

Otomatisasi Deployment dan Monitoring Aplikasi Web Sederhana menggunakan CI/CD Pipeline di AWS

Penyediaan dan Automasi Layanan
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Latar Belakang

- Muncul kebutuhan untuk merancang sistem deployment yang sepenuhnya otomatis, terutama dengan alat seperti Git dan Jenkins untuk CI/CD di platform cloud seperti AWS.
- Tanpa otomasi dan monitoring yang memadai, identifikasi dan penanganan masalah menjadi lambat dan bersifat reaktif.

Rumusan Masalah

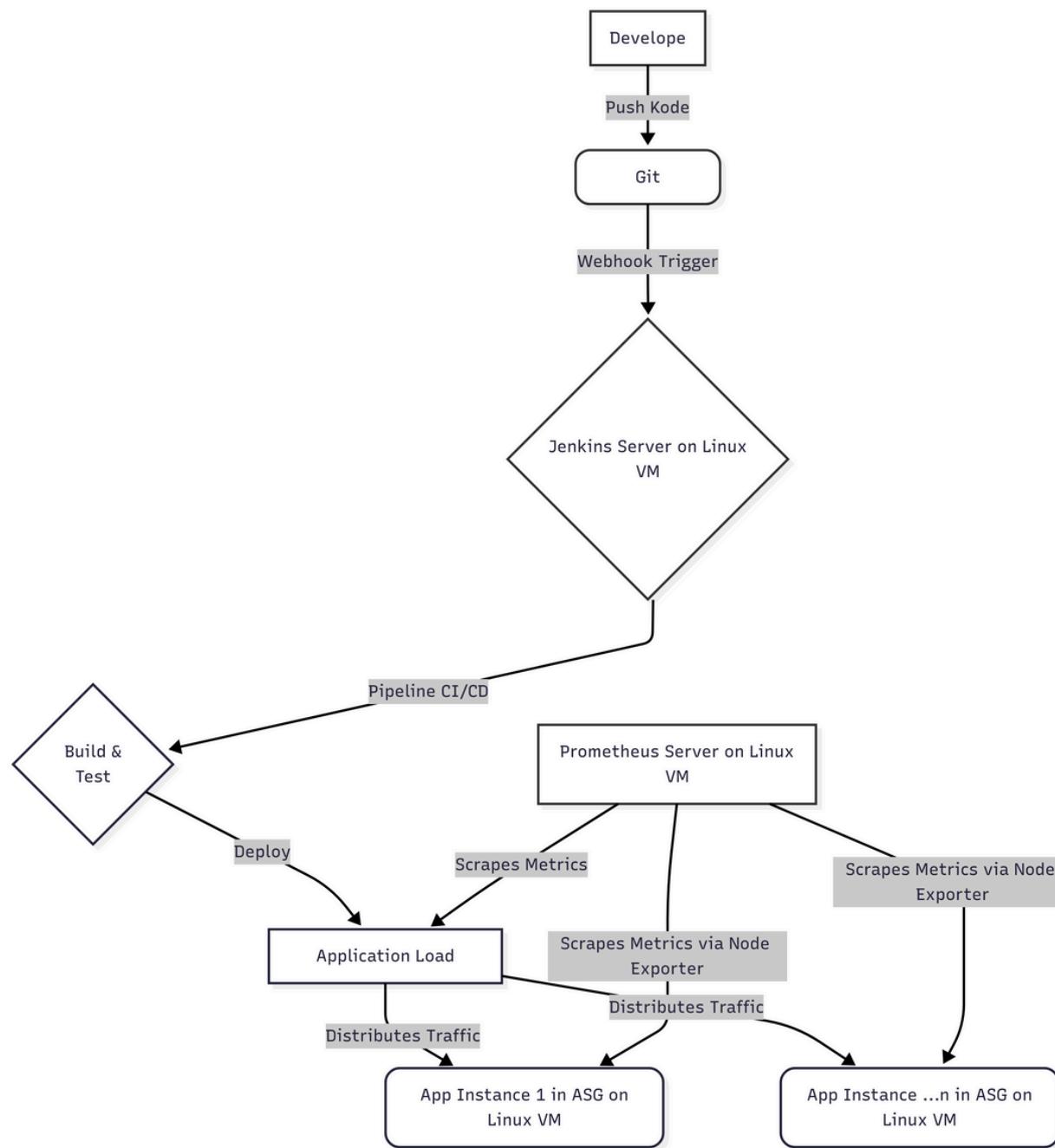
- Bagaimana merancang dan mengimplementasikan sebuah sistem deployment aplikasi web yang sepenuhnya otomatis dari repository kode hingga aplikasi berjalan di server?
- Bagaimana memanfaatkan Git dan Jenkins untuk membangun pipeline Continuous Integration/Continuous Deployment (CI/CD) yang efektif untuk aplikasi web di platform AWS?
- Bagaimana memastikan ketersediaan dan mempersiapkan skalabilitas aplikasi web di AWS menggunakan teknologi seperti Load Balancer dan konsep Autoscaling?
- Bagaimana melakukan monitoring performa aplikasi dan infrastruktur pendukungnya secara berkelanjutan?
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Tujuan Proyek

- Mengimplementasikan pipeline CI/CD menggunakan Git dan Jenkins untuk otomatisasi proses build, test, dan deploy aplikasi web sederhana.
- Melakukan deployment aplikasi web ke infrastruktur AWS EC2 yang didukung oleh Application Load Balancer untuk distribusi trafik dan peningkatan ketersediaan.
- Menganalisis, merencanakan, dan (jika waktu memungkinkan) mengimplementasikan dasar-dasar Autoscaling untuk menyesuaikan kapasitas aplikasi secara otomatis berdasarkan permintaan.
- Mengimplementasikan sistem monitoring dasar menggunakan Prometheus untuk memantau metrik kunci dari aplikasi dan infrastruktur AWS.

Desain Solusi

Diagram Alur Sistem



Penjelasan Komponen Utama:

- Git: Kontrol versi dan pemicu.
- Jenkins: Orkestrasi CI/CD.
- AWS EC2: Hosting aplikasi, Jenkins, Prometheus.
- AWS ALB: Distribusi trafik, ketersediaan.
- AWS ASG: Skalabilitas otomatis (direncanakan).
- Prometheus: Monitoring.

Alur Kerja CI/CD:

1. Developer push kode ke Git.
2. Webhook memicu build di Jenkins.
3. Jenkins: Checkout -> (Build) -> Test -> Deploy.
4. Aplikasi di-deploy ke instance EC2 di belakang ALB.
5. Prometheus memantau metrik.

Desain Solusi

Penjelasan Komponen Utama:

- Git: sistem kontrol versi untuk mengelola perubahan kode dan sebagai pemicu (trigger)
- Jenkins: Sebagai server otomasi utama
- Prometheus: Monitoring.

Alur Kerja CI/CD:

1. Developer push kode ke Git.
2. Webhook memicu build di Jenkins.
3. Jenkins: Checkout -> (Build) -> Test -> Deploy.
4. Aplikasi di-deploy ke instance EC2 di belakang ALB.
5. Prometheus memantau metrik.



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Rencana Penggunaan

Git (GitHub/GitLab):

akan digunakan untuk manajemen versi kode aplikasi dan Jenkinsfile, dengan strategi branching sederhana yang memicu pipeline CI/CD otomatis melalui webhook.

