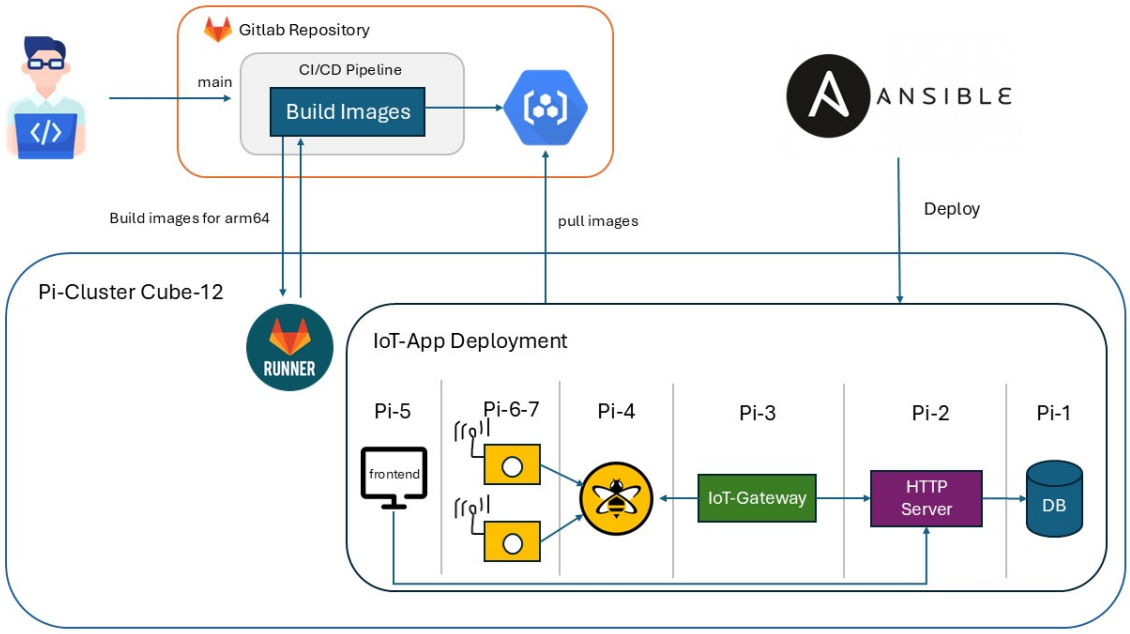
Overview

This documentation describes the deployment process of our IoT platform to a Raspberry Pi cluster. The deployment is automated using Ansible and Docker Compose, ensuring consistent and reliable deployment across all nodes.

Architecture

The deployment consists of multiple components running on Raspberry Pi nodes:

- Frontend service
- MQTT broker
- IoT Gateway
- HTTP Server
- RPC Database

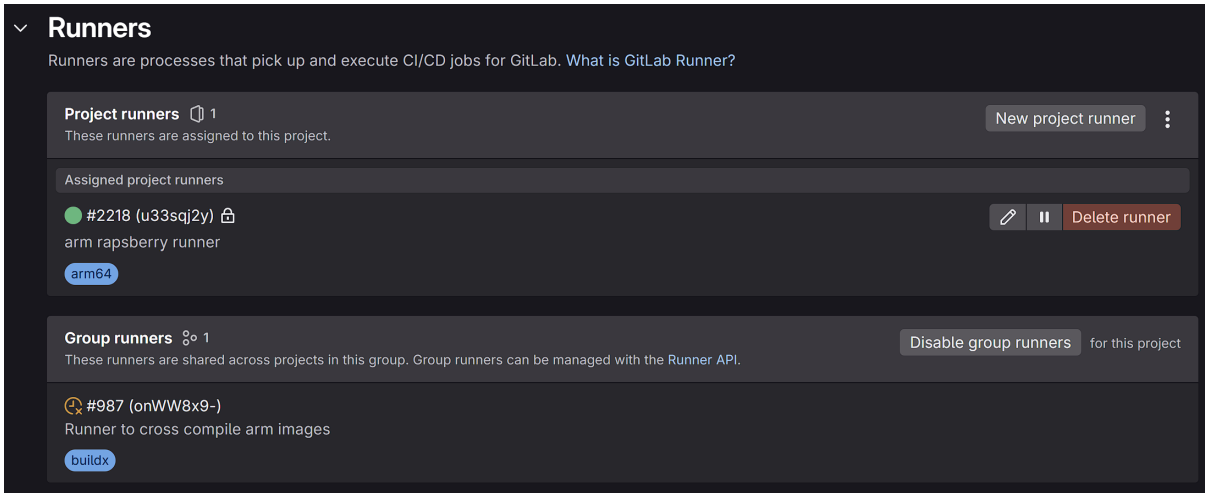


Deployment Process

The deployment process is fully automated through GitLab CI/CD pipeline and a custom ARM64 GitLab Runner. Here's how it works:

1. **Pipeline**

    - When code is pushed to main branch of the repository, GitLab CI/CD pipeline is triggered
    - Pipeline runs on a custom ARM64 GitLab Runner installed on the Pi cluster



- Pipeline builds Docker images for all services
- Images are pushed to GitLab Container Registry

2. **Build and Deploy**
    - Ansible playbooks are executed to deploy the services
    - Services are started using Docker Compose

Configuration

The deployment is configured through several YAML files:

- `hosts.yml` : Contains the inventory of all Pi nodes
- `setup.yml` : Initial setup tasks for the nodes
    - Create application directory
    - Copy docker-compose.yml
    - Login to GitLab registry
- `network_config.yml` : Network configuration for the cluster
- `deploy.yml` : Main deployment playbook
    - Start services with docker
- `docker-compose.yml` : Container orchestration configuration specific to pi-cluster

Accessing the Services

Frontend

The frontend is accessible at: http://141.100.42.125/ (Pi-5)

Other Services

- RPC Database: Available on port 50051 (Pi-1)
- HTTP Server: Available on port 8080 (P-2: http://141.100.42.122:8080)
- MQTT Broker (HiveMQ): Available on port 1883 (Pi-3)
- IoT-Gateway: (Pi-4)
- IoT-Sensors (Pi-6 and Pi-7)

Deploy yourself

Configuration

You need to adjust:

- In the ansible playbooks and `ansible.cfg` : Replace `stanbraeh` with your username.
- Current deployment is for **Cluster 12**. If you want to change, replace the clusterId in the ansible playbooks and `docker-compose.yml` .

Deployment Steps

1. Open the /deploy folder in linux or WSL
2. Set these environment variables for accessing gitlab repo and pi-cluster

- `export GITLAB_USERNAME="stxxxxxxx"`
- `export GITLAB_PASSWORD="your-gitlab-password"`

3. Execute Setup with Ansible
   `ansible-playbook setup.yml`

4. Execute Network-Config with Ansible
   `ansible-playbook network_config.yml`

5. Execute Deployment with Ansible
   `ansible-playbook deploy.yml`

6. Check if everything is running with `docker ps` on the server