Cloud -V

A developer's way to RISC-V Architecture

10x ENGINEERS

RISC-V

License

Section 1

On-boarding Developers

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RISC-V

Overview

Cloud-V enables software developers to use online emulation platform to build, run and test their applications on RISC-V architecture.

Objective: Create a scalable and flexible cloud-based infrastructure for CI testing of applications running on an emulated RISC-V processor system.

Features:

- Multiple runners with x86 and QEMU runner instances
- Automated builds with version control (github and gitlab)
- Ease of use with shell and CI scripting
- Out of the box RISC-V-compiled binary execution with QEMU user mode
- Scalability with addition of extra CPUs and emulated instances

Developer’s Onboarding

Important links:

- Cloud-V currently hosting live at https://cloud-v.co
- User Guide is available at 10xengineers.github.io

Getting a Cloud-V account:

- Through E-mail: ali.tariq@10xEngineers.ai
- Through Github issues: Create a github issue for account here and add details:
  - Name, E-mail, URL of github repository, Name of Organization

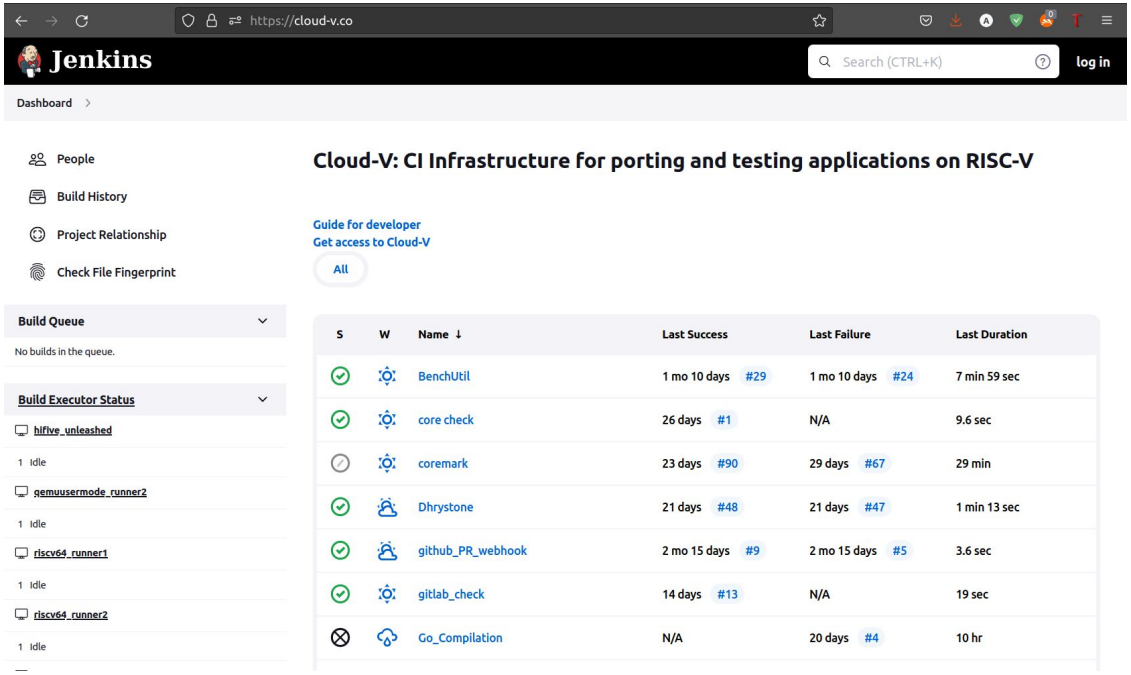
Developer’s Onboarding

Getting started:

- Create a github repository and add credentials in jenkins
- Apply for job build creation using github issue with following details:
  - Name of job build
  - Triggers for job build execution (manual or version-control trigger)
- View job build progress and summary at Cloud-V URL