Jenkins

di-hosting di AWS EC2, akan menjadi engine utama pipeline CI/CD. Pipeline (didefinisikan via Jenkinsfile) akan mengotomatisasi checkout, build, tes sederhana, dan deployment ke AWS.



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Rencana Penggunaan

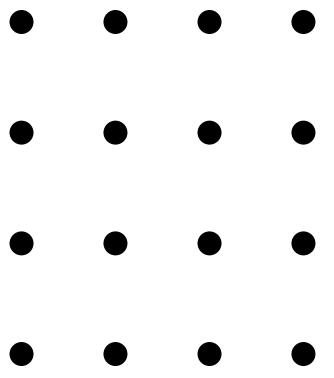
AWS Deployment

Platform Utama (EC2, ALB, ASG): Aplikasi web akan di-deploy ke AWS EC2. Application Load Balancer (ALB) akan mendistribusikan trafik untuk ketersediaan dan sebagai dasar skalabilitas. AWS Auto Scaling Groups (ASG) akan direncanakan dan dianalisis untuk penyesuaian kapasitas otomatis berdasarkan metrik, dengan implementasi awal mungkin berfokus pada penyiapan dasar.

Kubernetes/EKS

AWS EKS akan dieksplorasi dan dianalisis sebagai alternatif deployment canggih untuk aplikasi berbasis container, sebagai studi perbandingan atau pengembangan masa depan. Implementasi penuh EKS di luar cakupan awal.

Pembagian Kerja Tim

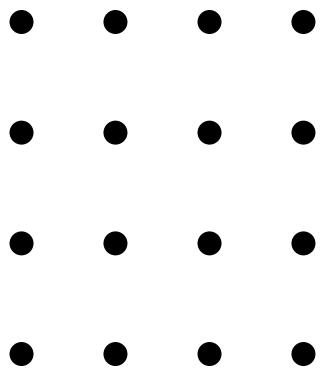


Anggota 1: Muhammad Faiz Fauzan

Tugas:

1. Melakukan analisis dan merencanakan pengembangan atau pemilihan aplikasi web sederhana yang akan dijadikan studi kasus.
2. Merencanakan setup dan konfigurasi repository Git, termasuk strategi branching dan alur kerja kolaborasi tim.
3. Merencanakan instalasi dan konfigurasi Jenkins Server, termasuk merancang struktur dasar Jenkinsfile untuk tahapan checkout, build (jika perlu), dan test awal.
4. Merencanakan strategi pengujian fungsional sederhana untuk aplikasi dan pipeline awal.
5. Berkontribusi dalam penyusunan bagian proposal dan dokumentasi awal terkait pemilihan aplikasi, manajemen kode, dan desain pipeline CI/CD.

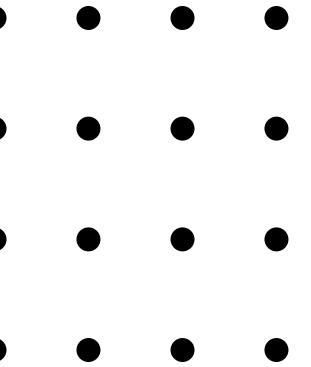
Pembagian Kerja Tim



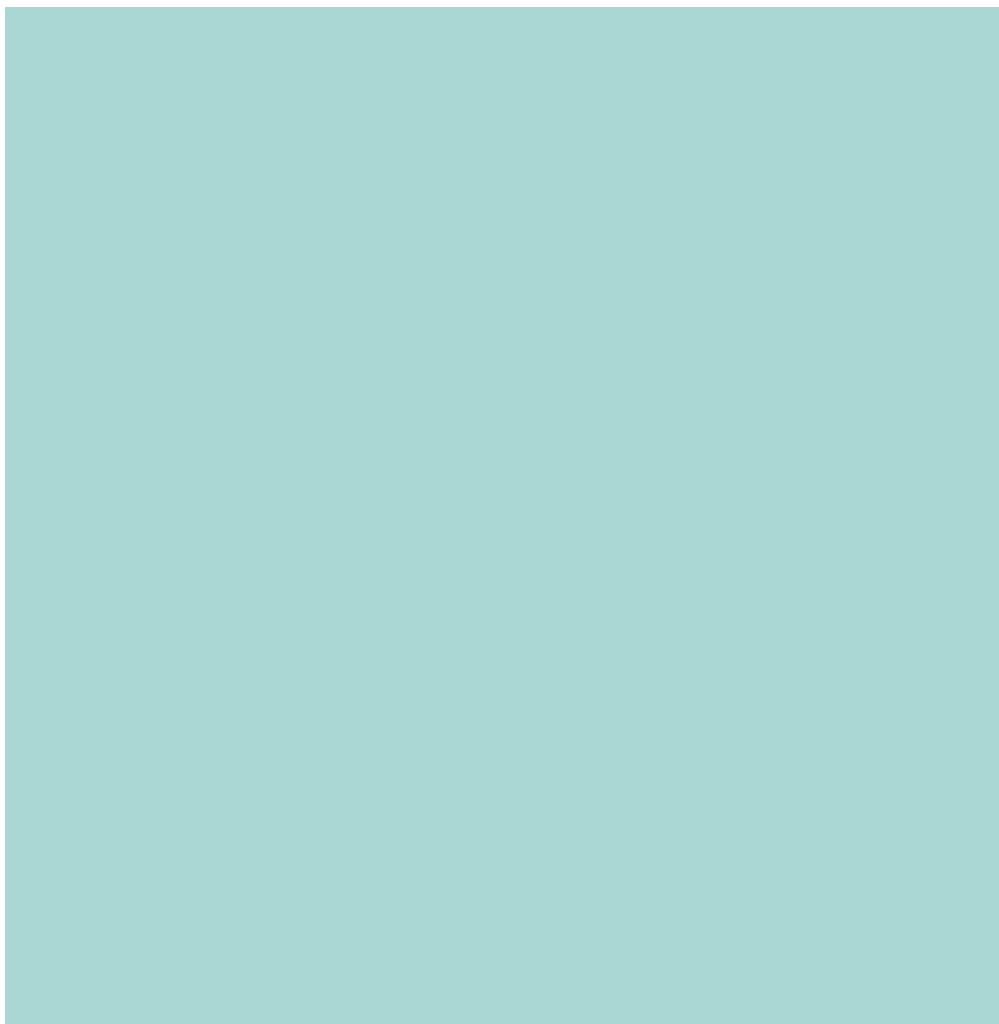
Anggota 2: Fira Zaha Iklila

Tugas:

1. Menganalisis kebutuhan dan merancang arsitektur infrastruktur di AWS, meliputi perencanaan untuk instance EC2 (aplikasi, Jenkins, Prometheus), Security Groups, IAM Roles, dan Application Load Balancer.
2. Melakukan perencanaan dan analisis untuk implementasi AWS Auto Scaling Groups.
3. Merencanakan arsitektur dan strategi monitoring menggunakan Prometheus, termasuk penentuan metrik kunci dan perencanaan instalasi exporters.
4. Merencanakan strategi pengujian performa sederhana untuk infrastruktur dan aplikasi.
5. Melakukan analisis komparatif awal mengenai opsi deployment (EC2 dengan ASG vs Kubernetes/EKS).
6. Berkontribusi dalam penyusunan bagian proposal dan dokumentasi awal terkait desain infrastruktur AWS, strategi deployment, rencana monitoring, dan analisis komparatif,



