The POWER of supercomputers at your fingertips

Rafael Sene | August 2019

OpenPOWER™

About

rpsene.com
rpsene@br.ibm.com

OpenPOWER™

Today

Making the journey to POWER easy.

The fast pace of new open-source projects

OpenPOWER™

CNCF Cloud Native Landscape

2019-08-12T14:42:12Z 0071b40

Overwhelmed? Please see the CNCF Trail Map. That and the interactive landscape are at l.cncf.io

Greyed logos are not open source

App Definition and Development

Database

Streaming & Messaging

Application Definition & Image Build

Continuous Integration & Delivery

Orchestration & Management

Scheduling & Orchestration

Coordination & Service Discovery

Remote Procedure Call

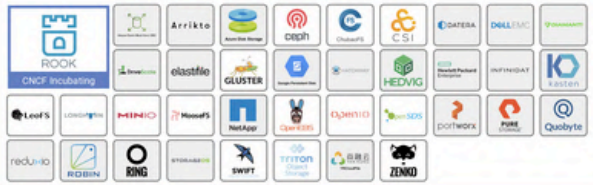
Service Proxy

API Gateway

Service Mesh

Runtime

Cloud Native Storage



Container Runtime

Cloud Native Network

Provisioning

Automation & Configuration

Container Registry

Security & Compliance

Key Management

Platform

Certified Kubernetes - Distribution

Certified Kubernetes - Hosted

Certified Kubernetes - Installer

PaaS/Container Service

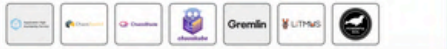
Observability and Analysis

Monitoring

Logging

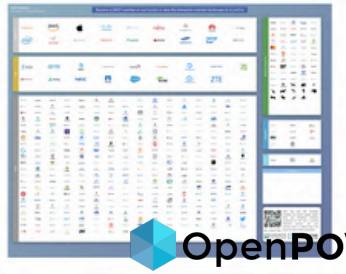
Tracing

Chaos Engineering



Serverless

Members



Special

Kubernetes Certified Service Provider

Kubernetes Training Partner

This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path

l.cncf.io

CLOUD NATIVE COMPUTING FOUNDATION

CLOUD NATIVE Landscape

Redpoint Amplify

OpenPOWER™

Remove extraneous backtick ✓ — 2

#2370 opened 7 days ago by thomwiggers • Review required — 1 of 1

Clarify c — 3

#2368 ope

Tip to c — 3

#2358 ope

Doc Add — 1

#2354 ope

Add AW — 2

#2350 ope

restic/restic on Jul 16

Add support for ppc64le #2342

This commit adds support for cross-compiling Restic for ppc64le as part of the releas...

`restic:master` ← `rpsene:master`

You commented and opened

Review required

Add support for ppc64le ✓ — 2

#2342 opened on Jul 16 by rpsene • Review required — 6 of 6

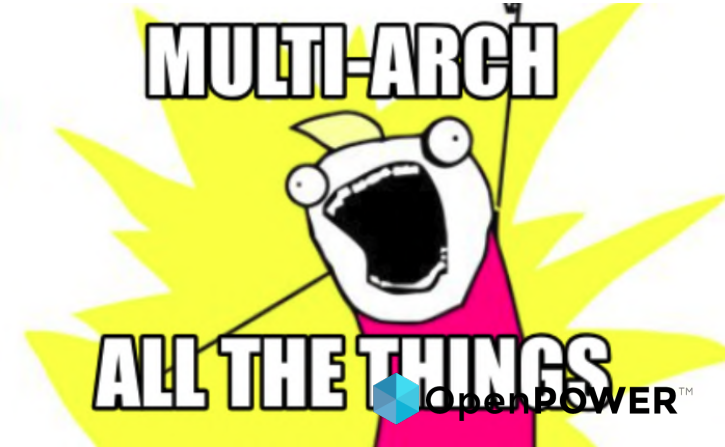
Prune speedup ✓ — 4

OpenPOWER™

The adoption of open-source software comes from developers organically downloading/cloning and using it.

The World is multi-arch.

So should be the development!



Chapter I

The POWER SDK

Migration Advisor

- Linux/Power 32 bits to Linux/Power 64 bits application migration
  - Cast to pointers with different size
  - Implicit cast to variable with different size
  - Long usage
  - Union, structs and classes with incompatible type declarations
- Linux/Power application optimization
  - Sync built-in to C11 standard atomic built-in
- Linux/x86 to Linux/Power application migration
  - Cast with endianness issues
  - Char usage
  - Float128 usage
  - Hardware Transactional Memory (HTM)
  - Linux/x86-specific API
  - Long double usage
  - Non-portable Pthreads implementation
  - Performance Degradation
  - Struct with BitFields
  - Syscall not available for Linux on Power
  - Union with endianness issues
  - x86-specific assembly
  - x86-specific compiler built-in

1

4

```
// Sum 2 Vectors
#ifdef __PPC__
    v1 = vec_add(test.v, test2.v);
#else
    v1 = __builtin_ia32_addps(test.v, test2.v);
#endif
```

3

```
// Sum 2 Vectors
v1 =  __builtin_ia32_addps(test.v, test2.v);
```

x86-specific compiler built-in
1 quick fix available:
Built-in quick fix
Press 'F2' for focus

```
");
i++)
| ", v1[i]);
```

2

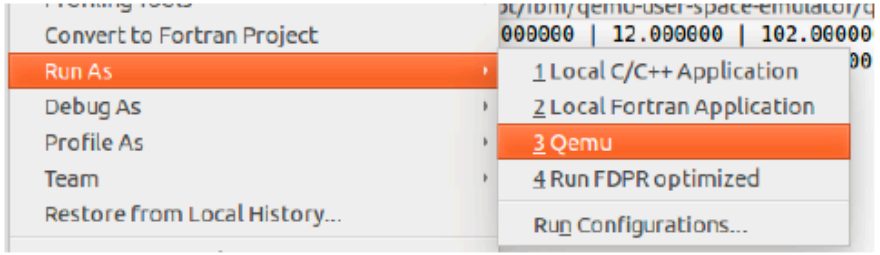
Migration Advisor

0 errors, 8 warnings, 0 others

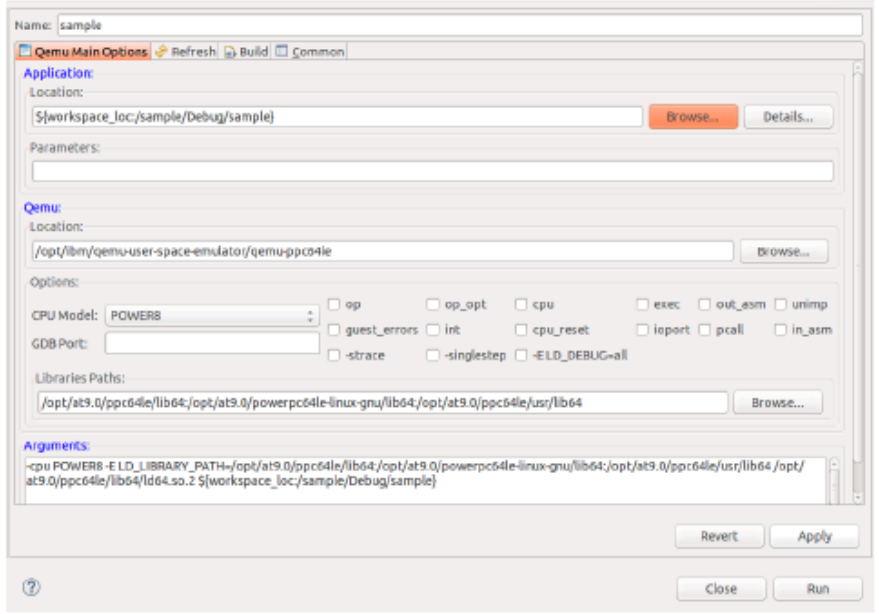
Description	Resource	Path	Location	Migration Advisor Type
Union with endianness issues (1 item)				
Potential endianness issue when creating a Un	sample.c	/sample/src	line 22	Union with endianness issues
Cast with endianness issues (1 item)				
Potential endianness issues when casting from	sample.c	/sample/src	line 37	Cast with endianness issues
Long double usage (1 item)				
Potential migration issue due size of long dou	sample.c	/sample/src	line 38	Long double usage
x86-specific compiler built-in (4 items)				
x86-specific compiler built-in	sample.c	/sample/src	line 28	x86-specific compiler built-in
x86-specific compiler built-in	sample.c	/sample/src	line 49	x86-specific compiler built-in
x86-specific compiler built-in	sample.c	/sample/src	line 66	x86-specific compiler built-in
x86-specific compiler built-in	sample.c	/sample/src	line 77	x86-specific compiler built-in
x86-specific assembly (1 item)				
Possible arch specific assembly	sample.c	/sample/src	line 74	x86-specific assembly

