

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

федеральное государственное автономное
образовательное учреждение высшего образования
«Самарский национальный исследовательский университет
имени академика С.П. Королева»
(Самарский университет)

Институт информатики, математики и электроники
Факультет информатики
Кафедра суперкомпьютеров и общей информатики

Отчет по лабораторной работе №2

Дисциплина: «Development Operations»

Тема: «Git and CI»

Выполнил: Торжков И.И.

Группа: 6411-100503D

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STEPS

1. Download Gitlab-Bitnami vm image from <https://bitnami.com/stack/gitlab/virtual-machine>
2. Upload <https://github.com/olindata/sample-gitlabci-cpp-project> to your Gitlab server.
3. To unblock SSH <https://docs.bitnami.com/virtual-machine/faq/get-started/enable-ssh/>
4. <https://askubuntu.com/questions/204400/ssh-public-key-no-supported-authentication-methods-available-server-sent-publ>
5. Install GitLab Runner using the official GitLab repositories <https://docs.gitlab.com/runner/install/linux-repository.html>
6. Update `/etc/gitlab/gitlab.rb` to disable https on gitlab (yes, it is not for production)

```
# use here your IP, but is must be HTTP
external_url 'http://192.168.88.228'
nginx['redirect_http_to_https'] = false
nginx['ssl_verify_client'] = "off"
```

7. Reconfigure GitLab for the changes to take effect:

```
$ sudo gitlab-ctl reconfigure
```
8. Register runner. Choose **shell** executor type. Use your ip and registration-token for command below:

```
$ sudo gitlab-runner register --url http://192.168.88.228/ --registration-token
yqjsLYNFrbjaC-QhmycE
```

9. Edit `.gitlab-ci.yml` to run runner in shell mode (without Docker)

```
job:
  script:
    - g++ helloworld.cpp -o helloworld
    - ./verify.sh
```

10. Run Pipeline: **CI/CD > Pipelines > Run pipeline**

PROCEDURE

Download and run Gitlab-Bitnami vmimage.

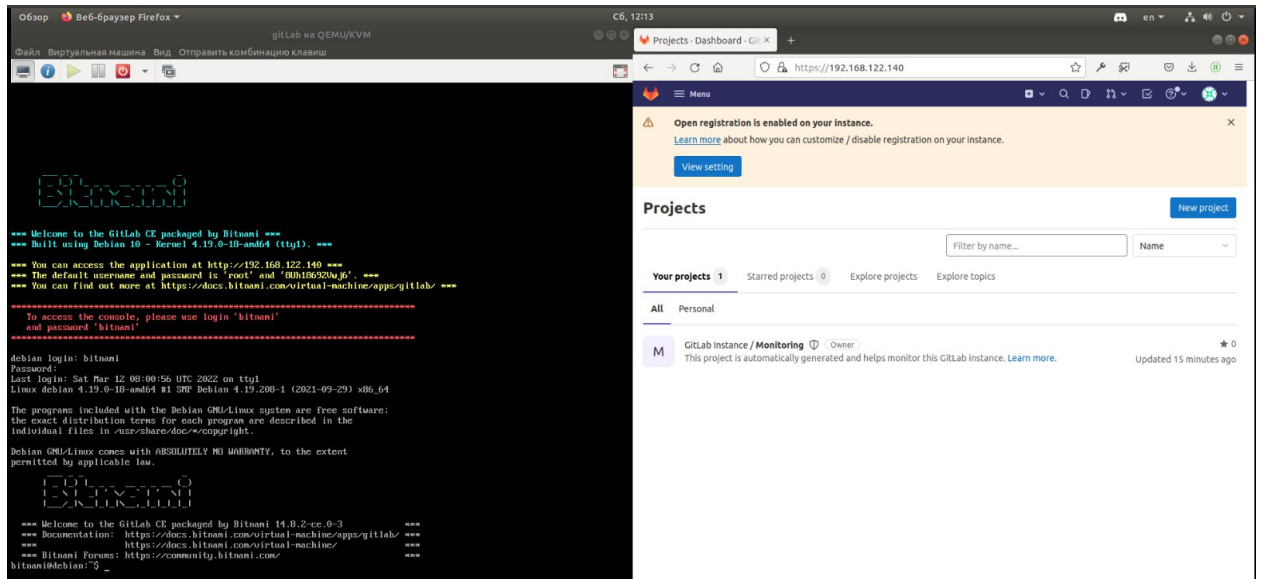


Figure 1

Upload <https://github.com/olindata/sample-gitlabci-cpp-project> to Gitlab server.