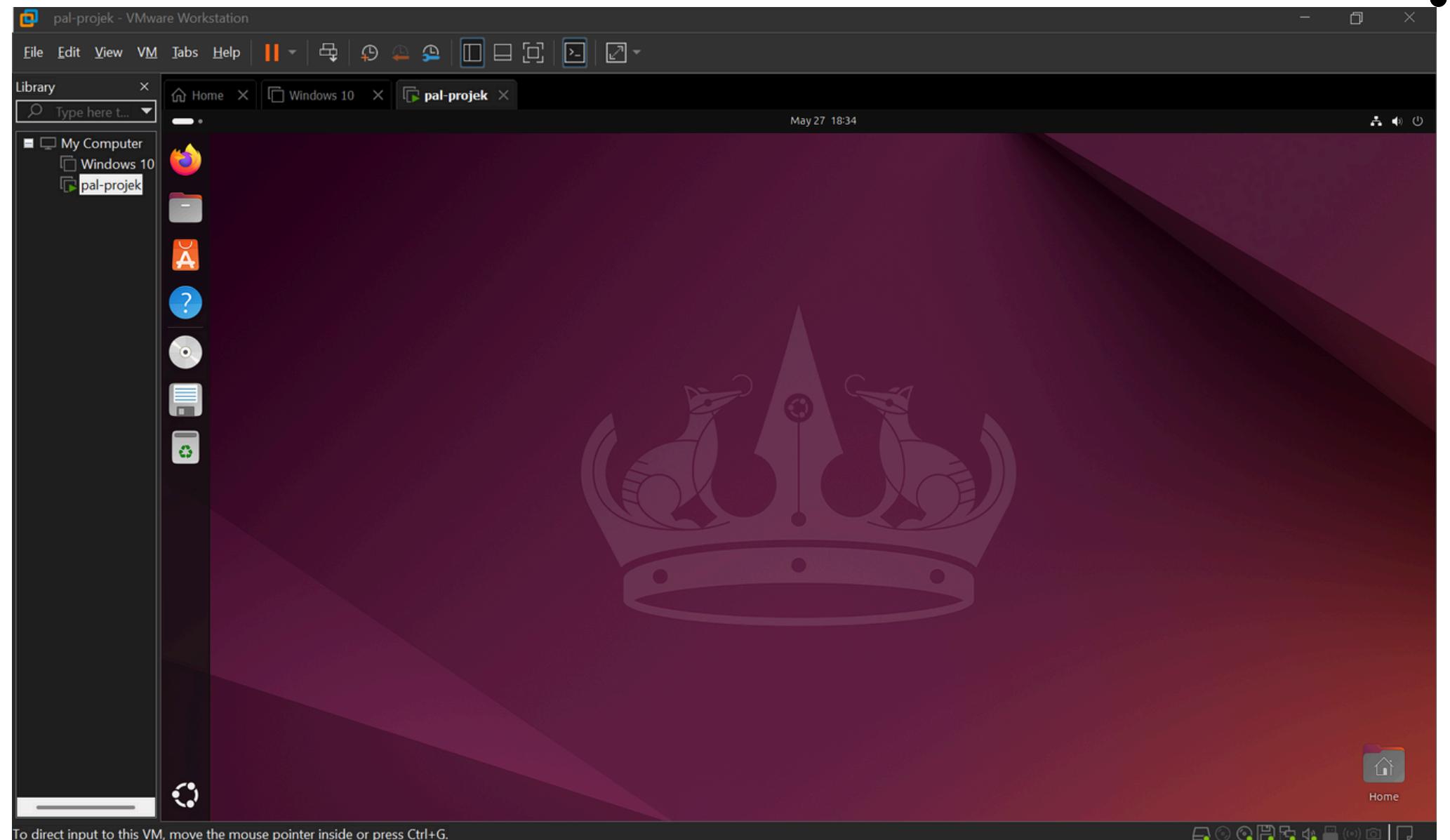
Progress



Langkah 0: Persiapan Awal



Instal VMware Workstation/Player di komputermu.



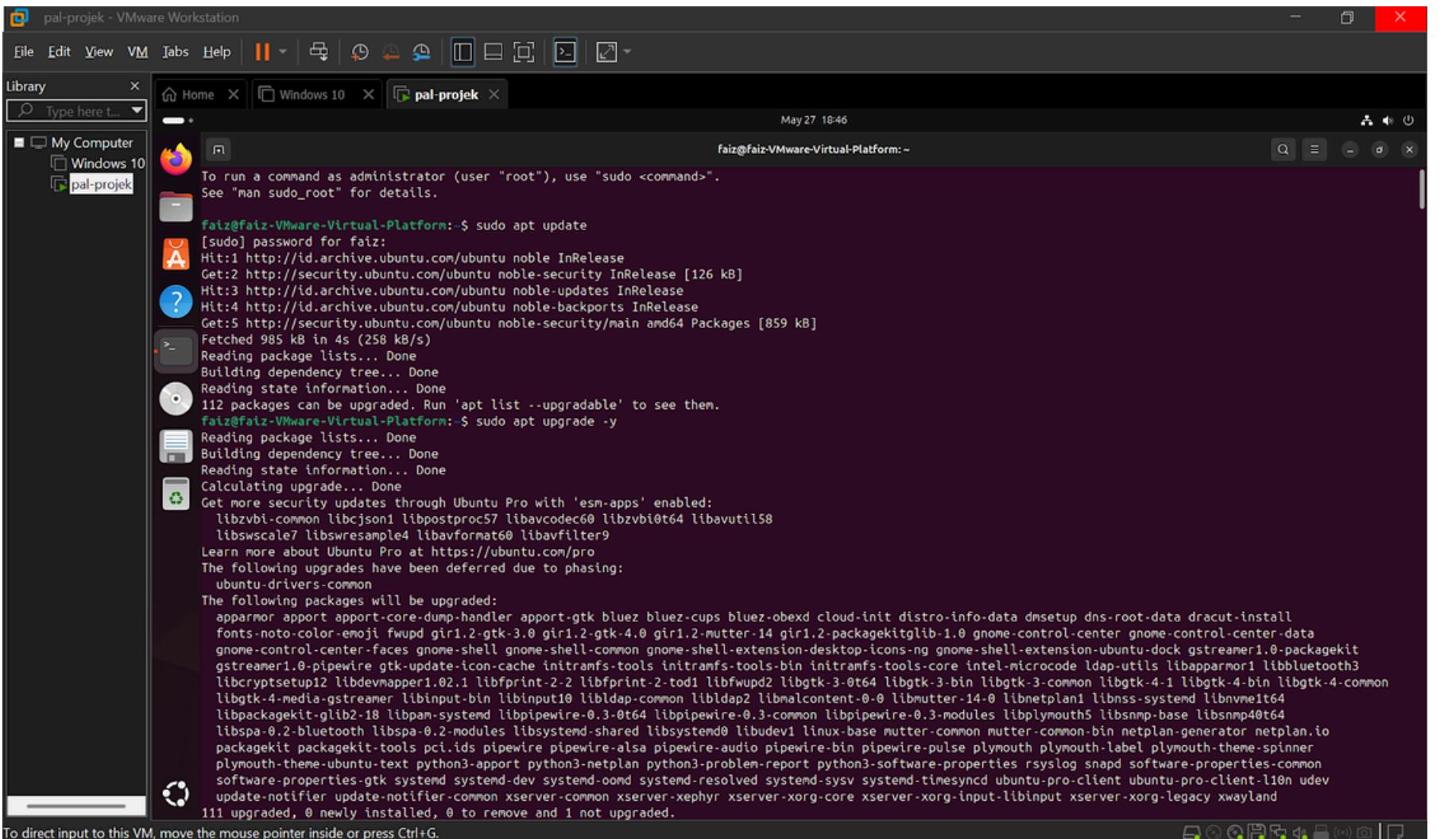
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Langkah 1: Instalasi Software Pendukung di VM Ubuntu