QEMU user-mode integration and IBM POWER8 Functional Simulator

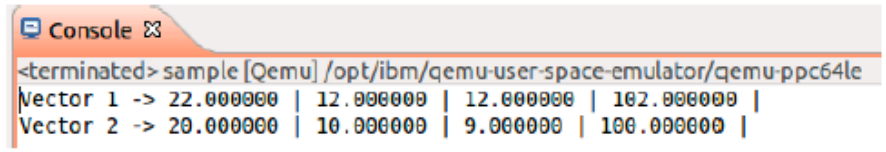
1

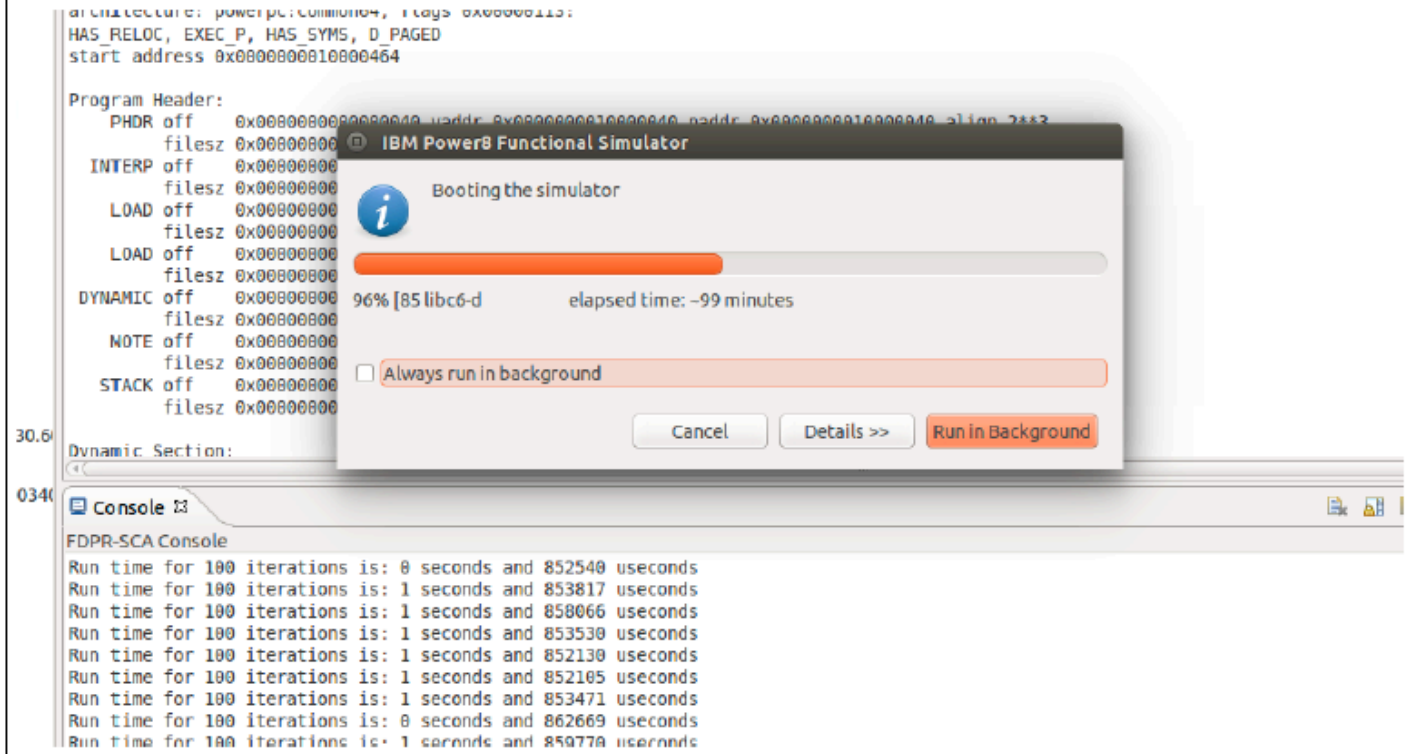


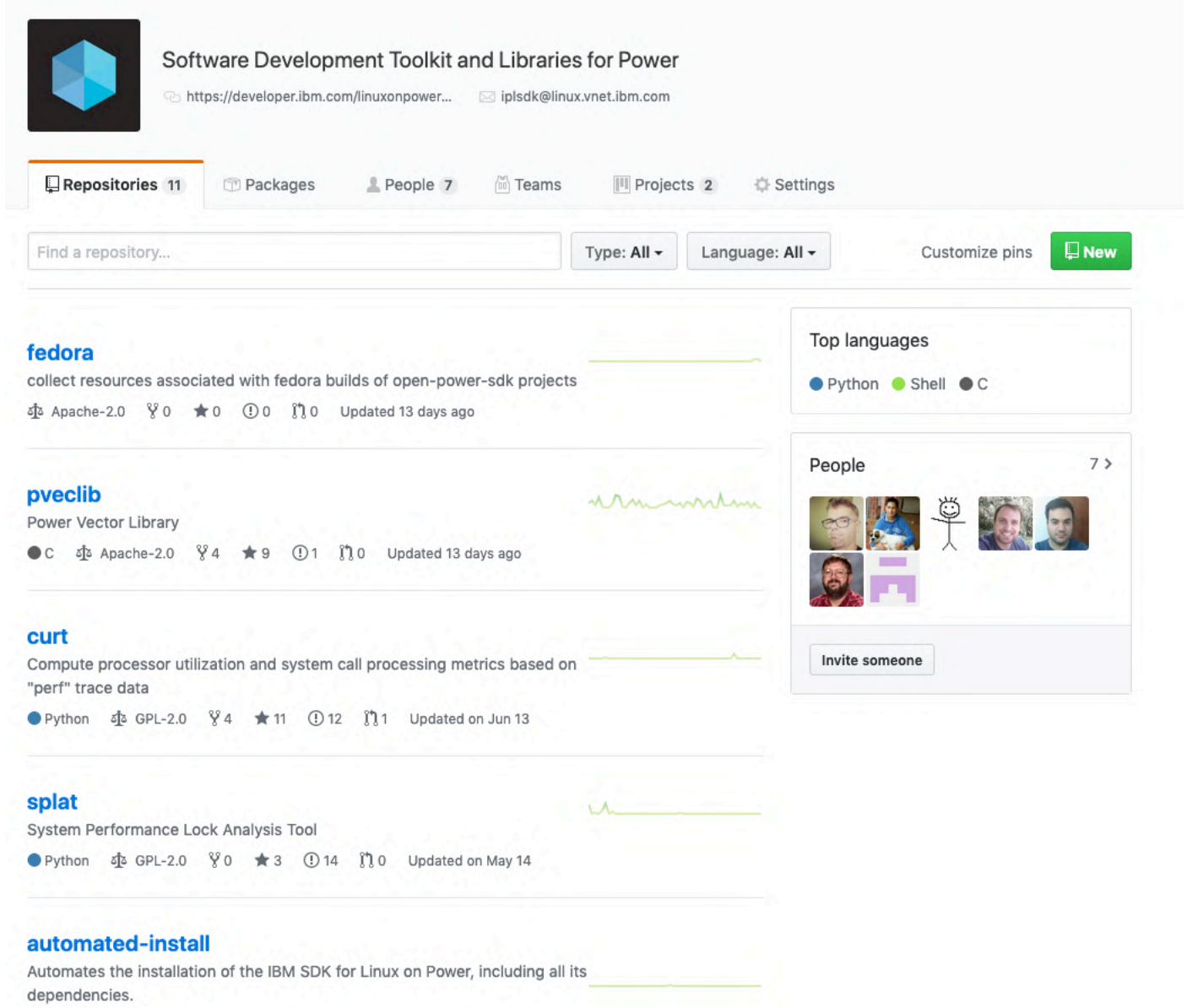
2



3







CLI tools are opensource

Not enough.

Chapter II

FREE Access to POWER

Flowery field where developers can get the resources they need.

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Developers

Resources

OpenPOWER™

Minicloud

The FREE OpenPOWER Cloud by Unicamp

openpower.ic.unicamp.br/minicloud

And they came!

1000+ Requests

"...I developed a rendering software tool that I'd like to optimise and test on the POWER platform. It's still being developed, and I'd like to make it multi platform Intel, ARM and POWER)..."

"... I am trying to enable LuaJIT for PPC64LE and would like to test it on actual hardware..."

"...Test software on ppc64le, troubleshoot compile errors and build packages..."

"...Development of the OpenSource RocksDB for ppc64le architecture. IBM have started a port to PPC64le, and we would like to ensure its continued functionality..."

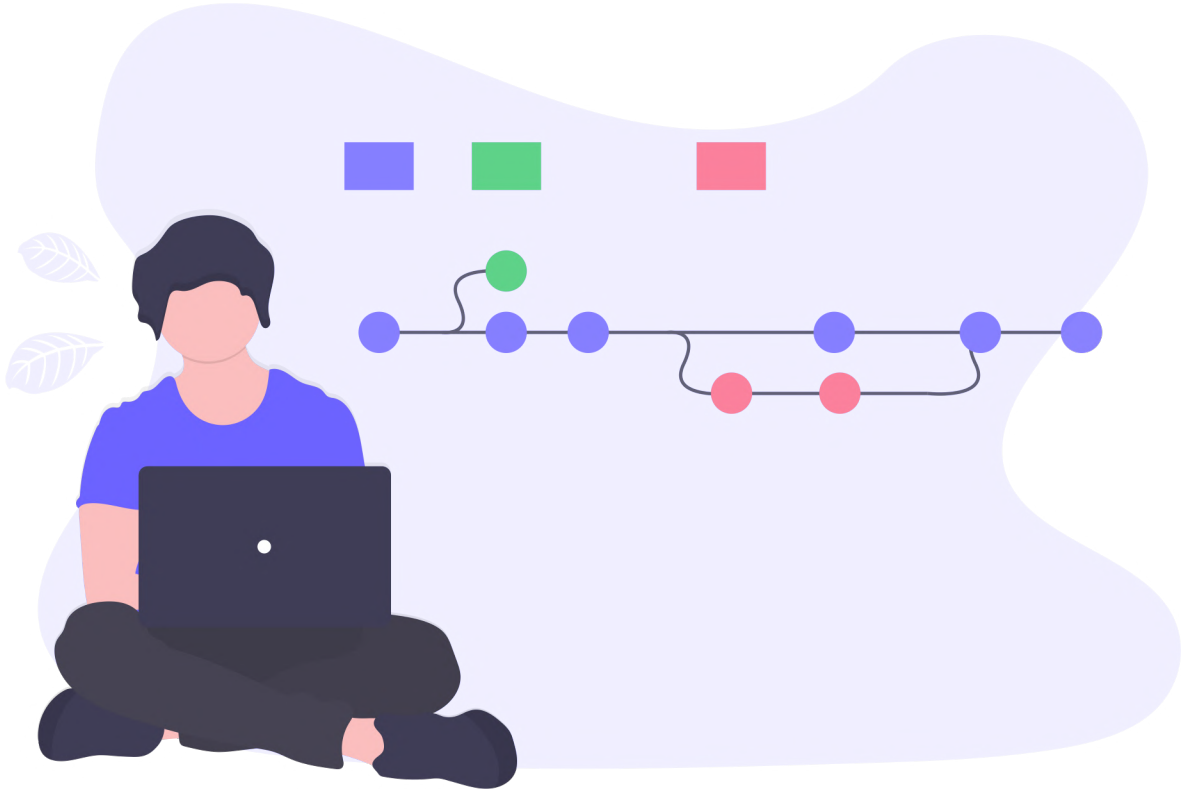
"...I require access to study Linux software development on the POWER architecture. This program is the best free option..."

Eventually, free access is no longer an option and it creates sales opportunities.

Cool, is this enough?

NO

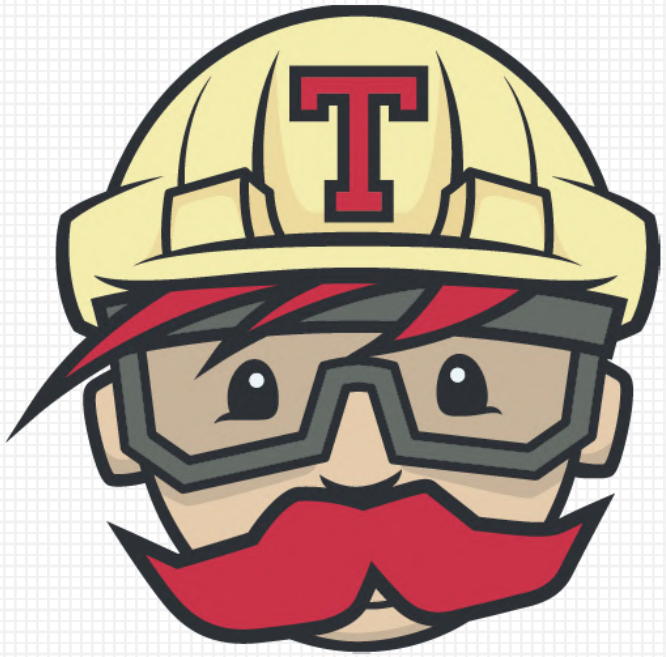
Chapter III



Be where developers are!