Create new repo.

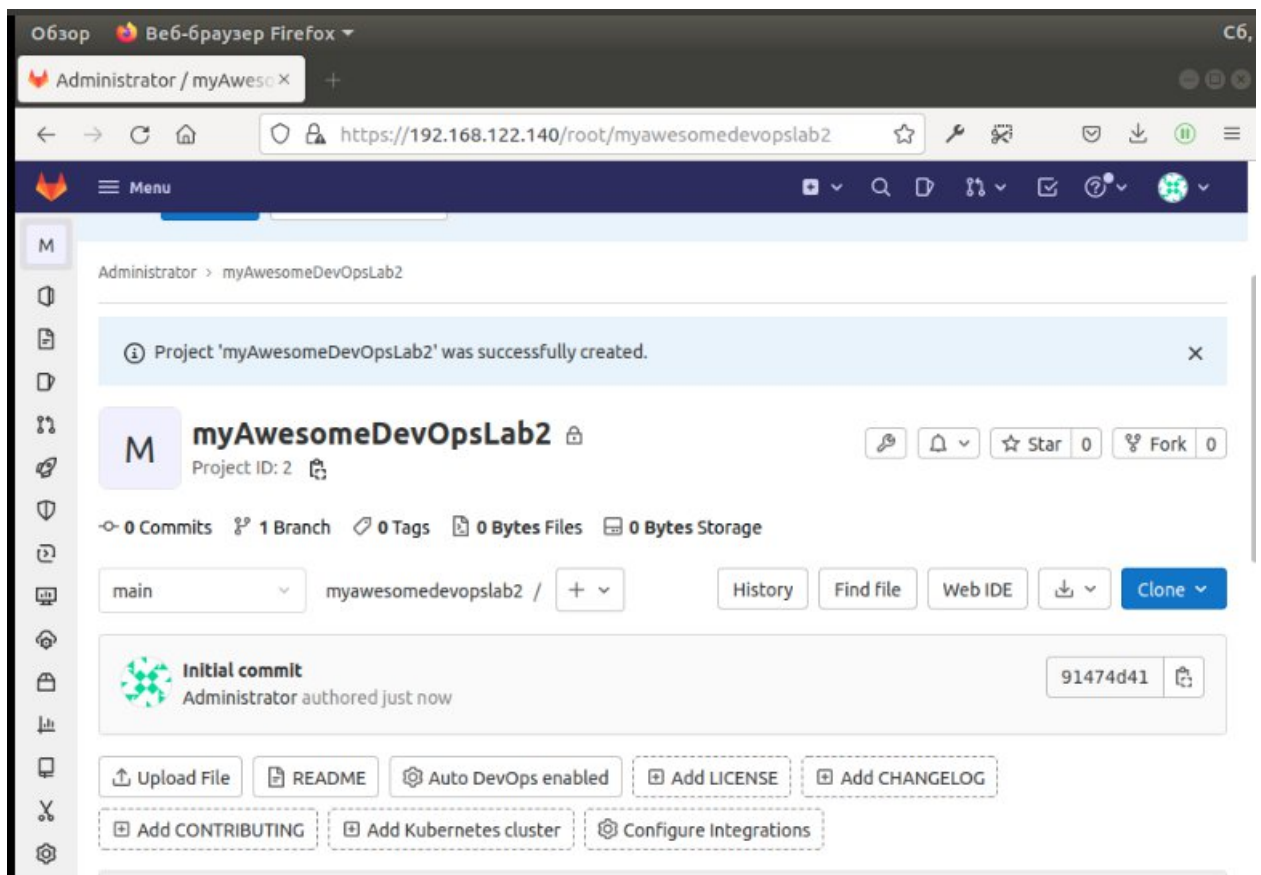
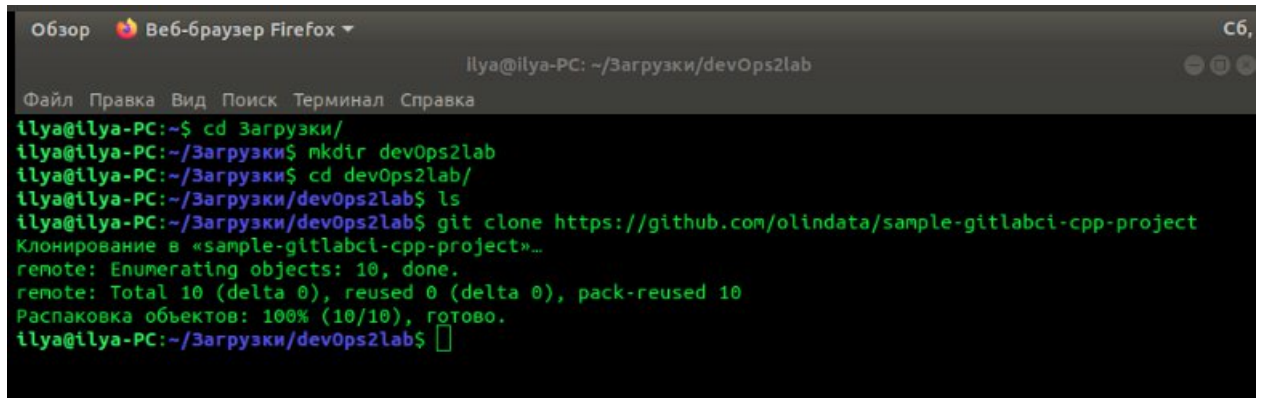