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Update Sistem

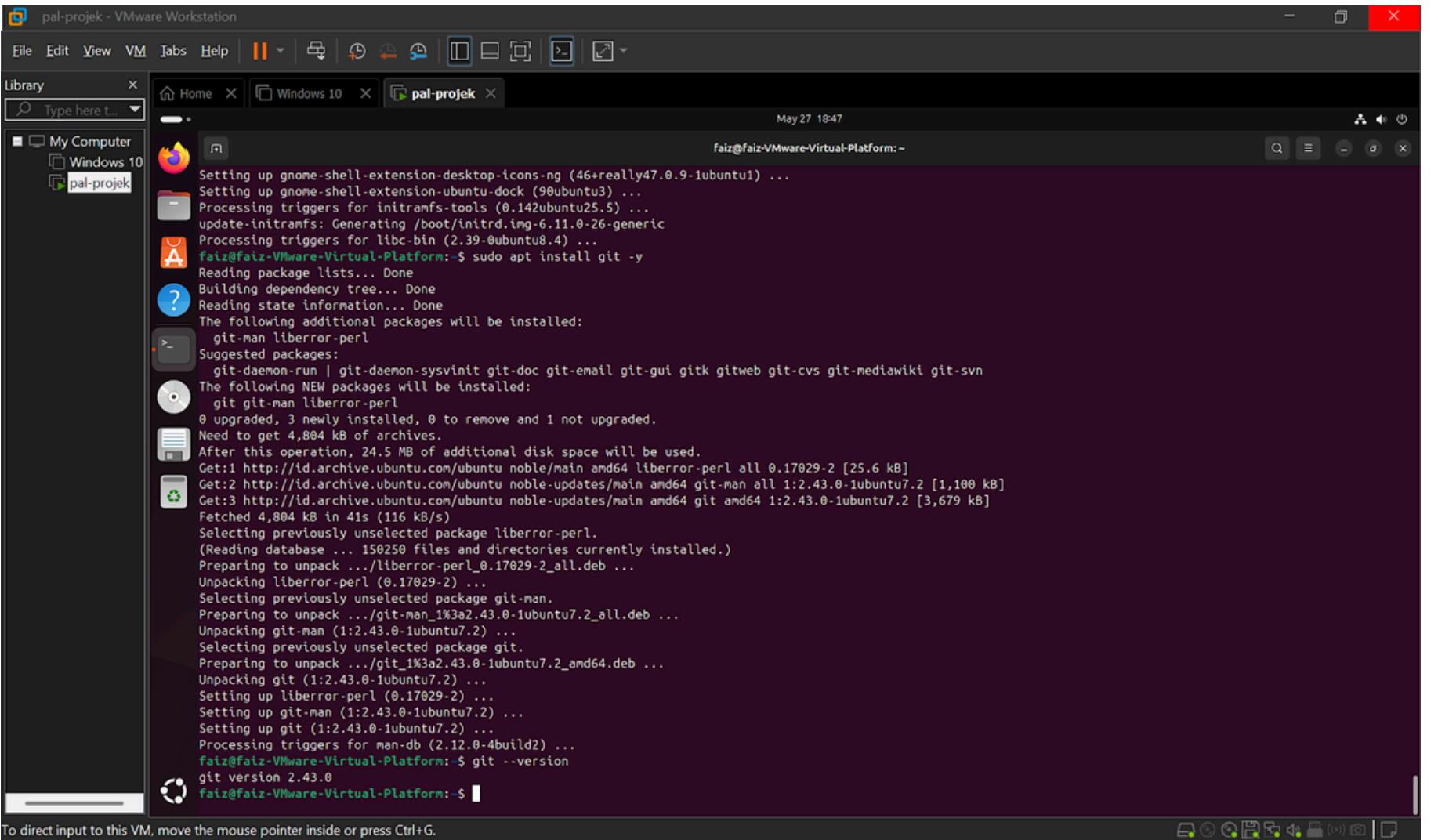


```
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
faiz@faiz-VMware-Virtual-Platform: ~$ sudo apt update  
[sudo] password for faiz:  
Hit:1 http://id.archive.ubuntu.com/ubuntu noble InRelease  
Get:2 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]  
Hit:3 http://id.archive.ubuntu.com/ubuntu noble-updates InRelease  
Hit:4 http://id.archive.ubuntu.com/ubuntu noble-backports InRelease  
Get:5 http://security.ubuntu.com/ubuntu noble-security/main amd64 Packages [859 kB]  
Fetched 985 kB in 4s (258 kB/s)  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
112 packages can be upgraded. Run 'apt list --upgradable' to see them.  
faiz@faiz-VMware-Virtual-Platform: ~$ sudo apt upgrade -y  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
Calculating upgrade... Done  
Get more security updates through Ubuntu Pro with 'esm-apps' enabled:  
libzvbi-common lib cJSON1 libpostproc57 libavcodec60 libzvbi0t64 libavutil58  
libswscale7 libwresample4 libavformat60 libavfilter9  
Learn more about Ubuntu Pro at https://ubuntu.com/pro  
The following upgrades have been deferred due to phasing:  
  ubuntu-drivers-common  
The following packages will be upgraded:  
  apparmor apport-core-dump-handler apport-gtk bluez bluez-cups bluez-obexd cloud-init distro-info-data dmsetup dns-root-data dracut-install  
  fonts-noto-color-emoji fwupd gir1.2-gtk-3.0 gir1.2-mutter-14 gir1.2-packagekitglib-1.0 gnome-control-center gnome-control-center-data  
  gnome-control-center-faces gnome-shell gnome-shell-common gnome-shell-extension-desktop-icons-ng gnome-shell-extension-ubuntu-dock gstreamer1.0-packagekit  
  gstreamer1.0-pipewire gtk-update-icon-cache initramfs-tools initramfs-tools-bin initramfs-tools-core intel-microcode ldap-utils libapparmor1 libbluetooth3  
  libcryptsetup2 libdevmapper1.02.1 libfprint-2-2 libfwupd2 libgtk-3-0t64 libgtk-3-bin libgtk-3-common libgtk-4-1 libgtk-4-2 libgtk-4-common  
  libgtk-4-media-gstreamer libinput-bin libinput10 libldap-common libldap2 libmalcontent-0-0 libmutter-14-0 libnetplan1 libnss-system libnvm1t64  
  libpackagekit-glib2-18 libpan-systemd libpipewire-0.3-0t64 libpipewire-0.3-common libpipewire-0.3-modules libplymouth5 libsnmp-base libsnmp40t64  
  libspa-0.2-bluetooth libspa-0.2-modules libsystemd-shared libudev1 linux-base mutter-common mutter-common-bin netplan-generator netplan.io  
  packagekit packagekit-tools pci.ids pipewire pipewire-alsa pipewire-audio pipewire-bin pipewire-pulse plymouth plymouth-label plymouth-theme-spinner  
  plymouth-theme-ubuntu-text python3-apport python3-netplan python3-problem-report python3-software-properties rsyslog snapd software-properties-common  