GitHub

GitLab



Travis CI

The home of open source testing

Over 900k open source projects and 600k users are testing on Travis CI.

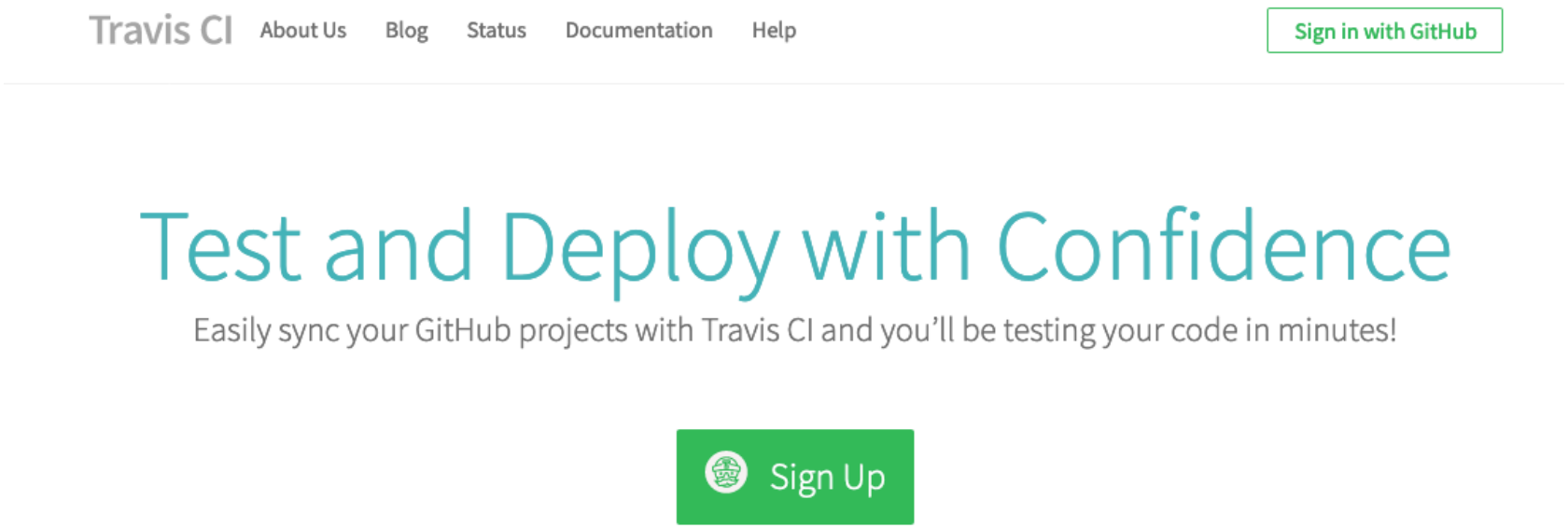
Always free for open source projects

os: linux-ppc64le

Is all you need!

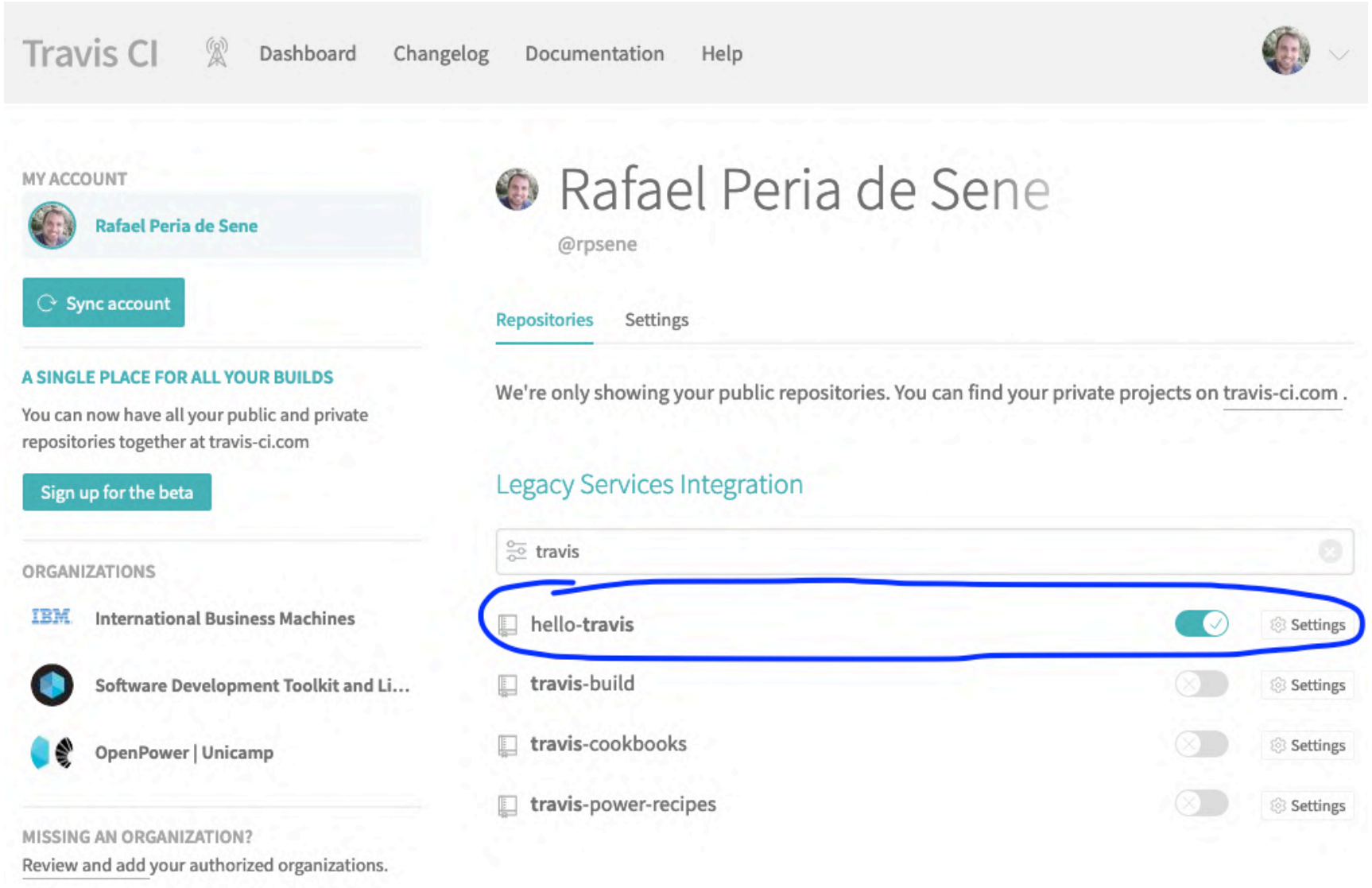
alpha version

step 1: sign in

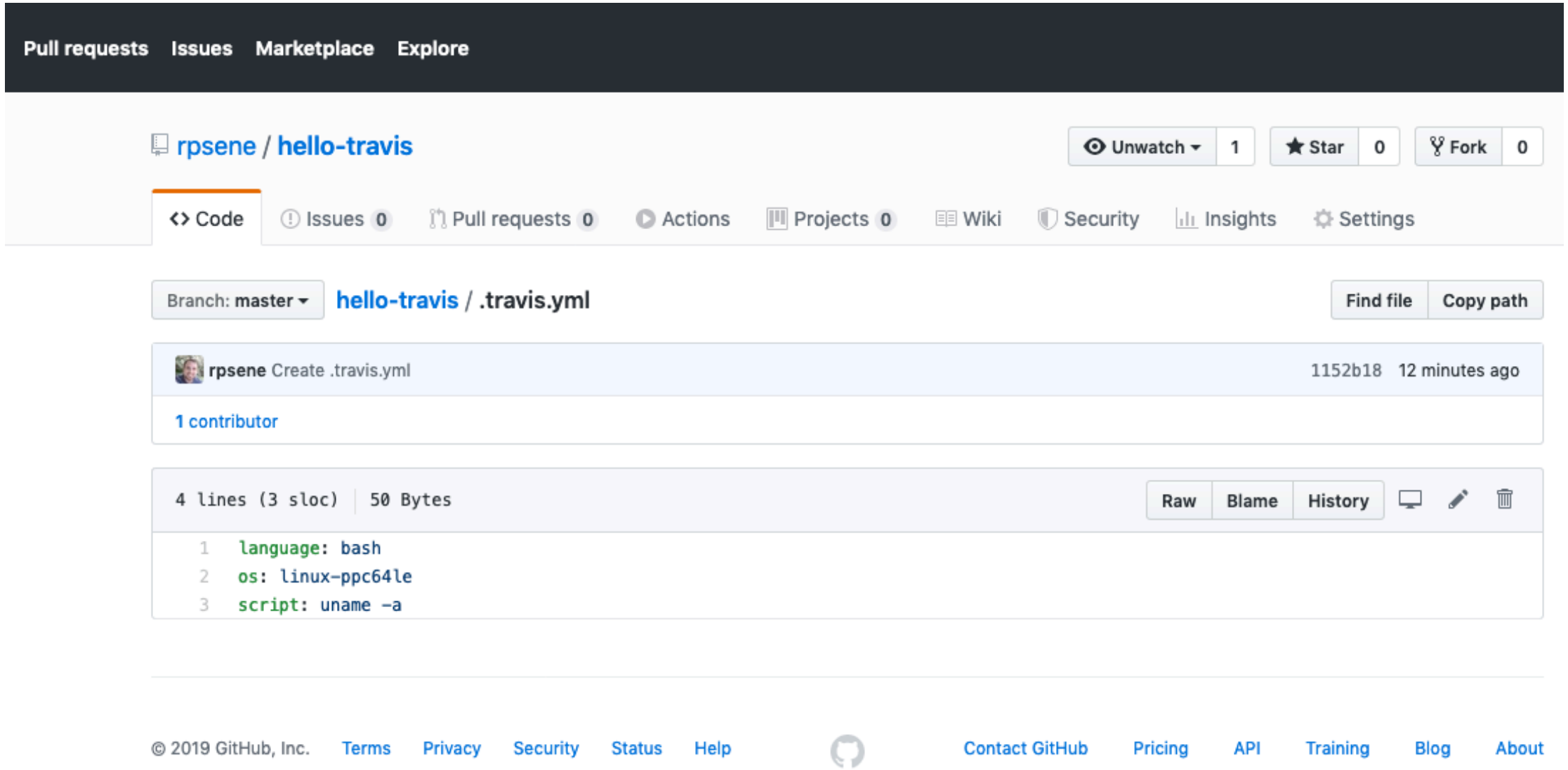


travis-ci.org

step 2: enable your project



step 3: create a travis.yml file



Describe your build according your needs.