Figure 2

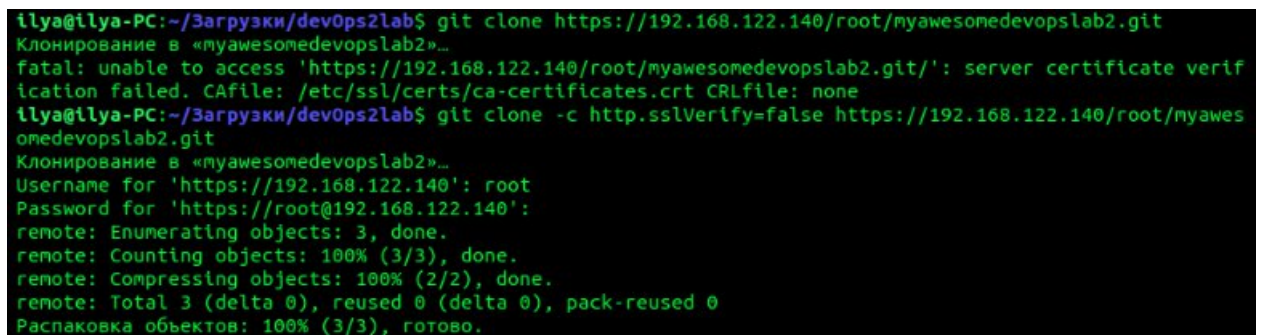
Clone project.



```
Обзор  Веб-браузер Firefox  C6,
ilya@ilya-PC: ~/Загрузки/devOps2lab
Файл Правка Вид Поиск Терминал Справка
ilya@ilya-PC:~$ cd Загрузки/
ilya@ilya-PC:~/Загрузки$ mkdir devOps2lab
ilya@ilya-PC:~/Загрузки$ cd devOps2lab/
ilya@ilya-PC:~/Загрузки/devOps2lab$ ls
ilya@ilya-PC:~/Загрузки/devOps2lab$ git clone https://github.com/olindata/sample-gitlabci-cpp-project
Клонирование в «sample-gitlabci-cpp-project»...
remote: Enumerating objects: 10, done.
remote: Total 10 (delta 0), reused 0 (delta 0), pack-reused 10
Распаковка объектов: 100% (10/10), готово.
ilya@ilya-PC:~/Загрузки/devOps2lab$
```