  software-properties-gtk systemd systemd-dev systemd-oomd systemd-resolved systemd-sysv systemd-timesyncd ubuntu-pro-client ubuntu-pro-client-l10n udev  
  update-notifier update-notifier-common xserver-common xserver-xephyr xserver-xorg-core xserver-xorg-input libinput xserver-xorg-legacy xwayland  
111 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

Langkah 1: Instalasi Software Pendukung di VM Ubuntu

Instal Git



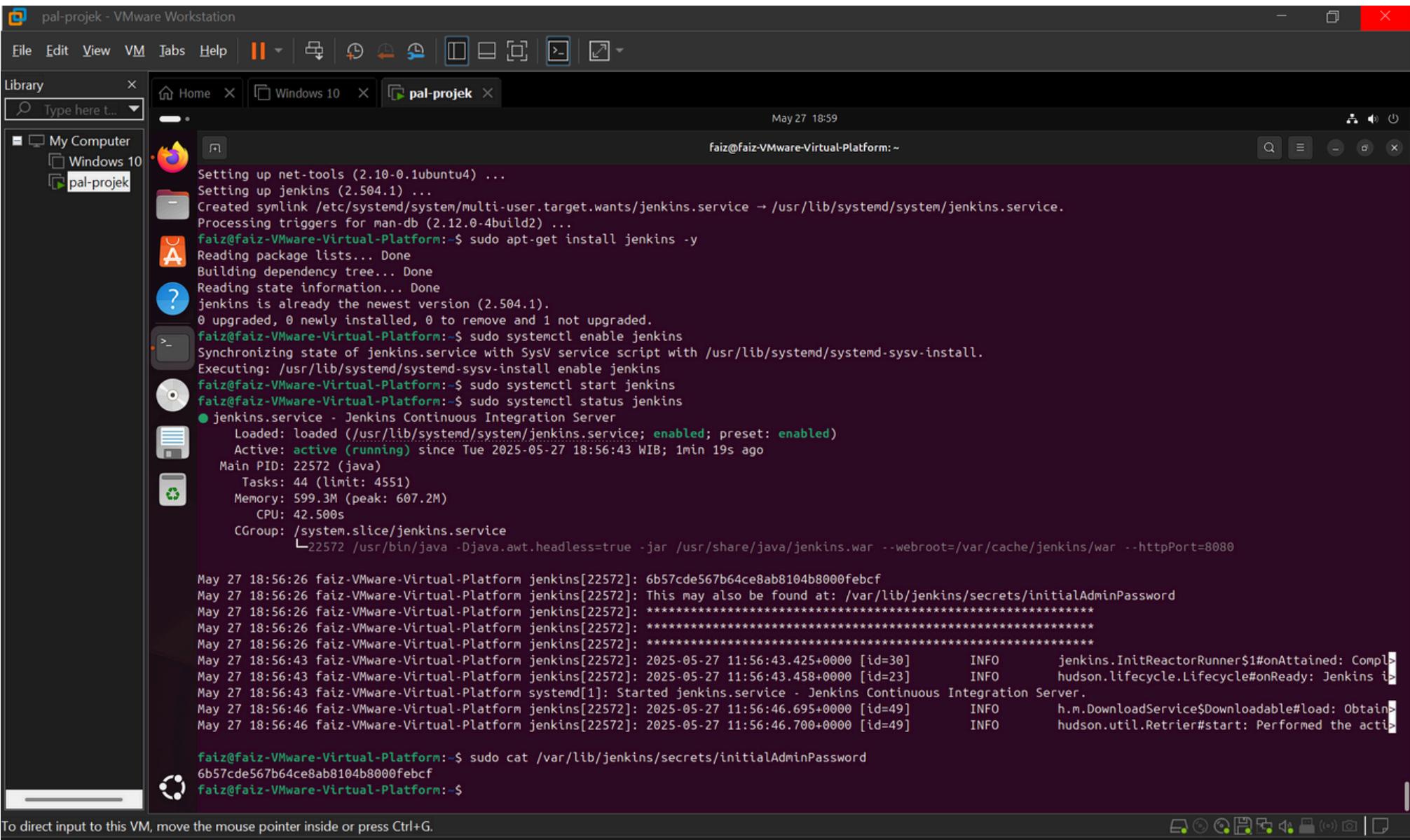
```
Setting up gnome-shell-extension-desktop-icons-ng (46+really47.0.9-1ubuntu1) ...
Setting up gnome-shell-extension-ubuntu-dock (90ubuntu3) ...
Processing triggers for initramfs-tools (0.142ubuntu25.5) ...
update-initramfs: Generating /boot/initrd.img-6.11.0-26-generic
Processing triggers for libc-bin (2.39-0ubuntu8.4) ...
faiz@faiz-VMware-Virtual-Platform:~$ sudo apt install git -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  git-man liberror-perl
Suggested packages:
  git-daemon-run | git-daemon-sysvinit git-doc git-email git-gui gitk gitweb git-cvs git-mediawiki git-svn
The following NEW packages will be installed:
  git git-man liberror-perl
0 upgraded, 3 newly installed, 0 to remove and 1 not upgraded.
Need to get 4,804 kB of additional disk space.
After this operation, 24.5 MB of additional disk space will be used.
Get:1 http://id.archive.ubuntu.com/ubuntu noble/amd64 liberror-perl all 0.17029-2 [25.6 kB]
Get:2 http://id.archive.ubuntu.com/ubuntu noble-updates/main amd64 git-man all 1:2.43.0-1ubuntu7.2 [1,100 kB]
Get:3 http://id.archive.ubuntu.com/ubuntu noble-updates/main amd64 git amd64 1:2.43.0-1ubuntu7.2 [3,679 kB]
Fetched 4,804 kB in 41s (116 kB/s)
Selecting previously unselected package liberror-perl.
(Reading database ... 150250 files and directories currently installed.)
Preparing to unpack .../liberror-perl_0.17029-2_all.deb ...
Unpacking liberror-perl (0.17029-2) ...
Selecting previously unselected package git-man.
Preparing to unpack .../git-man_1%3a2.43.0-1ubuntu7.2_all.deb ...
Unpacking git-man (1:2.43.0-1ubuntu7.2) ...
Selecting previously unselected package git.
Preparing to unpack .../git_1%3a2.43.0-1ubuntu7.2_amd64.deb ...
Unpacking git (1:2.43.0-1ubuntu7.2) ...
Setting up liberror-perl (0.17029-2) ...
Setting up git-man (1:2.43.0-1ubuntu7.2) ...
Setting up git (1:2.43.0-1ubuntu7.2) ...
Processing triggers for man-db (2.12.0-4build2) ...
faiz@faiz-VMware-Virtual-Platform:~$ git --version
git version 2.43.0
faiz@faiz-VMware-Virtual-Platform:~$
```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

Langkah 1: Instalasi Software Pendukung di VM Ubuntu

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Instal Jenkins