open-power / skiboot

Watch 30 | Star 72 | Fork 105

Code | Issues 62 | Pull requests 3 | Projects 1 | Wiki | Security | Insights

Branch: master ▾ skiboot / .travis.yml — Find file | Copy path

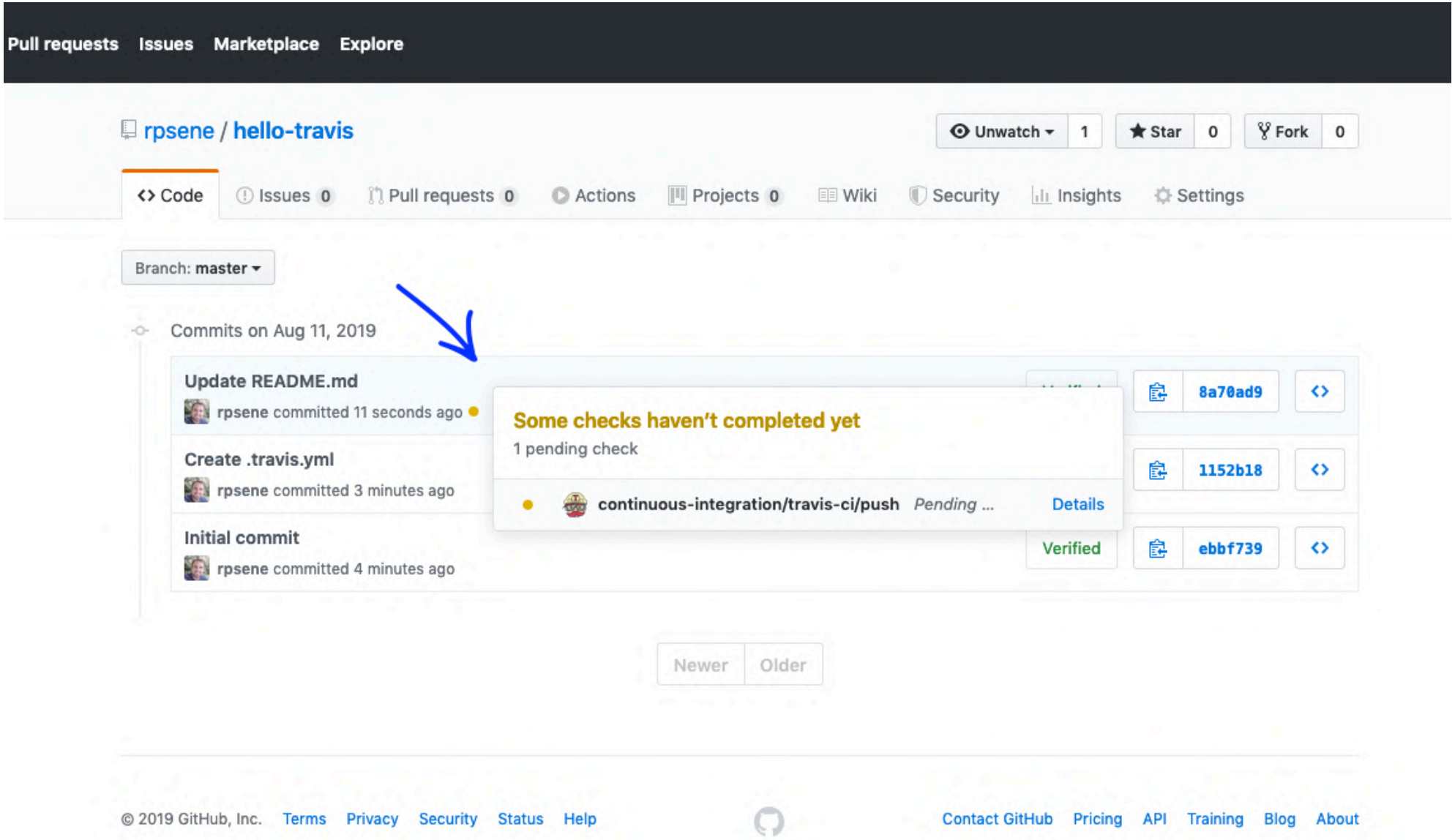
stewartsmith travis: remove fedora29 — 468a2dc — 17 days ago

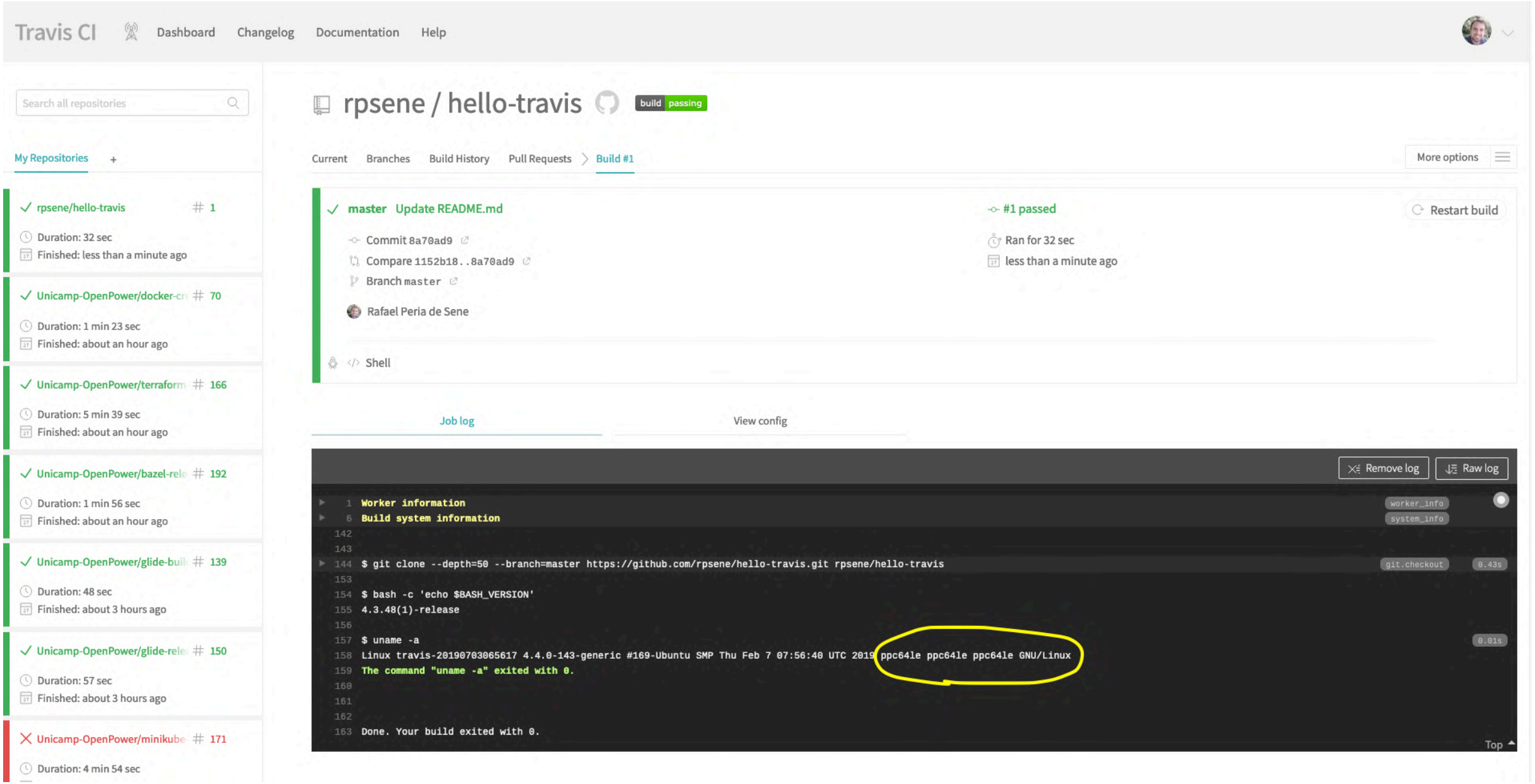
3 contributors

61 lines (50 sloc) | 1.69 KB — Raw | Blame | History

```yaml
language: c

os:
 - linux
 - linux-ppc64le

cache: ccache

env:
    matrix:
    - RUN_ON_CONTAINER=ubuntu-16.04
    - RUN_ON_CONTAINER=ubuntu-18.04
    - RUN_ON_CONTAINER=ubuntu-latest
    - RUN_ON_CONTAINER=centos7
    - RUN_ON_CONTAINER=fedora30
    - RUN_ON_CONTAINER=fedora-rawhide
    - RUN_ON_CONTAINER=debian-stretch
    - RUN_ON_CONTAINER=debian-unstable
    - RUN_ON_CONTAINER=docs
    global:
        # The next declaration is the encrypted COVERITY_SCAN_TOKEN, created
        #   via the "travis encrypt" command using the project repo's public key
        secure: "MpNEGFa1VrF/vsQq24n5UgfRbz1wVC6B8mubFnyK4gX0IuQ9xhWuTzMLUQF9UJxe5jnC2DTmVUvYTYN/hggw+PpYwbOOAE0QGR5pmPHA4PSRmc

matrix:
  allow_failures:
    - env: RUN_ON_CONTAINER=fedora-rawhide
    - env: RUN_ON_CONTAINER=debian-unstable
  exclude:
    - os: linux-ppc64le
      env: RUN_ON_CONTAINER=centos7
    - os: linux-ppc64le
      env: RUN_ON_CONTAINER=docs
```

step 4: start building




Travis CI
Dashboard
Changelog
Documentation
Help
Search all repositories
My Repositories
rpsene/hello-travis # 1
Duration: 32 sec
Finished: less than a minute ago
Unicamp-OpenPower/docker-cr # 70
Duration: 1 min 23 sec
Finished: about an hour ago
Unicamp-OpenPower/terraform # 166
Duration: 5 min 39 sec
Finished: about an hour ago
Unicamp-OpenPower/bazel-rele # 192
Duration: 1 min 56 sec
Finished: about an hour ago
Unicamp-OpenPower/glide-buil # 139
Duration: 48 sec
Finished: about 3 hours ago
Unicamp-OpenPower/glide-rele # 150
Duration: 57 sec
Finished: about 3 hours ago
Unicamp-OpenPower/minikube # 171
Duration: 4 min 54 sec
rpsene / hello-travis
build passing
Current
Branches
Build History
Pull Requests
Build #1
More options
master Update README.md
Commit 8a70ad9
Compare 1152b18..8a70ad9
Branch master
Rafael Peria de Sene
Shell
#1 passed
Ran for 32 sec
less than a minute ago
Restart build
Job log
View config
Remove log
Raw log
1 Worker information
6 Build system information
142
143
144 $ git clone --depth=50 --branch=master https://github.com/rpsene/hello-travis.git rpsene/hello-travis
153
154 $ bash -c 'echo $BASH_VERSION'
155 4.3.48(1)-release
156
157 $ uname -a
158 Linux travis-20190703065617 4.4.0-143-generic #169-Ubuntu SMP Thu Feb 7 07:56:40 UTC 2019 ppc64le ppc64le ppc64le GNU/Linux
159 The command "uname -a" exited with 0.
160
161
162
163 Done. Your build exited with 0.
worker_info
system_info
git.checkout
0.43s
0.01s
Top

docs.travis-ci.com

Travis@IBM

POWER support started in 2017.