Figure 3

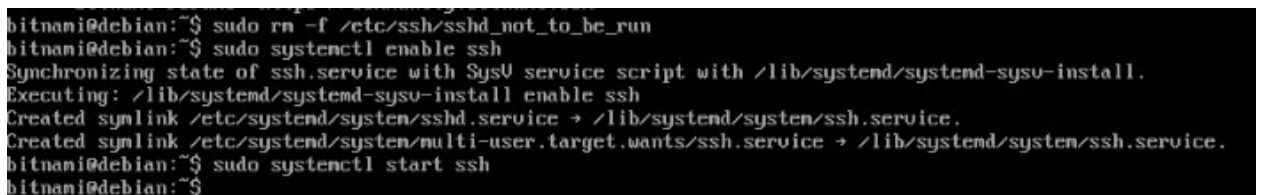
Upload project.



```
ilya@ilya-PC:~/Загрузки/devOps2lab$ git clone https://192.168.122.140/root/myawesomedevopslab2.git
Клонирование в «myawesomedevopslab2»...
fatal: unable to access 'https://192.168.122.140/root/myawesomedevopslab2.git/': server certificate verification failed. CAfile: /etc/ssl/certs/ca-certificates.crt CRLfile: none
ilya@ilya-PC:~/Загрузки/devOps2lab$ git clone -c http.sslVerify=false https://192.168.122.140/root/myawesomedevopslab2.git
Клонирование в «myawesomedevopslab2»...
Username for 'https://192.168.122.140': root
Password for 'https://root@192.168.122.140':
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Распаковка объектов: 100% (3/3), готово.
```

Figure 4

Unblock and configure SSH.



```
bitnani@debian:~$ sudo rm -f /etc/ssh/sshd_not_to_be_run
bitnani@debian:~$ sudo systemctl enable ssh
Synchronizing state of ssh.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable ssh
Created symlink /etc/systemd/system/ssh.service → /lib/systemd/system/ssh.service.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /lib/systemd/system/ssh.service.
bitnani@debian:~$ sudo systemctl start ssh
bitnani@debian:~$
```

Figure 5

```

#AllowAgentForwarding yes
#AllowTcpForwarding yes
#GatewayPorts no
X11Forwarding yes
#X11DisplayOffset 10
#X11UseLocalhost yes
#PermitTTY yes
PrintMotd no
#PrintLastLog yes
#TCPKeepAlive yes
#PermitUserEnvironment no
#Compression delayed

#ClientAliveCountMax 3
#UseDNS no
#PidFile /var/run/sshd.pid
#MaxStartups 10:30:100
#PermitTunnel no
#ChrootDirectory none
#VersionAddendum none

# no default banner path
#Banner none

# Allow client to pass locale environment variables
AcceptEnv LANG LC_*

# override default of no subsystems
Subsystem        sftp    /usr/lib/openssh/sftp-server

# Example of overriding settings on a per-user basis
#Match User anoncvs
#      X11Forwarding no
#      AllowTcpForwarding no
#      PermitTTY no
#      ForceCommand cvs server

ClientAliveInterval 180

Ciphers aes128-ctr,aes192-ctr,aes256-ctr,aes128-gcm@openssh.com,aes256-gcm@openssh.com,chacha20-poly1305@openssh.com

PasswordAuthentication yes

PermitRootLogin no
"/etc/ssh/sshd_config" 129L, 3420C written
bitnani@debian:~$ sudo /etc/init.d/ssh restart
[ ok ] Restarting ssh (via systemctl): ssh.service.
bitnani@debian:~$

```

Figure 6

Install GitLab Runner .

Download script from official site.

```

bitnani@debian:~$ curl "https://packages.gitlab.com/install/repositories/runner/gitlab-runner/script.deb.sh" | sudo bash
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 5945 100 5945    0     0 16985      0 --:--:-- --:--:-- --:--:-- 16985
Detected operating system as debian/buster.
Checking for curl...
Detected curl...
Checking for gpg...
Detected gpg...
Running apt-get update... done.
Installing debian-archive-keyring which is needed for installing
apt-transport-https on many Debian systems.
Installing apt-transport-https... done.
Installing /etc/apt/sources.list.d/runner_gitlab-runner.list...done.
Importing packagecloud gpg key... done.
Running apt-get update... done.

The repository is setup! You can now install packages.
bitnani@debian:~$