```
Setting up net-tools (2.10-0.1ubuntu4) ...
Setting up jenkins (2.504.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
faiz@faiz-VMware-Virtual-Platform:~$ sudo apt-get install jenkins -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
jenkins is already the newest version (2.504.1).
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl enable jenkins
Synchronizing state of jenkins.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable jenkins
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl start jenkins
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl status jenkins
● jenkins.service - Jenkins Continuous Integration Server
   Loaded: loaded (/usr/lib/systemd/system/jenkins.service; enabled; preset: enabled)
     Active: active (running) since Tue 2025-05-27 18:56:43 WIB; 1min 19s ago
       Main PID: 22572 (java)
          Tasks: 44 (limit: 4551)
            Memory: 599.3M (peak: 607.2M)
              CPU: 42.500s
            CGroup: /system.slice/jenkins.service
                ▾ 22572 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenkins/war --httpPort=8080

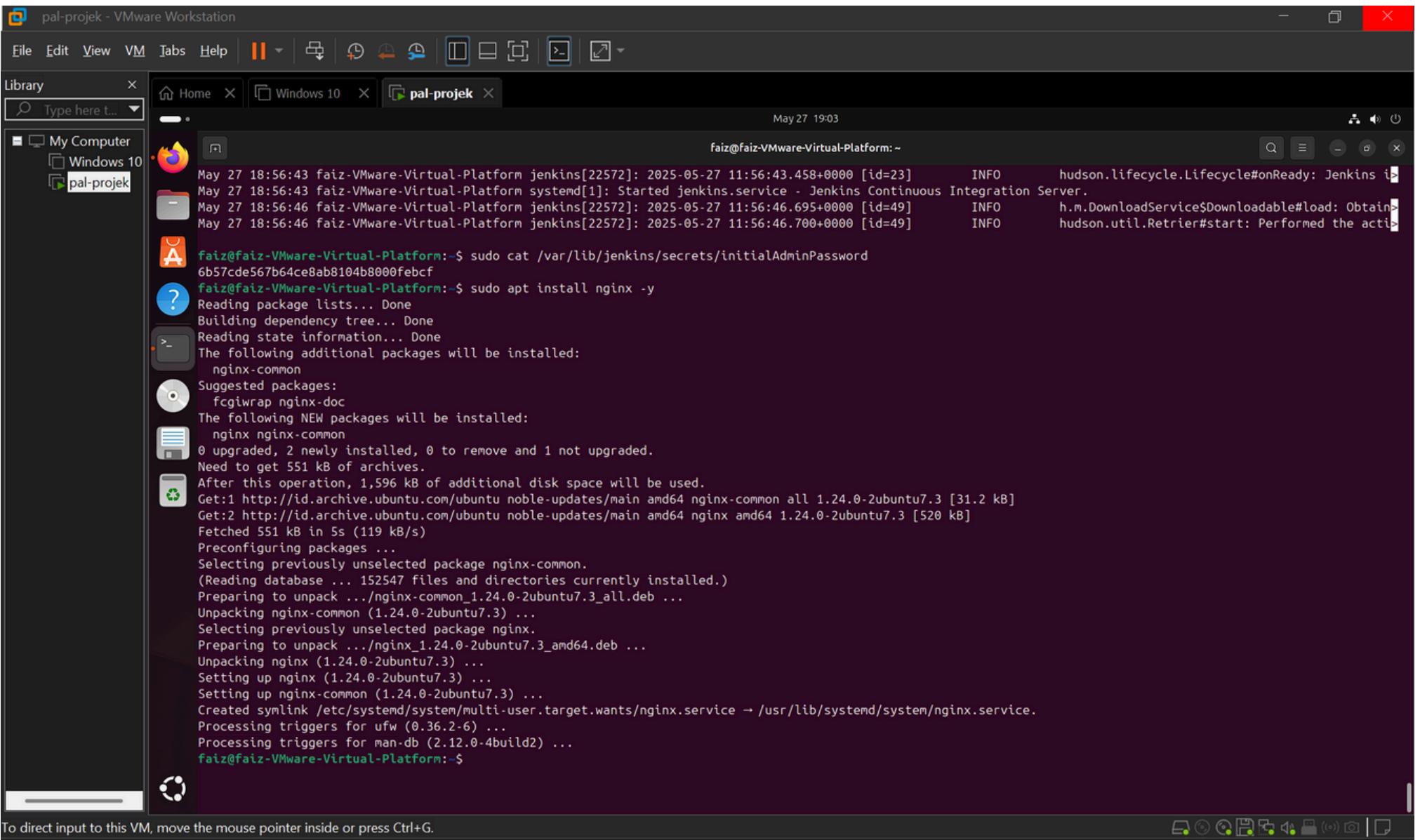
May 27 18:56:26 faiz-VMware-Virtual-Platform jenkins[22572]: 6b57cde567b64ce8ab8104b8000febfcf
May 27 18:56:26 faiz-VMware-Virtual-Platform jenkins[22572]: This may also be found at: /var/lib/jenkins/secrets/initialAdminPassword
May 27 18:56:26 faiz-VMware-Virtual-Platform jenkins[22572]: ****
May 27 18:56:26 faiz-VMware-Virtual-Platform jenkins[22572]: ****
May 27 18:56:26 faiz-VMware-Virtual-Platform jenkins[22572]: ****
May 27 18:56:43 faiz-VMware-Virtual-Platform jenkins[22572]: 2025-05-27 11:56:43.425+0000 [id=30]      INFO      jenkins.InitReactorRunner$1#onAttained: Comp...
May 27 18:56:43 faiz-VMware-Virtual-Platform jenkins[22572]: 2025-05-27 11:56:43.458+0000 [id=23]      INFO      hudson.lifecycle.Lifecycle#onReady: Jenkins i...
May 27 18:56:43 faiz-VMware-Virtual-Platform systemd[1]: Started jenkins.service - Jenkins Continuous Integration Server.
May 27 18:56:46 faiz-VMware-Virtual-Platform jenkins[22572]: 2025-05-27 11:56:46.695+0000 [id=49]      INFO      h.m.DownloadService$Downloadable#load: Obtain...
May 27 18:56:46 faiz-VMware-Virtual-Platform jenkins[22572]: 2025-05-27 11:56:46.700+0000 [id=49]      INFO      hudson.util.Retriger#start: Performed the acti...