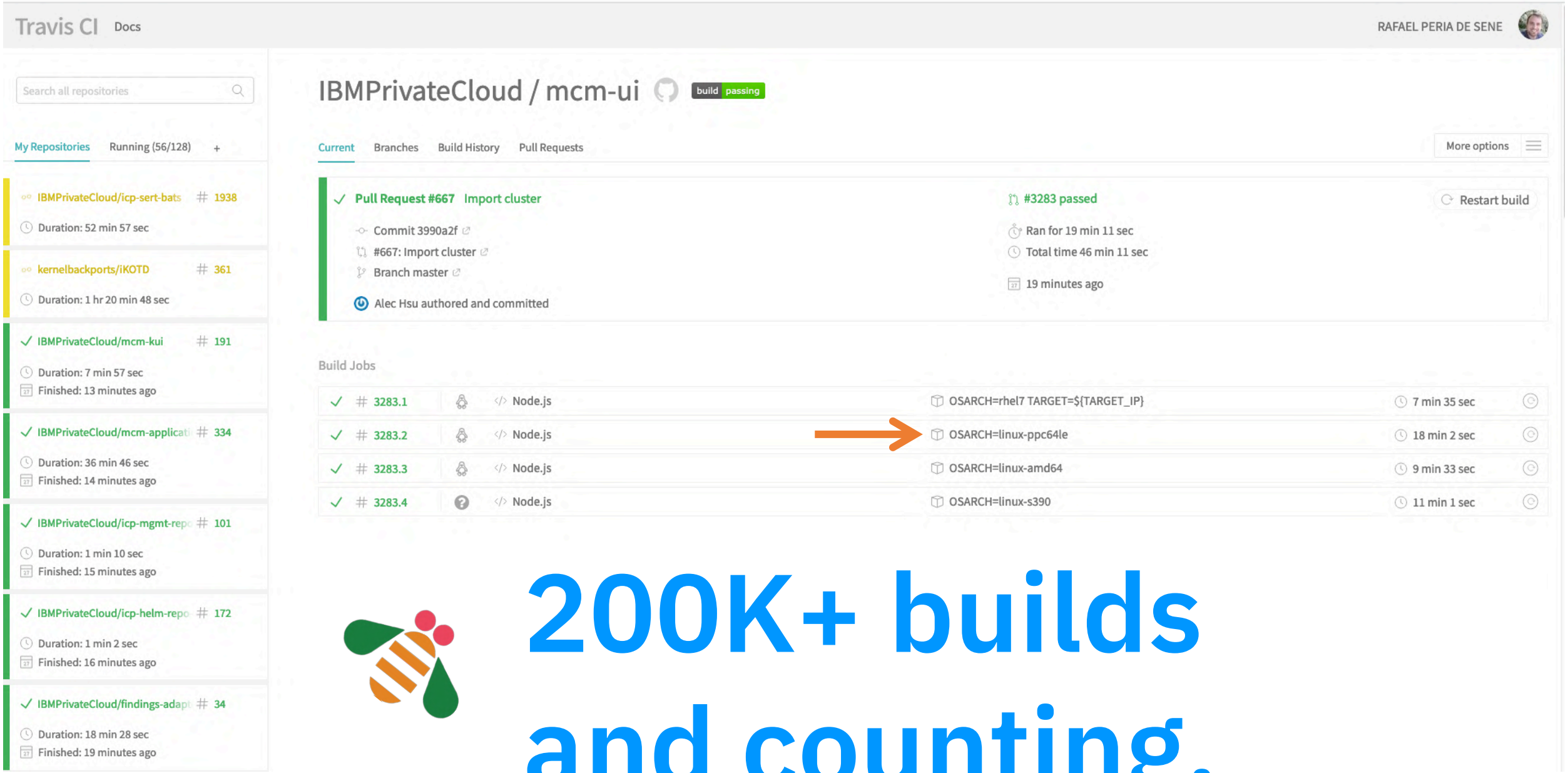
POWER support started in 2017.

Required for ICP development parity between X and P.

POWER support started in 2017.

Required for ICP development parity between X and P.

Everyone can build on POWER today at IBM using Travis.

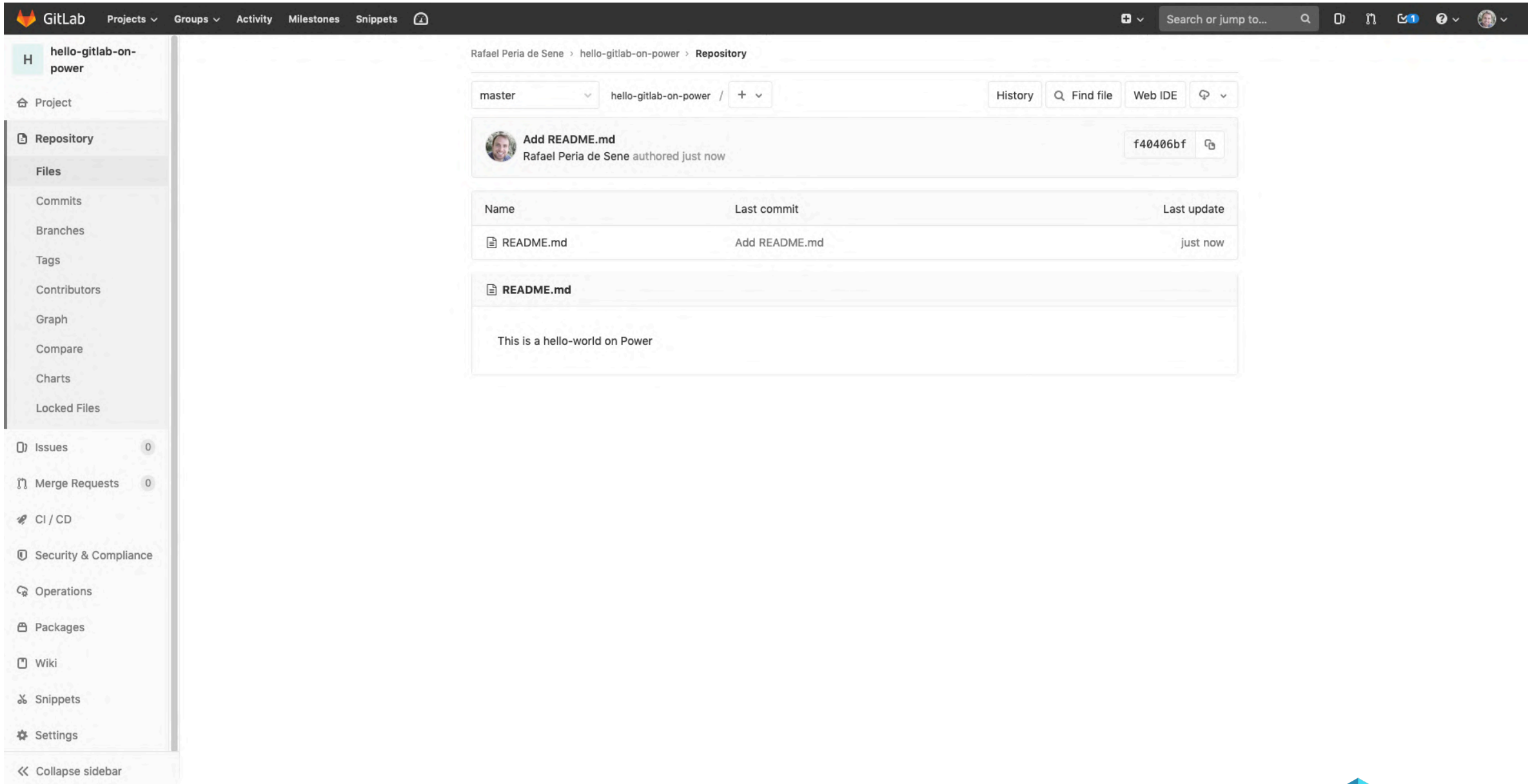


200K+ builds and counting.