```

Figure 7

Execute script.

```
Suggested packages:
  git-daemon-run | git-daemon-sysvinit git-doc git-el git-email git-gui gitk gitweb git-cvs git-mediawiki git-svn
  docker-engine
The following NEW packages will be installed:
  git git-man gitlab-runner libcurl3-gnutls liberror-perl
0 upgraded, 5 newly installed, 0 to remove and 2 not upgraded.
Need to get 442 MB of archives.
After this operation, 508 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://deb.debian.org/debian buster/main amd64 libcurl3-gnutls amd64 7.64.0-4+deb10u2 [330 kB]
Get:2 http://deb.debian.org/debian buster/main amd64 liberror-perl all 0.17027-2 [30.9 kB]
Get:3 http://deb.debian.org/debian buster/main amd64 git-man all 1:2.20.1-2+deb10u3 [1,620 kB]
Get:5 http://deb.debian.org/debian buster/main amd64 git amd64 1:2.20.1-2+deb10u3 [5,633 kB]
Get:4 https://packages.gitlab.com/runner/gitlab-runner/debian buster/main amd64 gitlab-runner amd64 14.8.2 [434 MB]
Fetched 442 MB in 40s (11.0 MB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package libcurl3-gnutls:amd64.
(Reading database ... 109461 files and directories currently installed.)
Preparing to unpack .../libcurl3-gnutls_7.64.0-4+deb10u2_amd64.deb ...
Unpacking libcurl3-gnutls:amd64 (7.64.0-4+deb10u2) ...
Selecting previously unselected package liberror-perl.
Preparing to unpack .../liberror-perl_0.17027-2_all.deb ...
Unpacking liberror-perl (0.17027-2) ...
Selecting previously unselected package git-man.
Preparing to unpack .../git-man_1:3a2.20.1-2+deb10u3_all.deb ...
Unpacking git-man (1:2.20.1-2+deb10u3) ...
Selecting previously unselected package git.
Preparing to unpack .../git_1:3a2.20.1-2+deb10u3_amd64.deb ...
Unpacking git (1:2.20.1-2+deb10u3) ...
Selecting previously unselected package gitlab-runner.
Preparing to unpack .../gitlab-runner_14.8.2_amd64.deb ...
Unpacking gitlab-runner (14.8.2) ...
Setting up libcurl3-gnutls:amd64 (7.64.0-4+deb10u2) ...
Setting up liberror-perl (0.17027-2) ...
Setting up git-man (1:2.20.1-2+deb10u3) ...
Setting up git (1:2.20.1-2+deb10u3) ...
Setting up gitlab-runner (14.8.2) ...
GitLab Runner: creating gitlab-runner...
Home directory skeleton not used
Runtime platform                                arch=amd64 os=linux pid=7024 revision=c6e7e194 version=14.8.2
gitlab-runner: the service is not installed
Runtime platform                                arch=amd64 os=linux pid=7032 revision=c6e7e194 version=14.8.2
gitlab-ci-multi-runner: the service is not installed
Runtime platform                                arch=amd64 os=linux pid=7057 revision=c6e7e194 version=14.8.2
Runtime platform                                arch=amd64 os=linux pid=7097 revision=c6e7e194 version=14.8.2
INFO: Docker installation not found, skipping clear-docker-cache
Processing triggers for libc-bin (2.28-10) ...
bitnami@debian: $
```