faiz@faiz-VMware-Virtual-Platform:~$ sudo cat /var/lib/jenkins/secrets/initialAdminPassword
6b57cde567b64ce8ab8104b8000febfcf
faiz@faiz-VMware-Virtual-Platform:~$
```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

Langkah 1: Instalasi Software Pendukung di VM Ubuntu

Instal Nginx



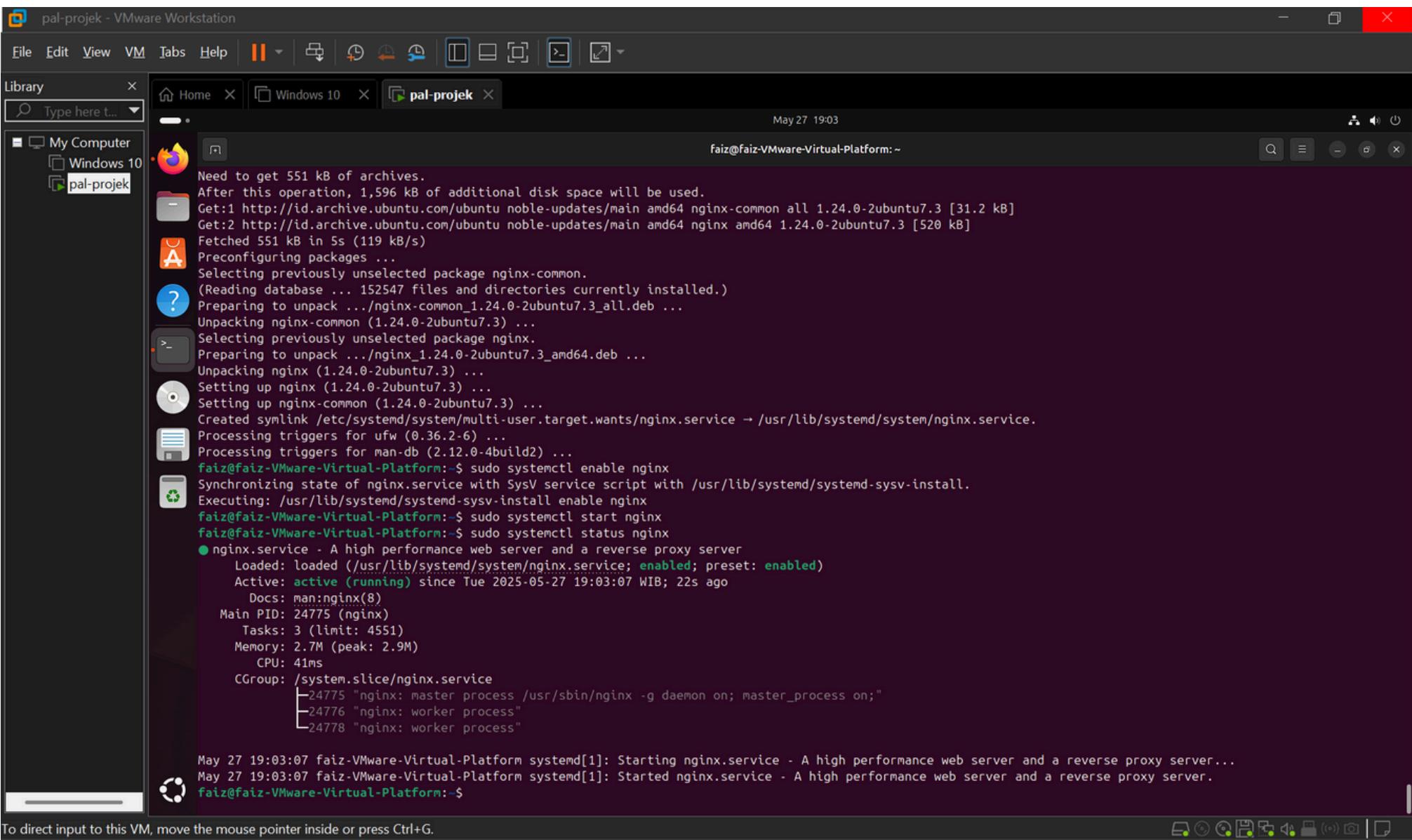
The screenshot shows a VMware Workstation interface with a Linux virtual machine named 'pal-projek'. The terminal window displays the following command-line session:

```
faiz@faiz-VMware-Virtual-Platform:~$ sudo apt install nginx -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  nginx-common
  suggested packages:
  fcgiwrap nginx-doc
The following NEW packages will be installed:
  nginx nginx-common
0 upgraded, 2 newly installed, 0 to remove and 1 not upgraded.
Need to get 551 kB of archives.
After this operation, 1,596 kB of additional disk space will be used.
Get:1 http://id.archive.ubuntu.com/ubuntu noble-updates/main amd64 nginx-common all 1.24.0-2ubuntu7.3 [31.2 kB]
Get:2 http://id.archive.ubuntu.com/ubuntu noble-updates/main amd64 nginx amd64 1.24.0-2ubuntu7.3 [520 kB]
Fetched 551 kB in 5s (119 kB/s)
Preconfiguring packages ...
Selecting previously unselected package nginx-common.
(Reading database ... 152547 files and directories currently installed.)
Preparing to unpack .../nginx-common_1.24.0-2ubuntu7.3_all.deb ...
Unpacking nginx-common (1.24.0-2ubuntu7.3) ...
Selecting previously unselected package nginx.
Preparing to unpack .../nginx_1.24.0-2ubuntu7.3_amd64.deb ...
Unpacking nginx (1.24.0-2ubuntu7.3) ...
Setting up nginx (1.24.0-2ubuntu7.3) ...
Setting up nginx-common (1.24.0-2ubuntu7.3) ...
Created symlink /etc/systemd/system/multi-user.target.wants/nginx.service → /usr/lib/systemd/system/nginx.service.
Processing triggers for ufw (0.36.2-6) ...
Processing triggers for man-db (2.12.0-4build2) ...
faiz@faiz-VMware-Virtual-Platform:~$
```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

Langkah 1: Instalasi Software Pendukung di VM Ubuntu

Start dan enable semua aplikasi yang sudah kami install sebelumnya (Jenkins, Nginx)

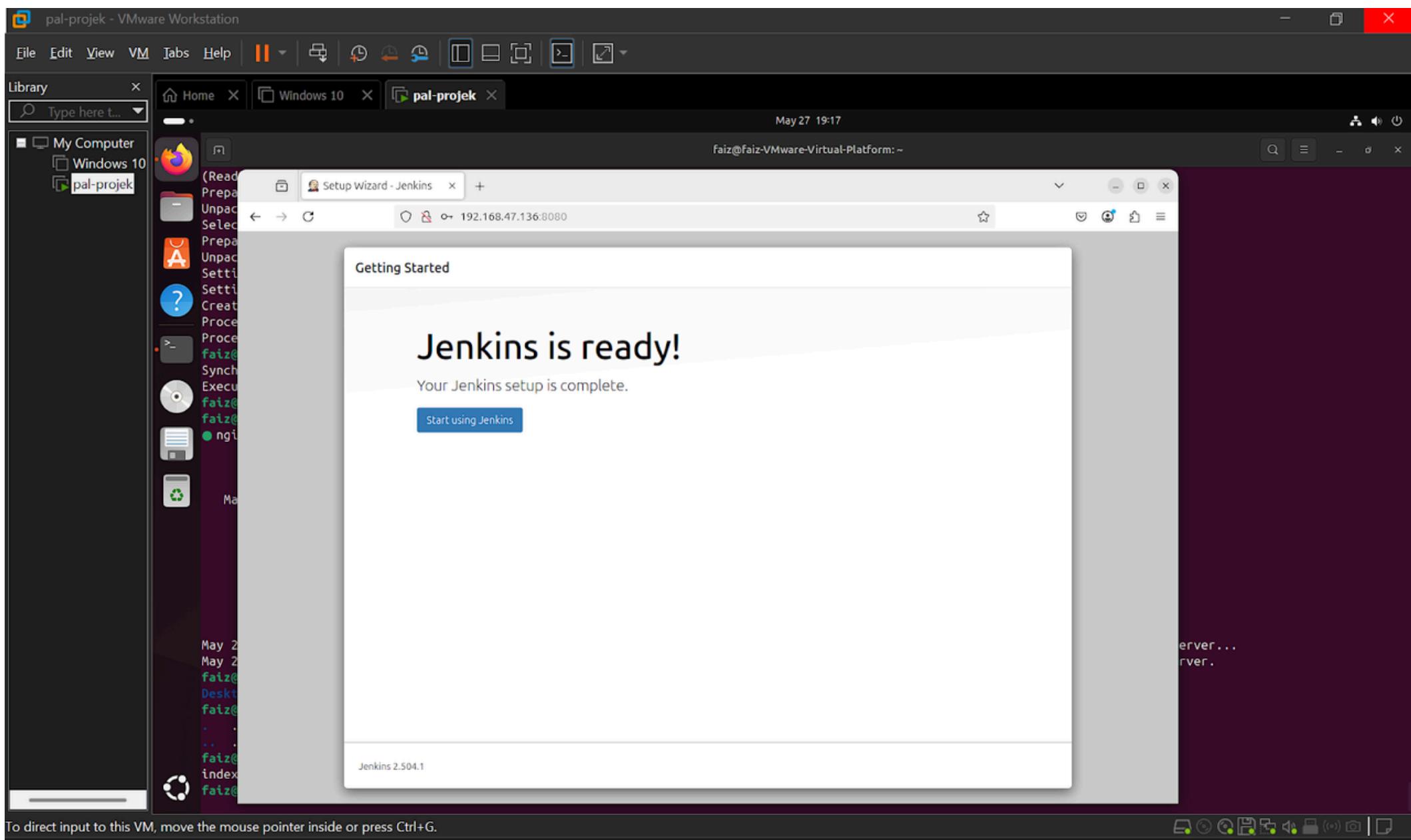