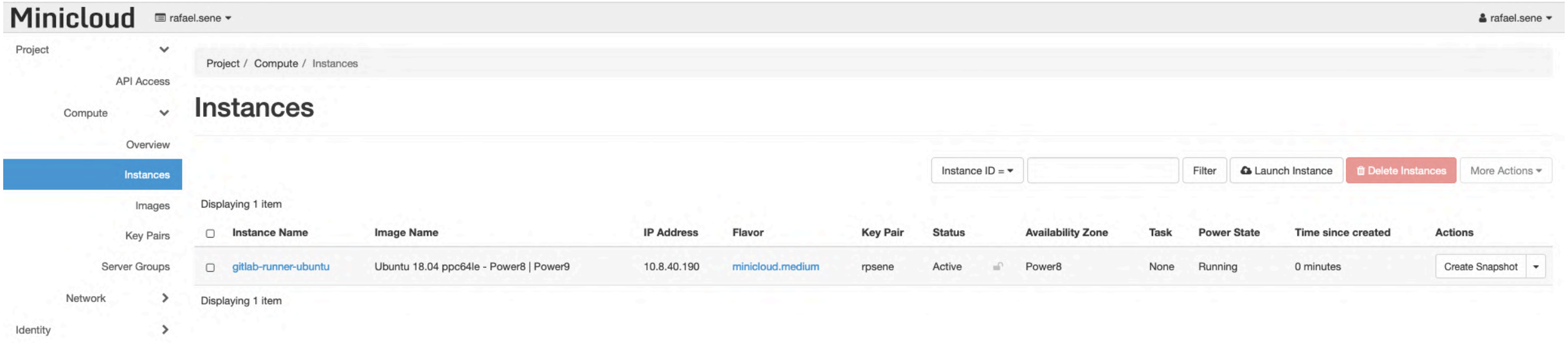
GitLab CICD

GitLab Runner

step 1: sign in



step 2: get a POWER VM



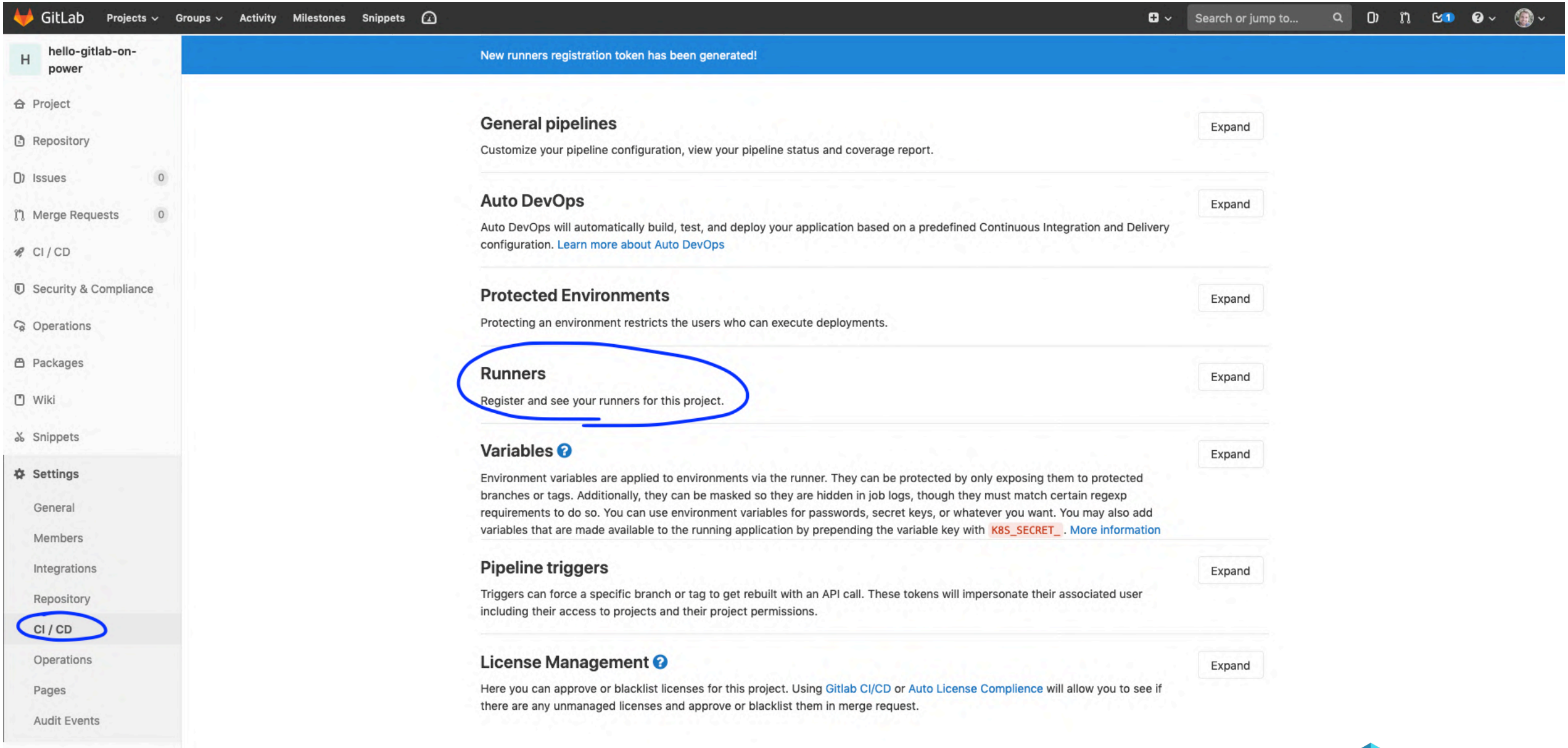
openpower.ic.unicamp.br/minicloud

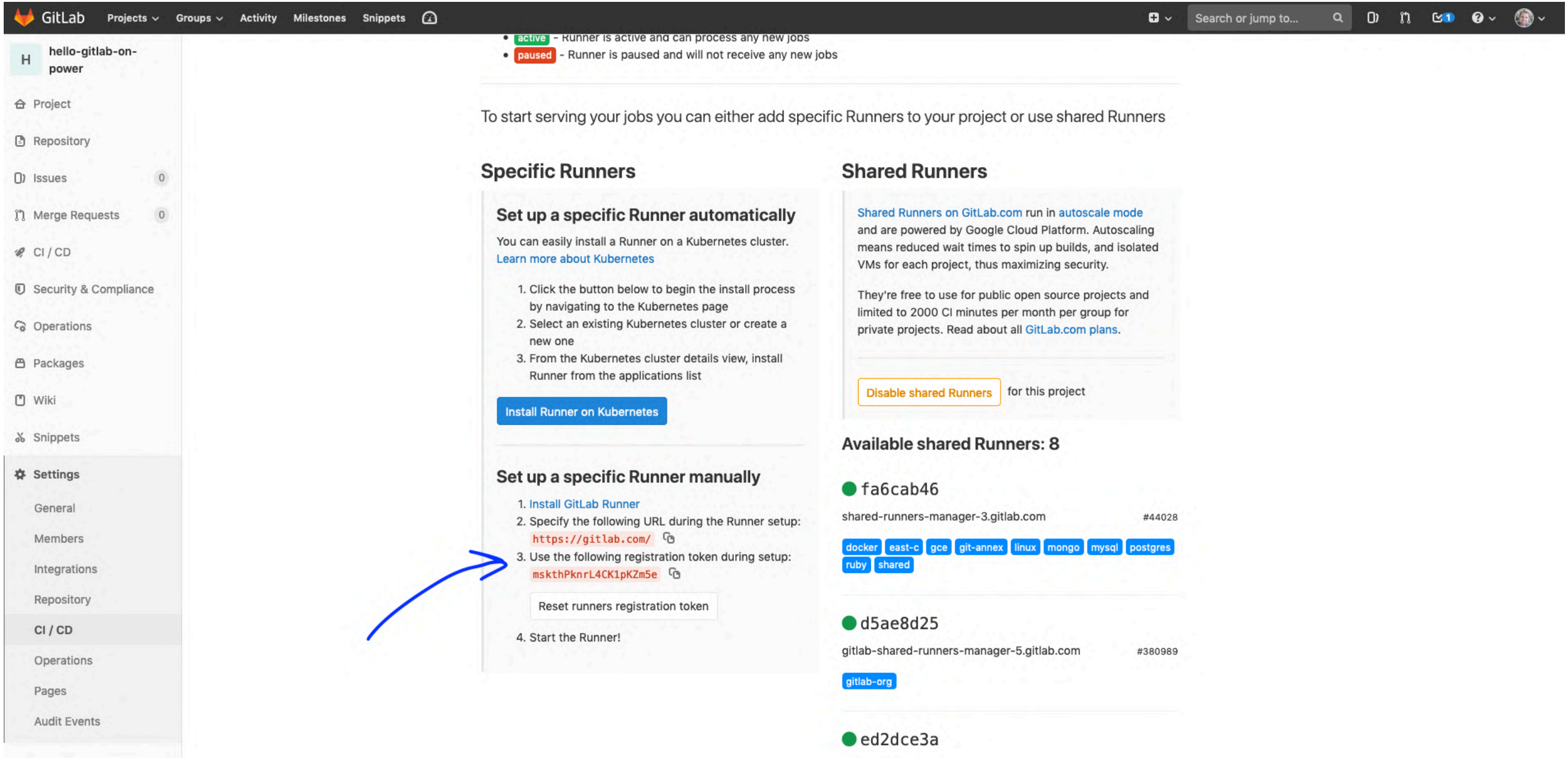
step 3: install GitLab Runner

```
root@gitlab-runner-ubuntu:~# apt-get install gitlab-runner
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  cdebootstrap debian-archive-keyring libdebian-installer-extra4 libdebian-installer4
Suggested packages:
  qemu-user-static docker.io
The following NEW packages will be installed:
  cdebootstrap debian-archive-keyring gitlab-runner libdebian-installer-extra4 libdebian-installer4
0 upgraded, 5 newly installed, 0 to remove and 4 not upgraded.
Need to get 6682 kB of archives.
After this operation, 32.1 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
```