Figure 8

Update /etc/gitlab/gitlab.rb to disable https on gitlab.

```
external_url 'http://192.168.122.140 '
```

```
nginx['redirect_http_to_https'] = false
```

```
nginx['ssl_verify_client'] = "off"
```



```

## GitLab Web server
##! Docs: https://docs.gitlab.com/omnibus/settings/nginx.html#using-a-non-bundled-web-server
#####

##! When bundled nginx is disabled we need to add the external webserver user to
##! the GitLab webserver group.
# web_server['external_users'] = []
# web_server['username'] = 'gitlab-www'
# web_server['group'] = 'gitlab-www'
# web_server['uid'] = nil
# web_server['gid'] = nil
# web_server['shell'] = '/bin/false'
# web_server['home'] = '/var/opt/gitlab/nginx'

#####

## GitLab NGINX
##! Docs: https://docs.gitlab.com/omnibus/settings/nginx.html
#####

# nginx['enable'] = true
# nginx['client_max_body_size'] = '250m'
# nginx['redirect_http_to_https'] = false
# nginx['redirect_http_to_https_port'] = 80

##! Most root CA's are included by default
# nginx['ssl_client_certificate'] = "/etc/gitlab/ssl/ca.crt"

##! enable/disable 2-way SSL client authentication
# nginx['ssl_verify_client'] = "off"

##! if ssl_verify_client on, verification depth in the client certificates chain
# nginx['ssl_verify_depth'] = "1"

# nginx['ssl_certificate'] = '/etc/gitlab/ssl/server.crt'
# nginx['ssl_certificate_key'] = '/etc/gitlab/ssl/server.key'
# nginx['ssl_ciphers'] = "ECDHE-ECDSA-AES128-GCM-SHA256:ECDHE-RSA-AES128-GCM-SHA256:ECDHE-ECDSA-AES256-GCM-SHA384:ECDHE-
56-GCM-SHA384:ECDHE-ECDSA-CHACHA20-POLY1305:ECDHE-RSA-CHACHA20-POLY1305:DHE-RSA-AES128-GCM-SHA256:DHE-RSA-AES256-GCM-SHA
# nginx['ssl_prefer_server_ciphers'] = "off"

##! **Recommended by: https://raymii.org/s/tutorials/Strong_SSL_Security_On_nginx.html
##! https://cipherli.st/**
# nginx['ssl_protocols'] = "TLSv1.2 TLSv1.3"

##! **Recommended in: https://nginx.org/en/docs/http/ngx_http_ssl_module.html**
# nginx['ssl_session_cache'] = "shared:SSL:10m"

"/etc/gitlab/gitlab.rb" 3028L, 133715C written
bitnami@debian:~$

```

Figure 9

Reconfigure GitLab.

```
* link[/var/opt/gitlab/grafana/conf] action create (up to date)
* link[/var/opt/gitlab/grafana/public] action create (up to date)
* directory[/opt/gitlab/etc/grafana/env] action create (up to date)
* ruby_block[populate Grafana configuration options] action run
  - execute the ruby block populate Grafana configuration options
* env_dir[/opt/gitlab/etc/grafana/env] action create
* directory[/opt/gitlab/etc/grafana/env] action create (up to date)
* file[/opt/gitlab/etc/grafana/env/SSL_CERT_DIR] action create (up to date)
  (up to date)
* template[/var/opt/gitlab/grafana/grafana.ini] action create (up to date)
* file[/var/opt/gitlab/grafana/provisioning/dashboards/gitlab_dashboards.yml] action create (up to date)
* file[/var/opt/gitlab/grafana/provisioning/datasources/gitlab_datasources.yml] action create (up to date)
* service[grafana] action nothing (skipped due to action :nothing)
* runit_service[grafana] action enable
* ruby_block[restart service] action nothing (skipped due to action :nothing)
* ruby_block[restart log service] action nothing (skipped due to action :nothing)
* ruby_block[reload log service] action nothing (skipped due to action :nothing)
* directory[/opt/gitlab/sv/grafana] action create (up to date)
* template[/opt/gitlab/sv/grafana/run] action create (up to date)
* directory[/opt/gitlab/sv/grafana/log] action create (up to date)
* directory[/opt/gitlab/sv/grafana/log/main] action create (up to date)
* template[/opt/gitlab/sv/grafana/log/config] action create (up to date)
* ruby_block[verify_chown_persisted_on_grafana] action nothing (skipped due to action :nothing)
* link[/var/log/gitlab/grafana/config] action create (up to date)
* template[/opt/gitlab/sv/grafana/log/run] action create (up to date)
* directory[/opt/gitlab/sv/grafana/env] action create (up to date)
* ruby_block[Delete unmanaged env files for grafana service] action run (skipped due to only_if)
* template[/opt/gitlab/sv/grafana/check] action create (skipped due to only_if)
* template[/opt/gitlab/sv/grafana/finish] action create (skipped due to only_if)
* directory[/opt/gitlab/sv/grafana/control] action create (up to date)
* link[/opt/gitlab/init/grafana] action create (up to date)
* file[/opt/gitlab/sv/grafana/down] action nothing (skipped due to action :nothing)
* directory[/opt/gitlab/service] action create (up to date)
* link[/opt/gitlab/service/grafana] action create (up to date)
* ruby_block[wait for grafana service socket] action run (skipped due to not_if)
  (up to date)
Recipe: gitlab::database_reindexing_disable
* crond_job[database-reindexing] action delete
  * file[/var/opt/gitlab/crond/database-reindexing] action delete (up to date)
  (up to date)
Recipe: nginx::enable
* runit_service[nginx] action restart (up to date)

Running handlers:
Running handlers complete
Chef Infra Client finished, 5/812 resources updated in 15 seconds
gitlab Reconfigured!
bitnami@debian:~$
```