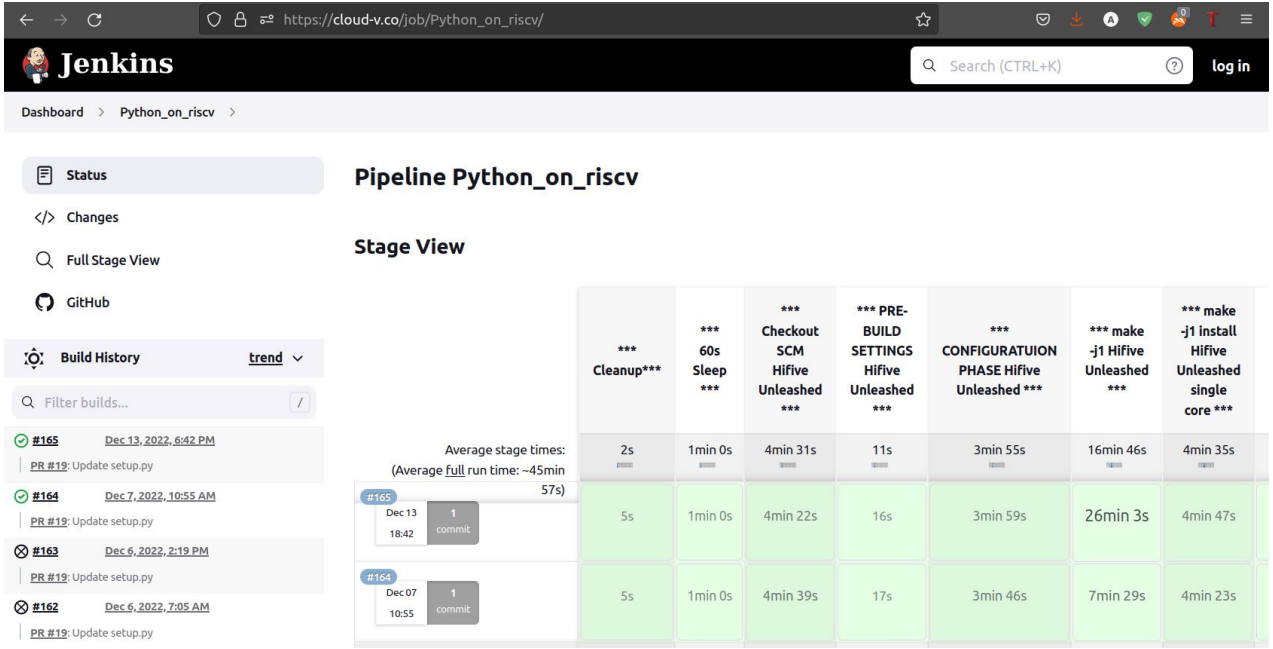
Developer’s Onboarding

Jenkins Dashboard:



Developer’s Onboarding

Jenkins pipeline stage view:



Developer’s Onboarding

Once the build is complete, the status will be shown on cloud-v as well as on commit

Section 2

Architecture

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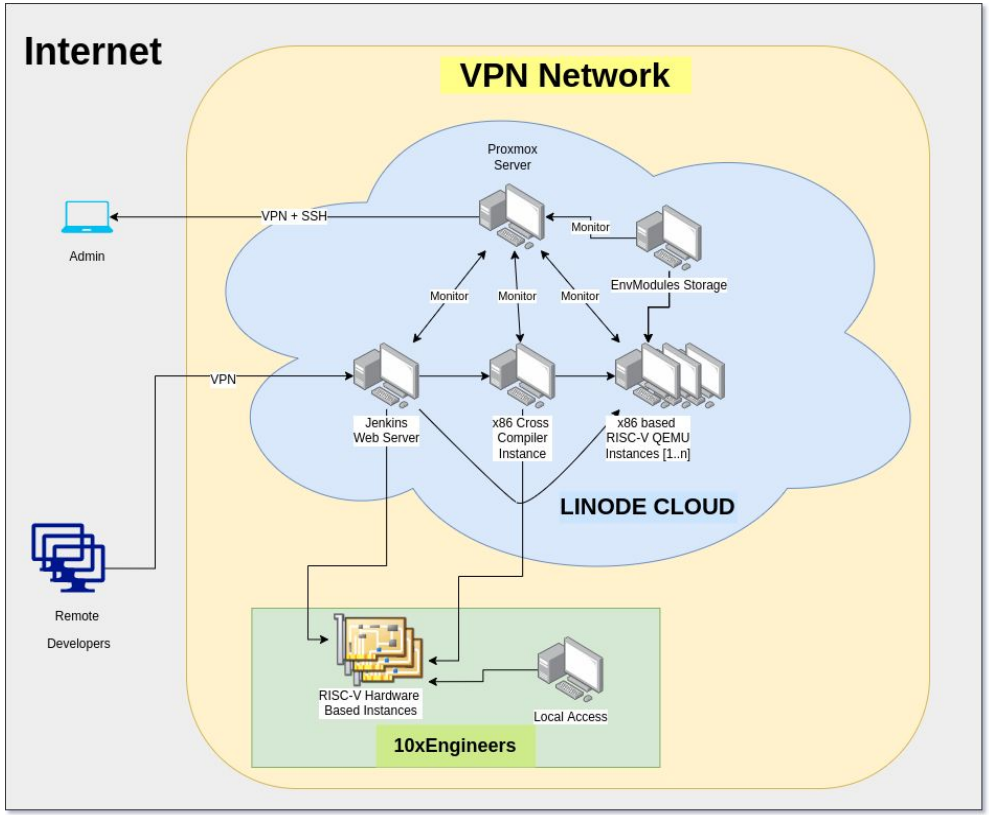
Architecture



Section 3

Jenkins Setup

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Jenkins Setup

Jenkins Installation:

- Get source code from github
- Read “CONTRIBUTING.md” for building
- Expose a port or run on localhost:8080 (by default)
- Complete initial setup on browser

Jenkins Setup

Jenkins Nodes:

- They are instances/runners to run builds on
- Add them in jenkins configuration using SSH
- Refer to the documentation for creating jenkins nodes

Section 4

Creating a Pipeline

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Creating a pipeline in jenkins

In Jenkins Dashboard:

- Click on “new item”
- Select “Pipeline” in job types
- Name the project
- Click “OK”

In Job configuration:

- Choose Triggers – How the build will start
- Choose the post triggers – What to do when job finishes

Section 5

Jenkins Pipeline Debugging

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RISC-V

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Jenkins Pipeline Debugging

Following steps can be used to debug Jenkins pipeline:

- Check if there is a syntax error in Jenkinsfile
- See Console output – In jenkins Job, click on build number and then on “Console Output”
- Check if the webhook is properly configured – Only if you enabled version control triggers
- Check if the desired node is selected – Nodes are runners on which job builds

Jenkins Pipeline Debugging

Console output of job build:

Dashboard > BenchUtil > #29

- Status
- Changes
- Console Output
  - View as plain text
- Edit Build Information
- Delete build '#29'
- Git Build Data
- Replay
- Pipeline Steps
- Workspaces
- Previous Build

Console Output

```
Started by user jenkins_user
Checking out git https://github.com/alitariq4589/BenchUtil.git into /home/jenkins_user/.jenkins/workspace
/BenchUtil@script/0e5df252c0f957f1707f475be03168229d3fa389639d19fbf68fea07cf69eae1 to read jenkinsfile
The recommended git tool is: NONE
using credential 95985a22-8a1a-483d-9ae8-5090a4cf0b6c
 > git rev-parse --resolve-git-dir /home/jenkins_user/.jenkins/workspace/BenchUtil@script
/0e5df252c0f957f1707f475be03168229d3fa389639d19fbf68fea07cf69eae1/.git # timeout=10
Fetching changes from the remote Git repository
 > git config remote.origin.url https://github.com/alitariq4589/BenchUtil.git # timeout=10
Fetching upstream changes from https://github.com/alitariq4589/BenchUtil.git
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
using GIT_ASKPASS to set credentials Github credentials for ali.tariq@10xengineers.ai
 > git fetch --tags --force --progress -- https://github.com/alitariq4589/BenchUtil.git +refs/heads/*:refs/remotes
/origin/* # timeout=10
 > git rev-parse origin/master^{commit} # timeout=10
Checking out Revision 4d9256c49ce40242113e9480d9746822832eba63 (origin/master)
 > git config core.sparsecheckout # timeout=10
 > git checkout -f 4d9256c49ce40242113e9480d9746822832eba63 # timeout=10
Commit message: "Update jenkinsfile"
 > git rev-list --no-walk 369af73f74b49a3b3584bf33de541437e448836b # timeout=10
[Pipeline] Start of Pipeline
[Pipeline] node
Running on x86_runner2 in /home/alitariq/runner2_dir/workspace/BenchUtil
```

Section 6

Github-Jenkins Integration

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Github-Jenkins Integration

Github configuration:

- Add “Jenkinsfile” in github repository – see this link for creating Jenkinsfile
- Add jenkins webhook in repository settings
- Ping webhook to check the connection

Jenkins Configuration:

- Add github credentials in jenkins having owner permissions to repository
- Add triggers in jenkins job

Section 7

Grafana and Prometheus Setup

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Grafana and Prometheus Setup

Important Links:

- Grafana is live at: https://monitor.cloud-v.co
- Prometheus is not hosted publicly

Installation:

- Get precompiled binaries of Grafana and Prometheus
- Get node_exporter precompiled binary
- Extract the tarballs

Grafana and Prometheus Setup

Setup:

- Copy node exporter to the runners being monitored
- Add node exporter links to Prometheus
- Add Prometheus hosting link to Grafana
- Add suitable queries in panels for resource monitoring
- Add Dashboards in Grafana to start monitoring

Section 8

Tools available on Cloud-V

Section 7
Tools available on Cloud-V

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Tools available on Cloud-V

Following are the platforms available on Cloud-V for software developers:

- One x86 runner instance
- One RISC-V QEMU user mode instance – For running RISC-V precompiled binaries
- One Hifive Unleashed board – For building and running applications on RISC-V linux
- One RISC-V QEMU linux – For building and running applications on RISC-V linux

Tools available on Cloud-V

Following are the softwares available on Cloud-V for software developers:

- RISC-V GNU Toolchain – Cross-compiler for producing RISC-V binaries on x86
- Java Development Kit – OpenJDK
- Ruby
- Python3
- Go
- Rust
- Openssl
- Git

Tools available on Cloud-V

Refer to this document for specific tooling information