Official POWER support: https://gitlab.com/gitlab-org/gitlab-runner/issues/2941

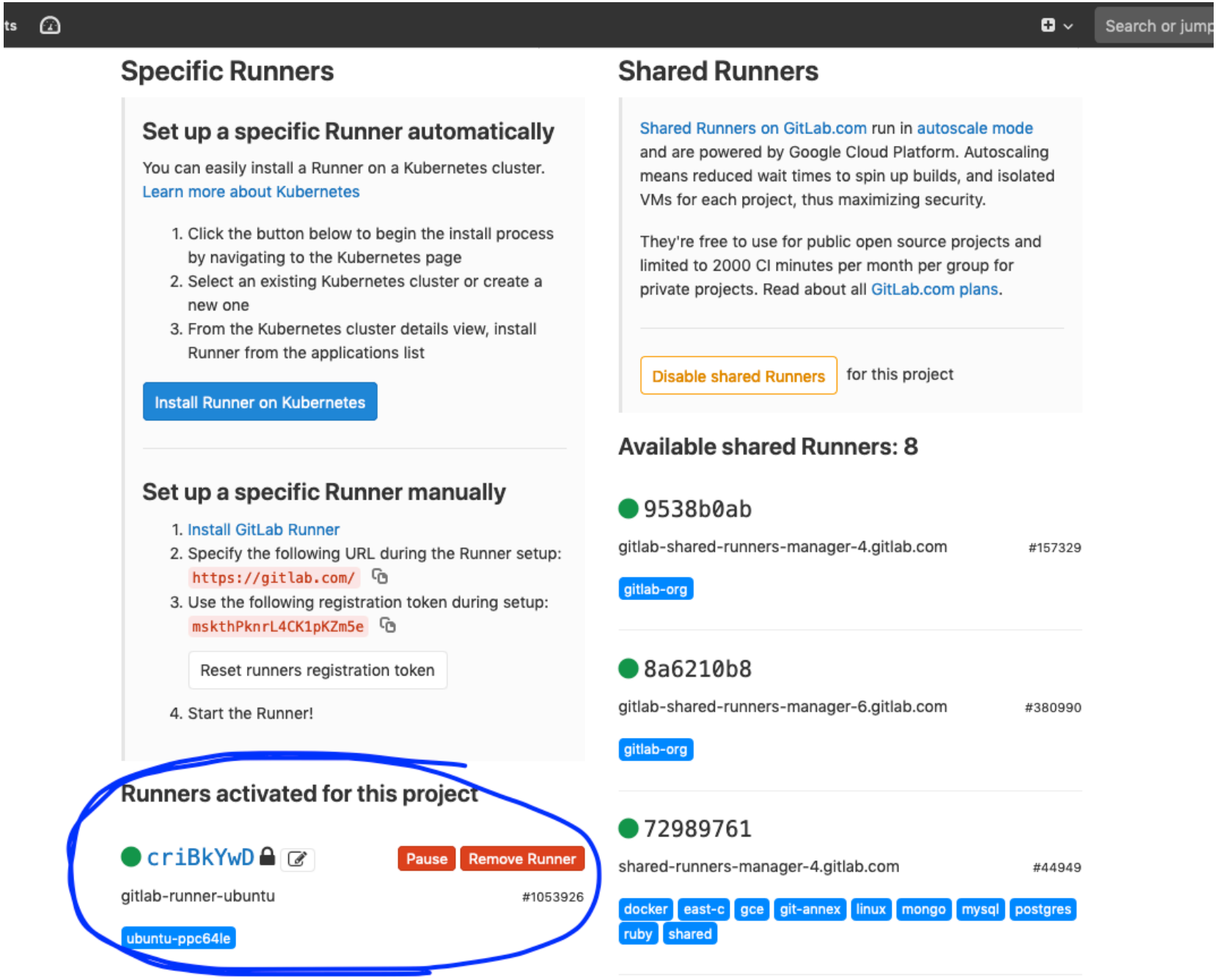
step 4: configure GitLab Runner




GitLab
Projects
Groups
Activity
Milestones
Snippets
Search or jump to...
hello-gitlab-on-power
Project
Repository
Issues 0
Merge Requests 0
CI / CD
Security & Compliance
Operations
Packages
Wiki
Snippets
Settings
General
Members
Integrations
Repository
CI / CD
Operations
Pages
Audit Events
active - Runner is active and can process any new jobs
paused - Runner is paused and will not receive any new jobs
To start serving your jobs you can either add specific Runners to your project or use shared Runners
Specific Runners
Set up a specific Runner automatically
You can easily install a Runner on a Kubernetes cluster.
Learn more about Kubernetes
1. Click the button below to begin the install process by navigating to the Kubernetes page
2. Select an existing Kubernetes cluster or create a new one
3. From the Kubernetes cluster details view, install Runner from the applications list
Install Runner on Kubernetes
Set up a specific Runner manually
1. Install GitLab Runner
2. Specify the following URL during the Runner setup:
https://gitlab.com/
3. Use the following registration token during setup:
mskthPknrL4CK1pKZm5e
Reset runners registration token
4. Start the Runner!
Shared Runners
Shared Runners on GitLab.com run in autoscale mode and are powered by Google Cloud Platform. Autoscaling means reduced wait times to spin up builds, and isolated VMs for each project, thus maximizing security.
They're free to use for public open source projects and limited to 2000 CI minutes per month per group for private projects. Read about all GitLab.com plans.
Disable shared Runners
for this project
Available shared Runners: 8
fa6cab46
shared-runners-manager-3.gitlab.com
#44028
docker
east-c
gce
git-annex
linux
mongo
mysql
postgres
ruby
shared
d5ae8d25
gitlab-shared-runners-manager-5.gitlab.com
#380989
gitlab-org
ed2dce3a

step 5: register GitLab Runner

```
root@gitlab-runner-ubuntu:~# gitlab-runner register
Running in system-mode.

Please enter the gitlab-ci coordinator URL (e.g. https://gitlab.com/):
https://gitlab.com/
Please enter the gitlab-ci token for this runner:
mskthPknrL4CK1pKZm5e
Please enter the gitlab-ci description for this runner:
[gitlab-runner-ubuntu]:
Please enter the gitlab-ci tags for this runner (comma separated):
ubuntu-ppc64le
Whether to run untagged builds [true/false]:
[false]:
Whether to lock the Runner to current project [true/false]:
[true]:
Registering runner... succeeded                     runner=mskthPkn
Please enter the executor: docker-ssh, shell, docker-ssh+machine, kubernetes, docker, parallels, ssh, virtualbox, docker+machine:
shell
Runner registered successfully. Feel free to start it, but if it's running already the config should be automatically reloaded!
```


Search or jump
Specific Runners
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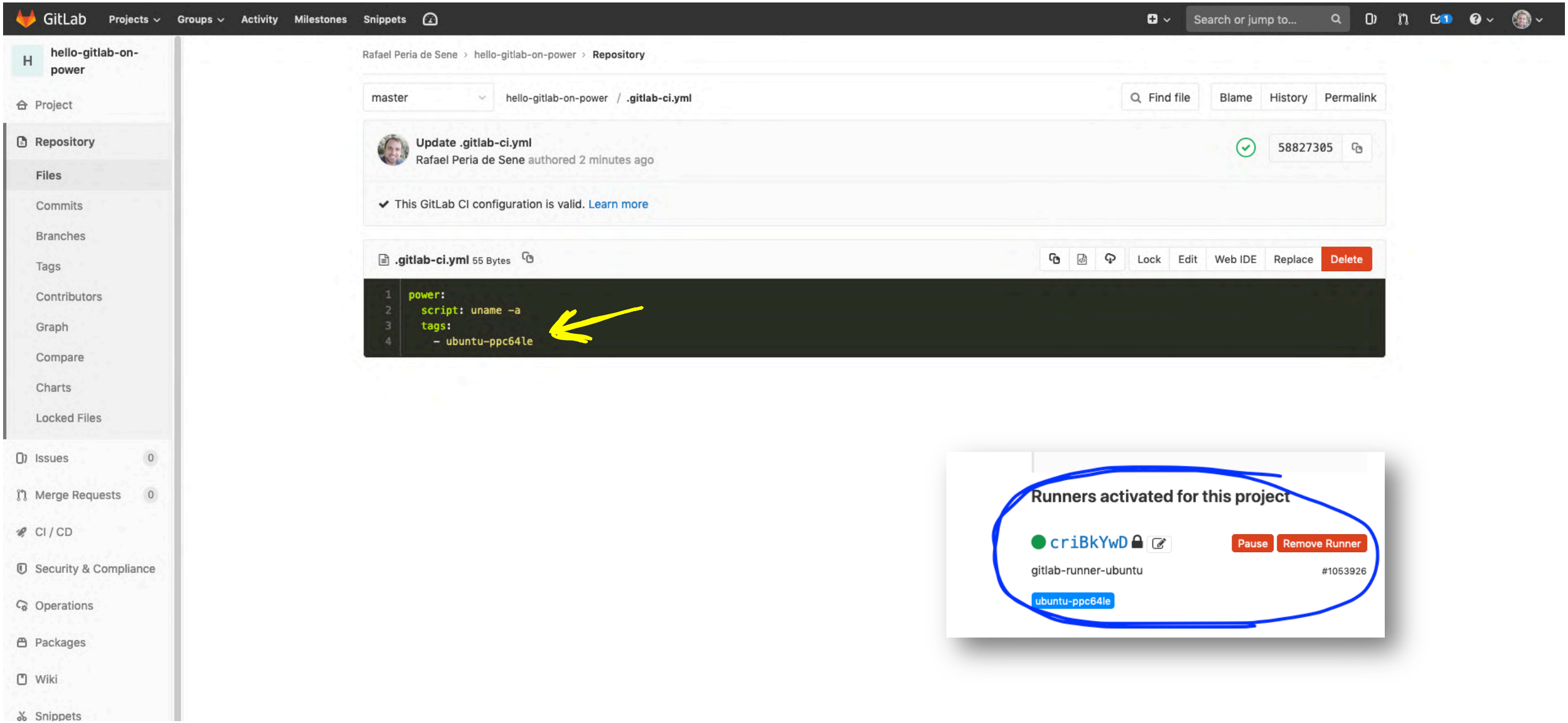
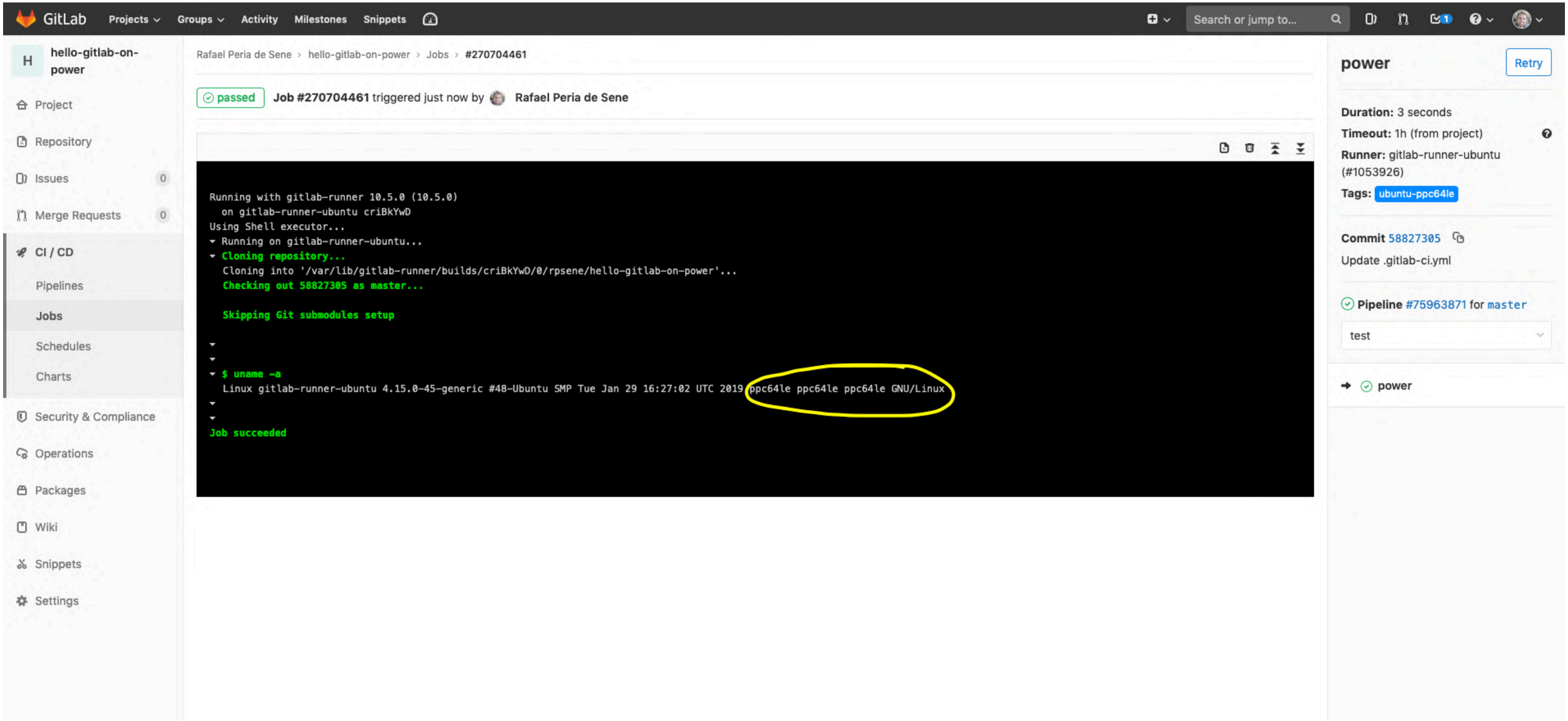
https://gitlab.com/
3. Use the following registration token during setup:
mskthPknrL4CK1pKZm5e
Reset runners registration token
4. Start the Runner!
Runners activated for this project
criBkYwD
Pause
Remove Runner
gitlab-runner-ubuntu
#1053926
ubuntu-ppc64le
Shared Runners
Shared Runners on GitLab.com run in autoscale mode and are powered by Google Cloud Platform. Autoscaling means reduced wait times to spin up builds, and isolated VMs for each project, thus maximizing security.
They're free to use for public open source projects and limited to 2000 CI minutes per month per group for private projects. Read about all GitLab.com plans.
Disable shared Runners
for this project
Available shared Runners: 8
9538b0ab
gitlab-shared-runners-manager-4.gitlab.com
#157329
gitlab-org
8a6210b8
gitlab-shared-runners-manager-6.gitlab.com
#380990
gitlab-org
72989761
shared-runners-manager-4.gitlab.com
#44949
docker
east-c
gce
git-annex
linux
mongo
mysql
postgres
ruby
shared