Figure 10

Register runner. Choose shell executor type.

Get token.

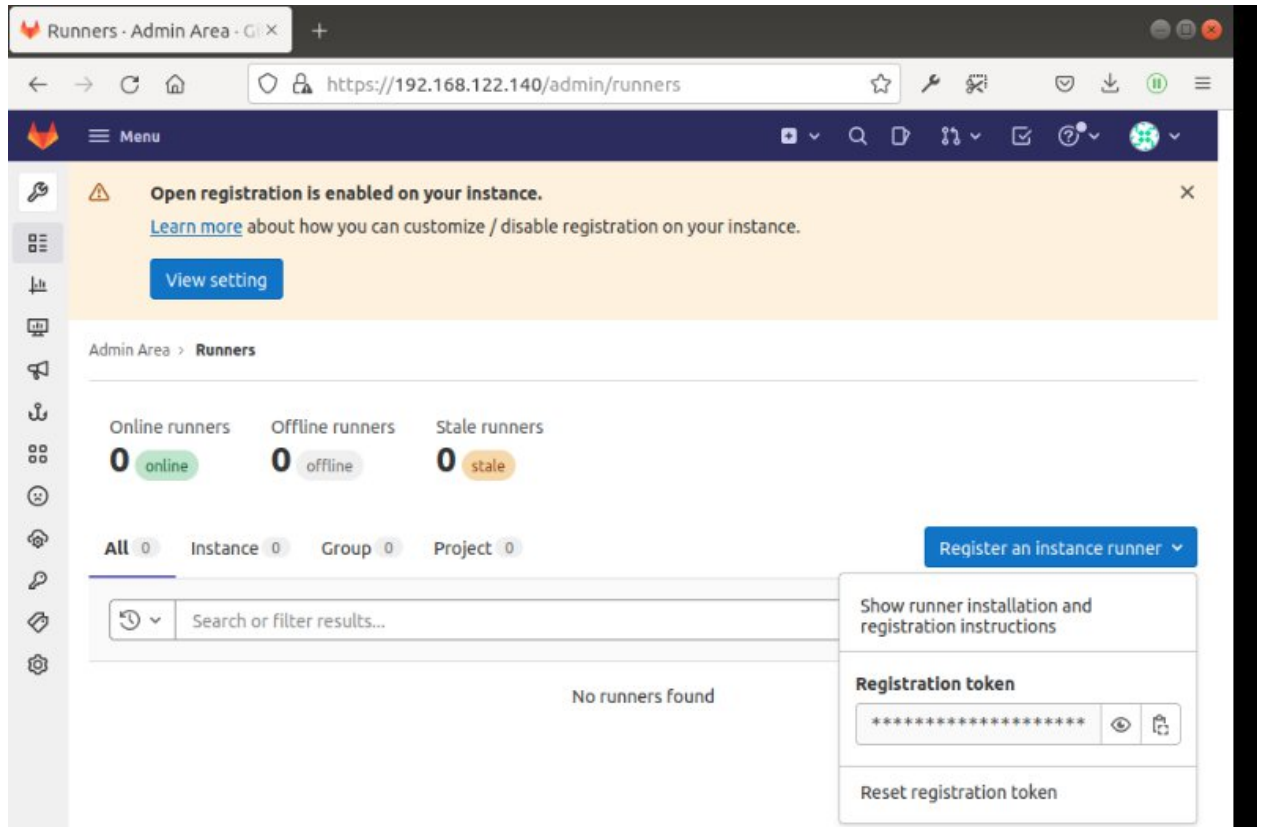


Figure 11

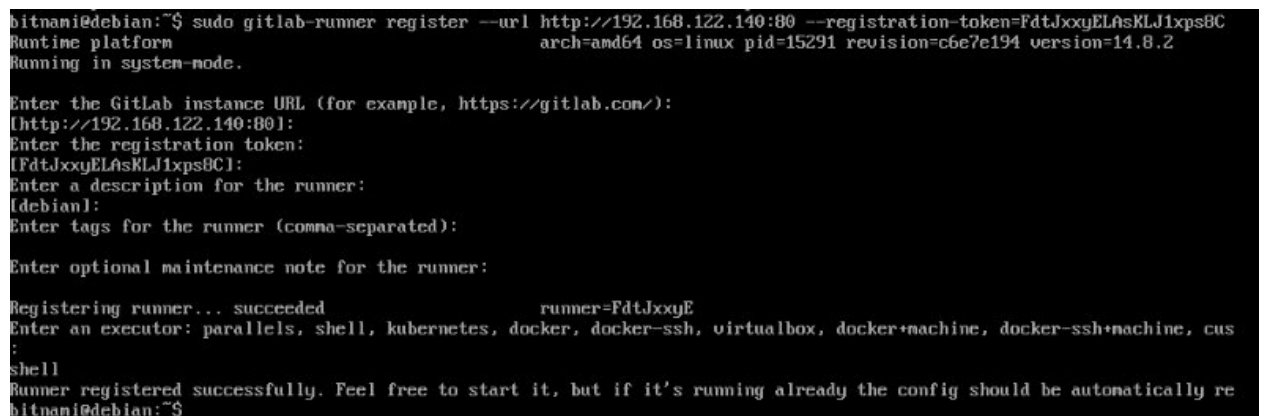


Figure 12

Edit `.gitlab-ci.yml` to run runner and run Pipeline.

The screenshot displays the GitLab web interface for a specific job. At the top, a notification banner states "Open registration is enabled on your instance." with a "View setting" button. Below this, the breadcrumb navigation shows "Administrator > myAwesomeDevOpsLab2 > Jobs > #3". The job status is "passed" and it was triggered 1 minute ago by the "Administrator".

The main panel shows the job's execution log, which includes the following steps:

- 1 Running with gitlab-runner 14.8.2 (c6e7e194)
- 2 on debian aVRQ8E1W
- 3 **Preparing the "shell" executor** (00:00)
- 4 Using Shell executor...
- 6 **Preparing environment** (00:00)
- 7 Running on debian...
- 9 **Getting source from Git repository** (00:00)
- 10 **Fetching changes with git depth set to 20...**
- 11 Reinitialized existing Git repository in /home/gitlab-runner/builds/aVRQ8E1W/0/root/myawesomedevopslab2/.git/
- 12 **Checking out 849ebdc2 as main...**
- 13 Removing helloworld
- 14 **Skipping Git submodules setup**
- 16 **Executing "step_script" stage of the job script** (00:01)
 - 17 \$ g++ helloworld.cpp -o helloworld
 - 18 \$./verify.sh
 - 19 Starting sample CI verification script
 - 20 Trying to execute ./helloworld
 - 21 Retval is 0, OK
 - 22 Output is correct, OK
 - 24 **Job succeeded**

The right sidebar provides additional job details: "Duration: 2 seconds", "Finished: 1 minute ago", "Timeout: 1h (from project)", and "Runner: #1 (aVRQ8E1W) debian". It also shows the "Commit 849ebdc2" and "step 9 fix". A dropdown menu for "Pipeline #3 for main" is set to "test". At the bottom, a "job" status is indicated with a green checkmark.

Figure 13

CONCLUSION

During the execution of the work, GitLab server was created, automatic software compilation and verification was configured, basic utilities for working with repositories, runners and pipelines were studied.