step 6: configure .gitlab-ci.yml




GitLab
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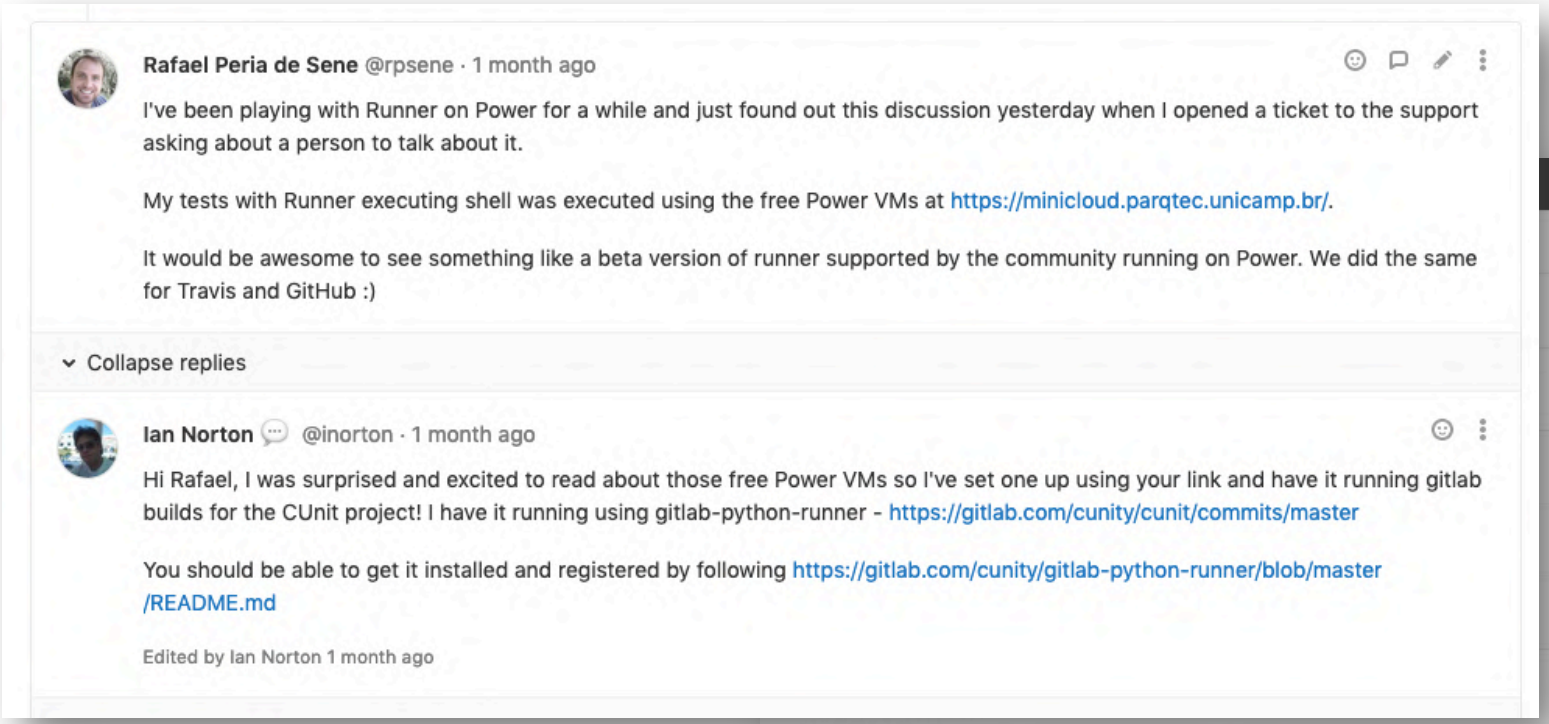
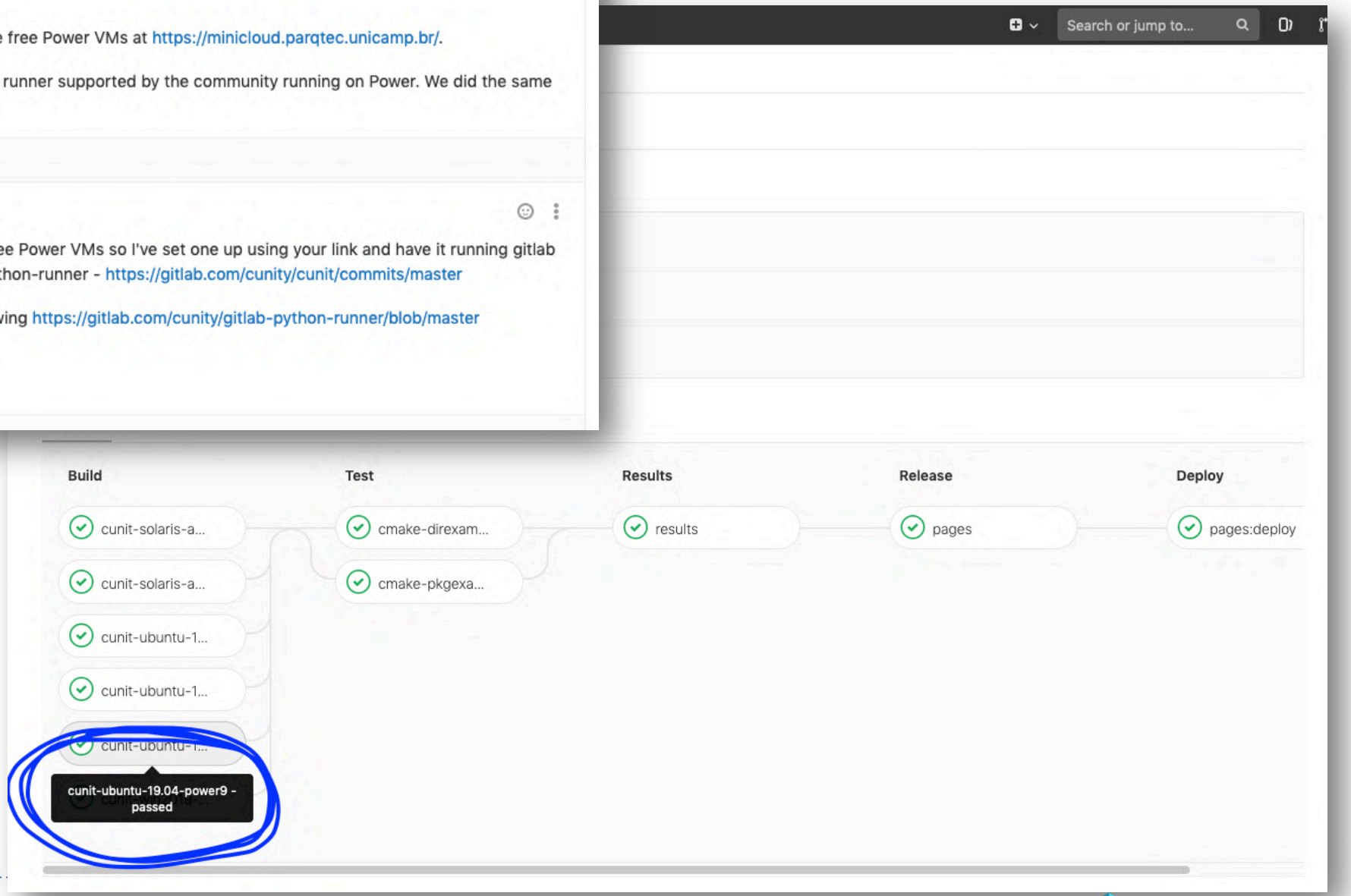
Search or jump to...
hello-gitlab-on-power
Project
Repository
Issues 0
Merge Requests 0
CI / CD
Pipelines
Jobs
Schedules
Charts
Security & Compliance
Operations
Packages
Wiki
Snippets
Settings
Rafael Peria de Sene › hello-gitlab-on-power › Jobs › #270704461
passed
Job #270704461 triggered just now by Rafael Peria de Sene
Running with gitlab-runner 10.5.0 (10.5.0)
on gitlab-runner-ubuntu criBkYwD
Using Shell executor...
Running on gitlab-runner-ubuntu...
Cloning repository...
Cloning into '/var/lib/gitlab-runner/builds/criBkYwD/0/rpsene/hello-gitlab-on-power'...
Checking out 58827305 as master...
Skipping Git submodules setup
$ uname -a
Linux gitlab-runner-ubuntu 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:27:02 UTC 2019 ppc64le ppc64le ppc64le GNU/Linux
Job succeeded
power
Retry
Duration: 3 seconds
Timeout: 1h (from project)
Runner: gitlab-runner-ubuntu (#1053926)
Tags: ubuntu-ppc64le
Commit 58827305
Update .gitlab-ci.yml
Pipeline #75963871 for master
test
power


Rafael Peria de Sene @rpsene · 1 month ago
I've been playing with Runner on Power for a while and just found out this discussion yesterday when I opened a ticket to the support asking about a person to talk about it.
My tests with Runner executing shell was executed using the free Power VMs at https://minicloud.parqtec.unicamp.br/.
It would be awesome to see something like a beta version of runner supported by the community running on Power. We did the same for Travis and GitHub :)
Collapse replies
Ian Norton @inorton · 1 month ago
Hi Rafael, I was surprised and excited to read about those free Power VMs so I've set one up using your link and have it running gitlab builds for the CUnit project! I have it running using gitlab-python-runner - https://gitlab.com/cunity/cunit/commits/master
You should be able to get it installed and registered by following https://gitlab.com/cunity/gitlab-python-runner/blob/master/README.md
Edited by Ian Norton 1 month ago


Search or jump to...
Build
Test
Results
Release
Deploy
cunit-solaris-a...
cunit-solaris-a...
cunit-ubuntu-1...
cunit-ubuntu-1...
cmake-direxam...
cmake-pkgexa...
results
pages
pages:deploy
cunit-ubuntu-19.04-power9 - passed

docs.gitlab.com/ee/ci/

So, what next?

More POWER

Better Documentation

More Advocacy

Thank You!

Rafael Sene - rpsene@br.ibm.com | rpsene.com