```
faiz@faiz-VMware-Virtual-Platform:~$ sudo apt update
faiz@faiz-VMware-Virtual-Platform:~$ sudo apt install nginx
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl enable nginx
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl start nginx
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl status nginx
● nginx.service - A high performance web server and a reverse proxy server
   Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: enabled)
   Active: active (running) since Tue 2025-05-27 19:03:07 WIB; 22s ago
     Docs: man:nginx(8)
     Main PID: 24775 (nginx)
        Tasks: 3 (limit: 4551)
       Memory: 2.7M (peak: 2.9M)
          CPU: 41ms
         CGroup: /system.slice/nginx.service
             ├─24775 "nginx: master process /usr/sbin/nginx -g daemon on; master_process on;"
             ├─24776 "nginx: worker process"
             └─24778 "nginx: worker process"

May 27 19:03:07 faiz-VMware-Virtual-Platform systemd[1]: Starting nginx.service - A high performance web server and a reverse proxy server...
May 27 19:03:07 faiz-VMware-Virtual-Platform systemd[1]: Started nginx.service - A high performance web server and a reverse proxy server.
faiz@faiz-VMware-Virtual-Platform:~$
```

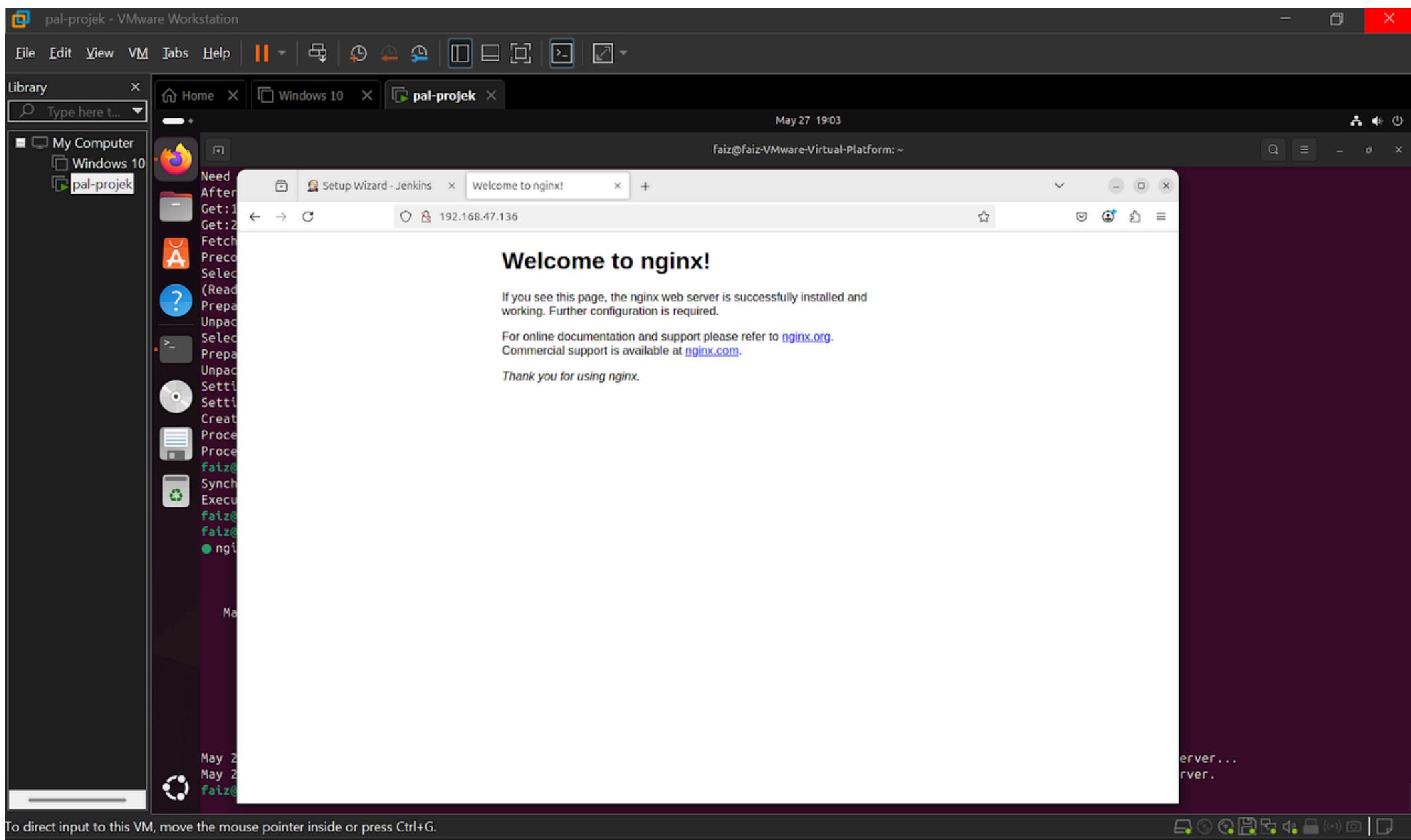
Langkah 1: Instalasi Software Pendukung di VM Ubuntu

Set up Jenkins



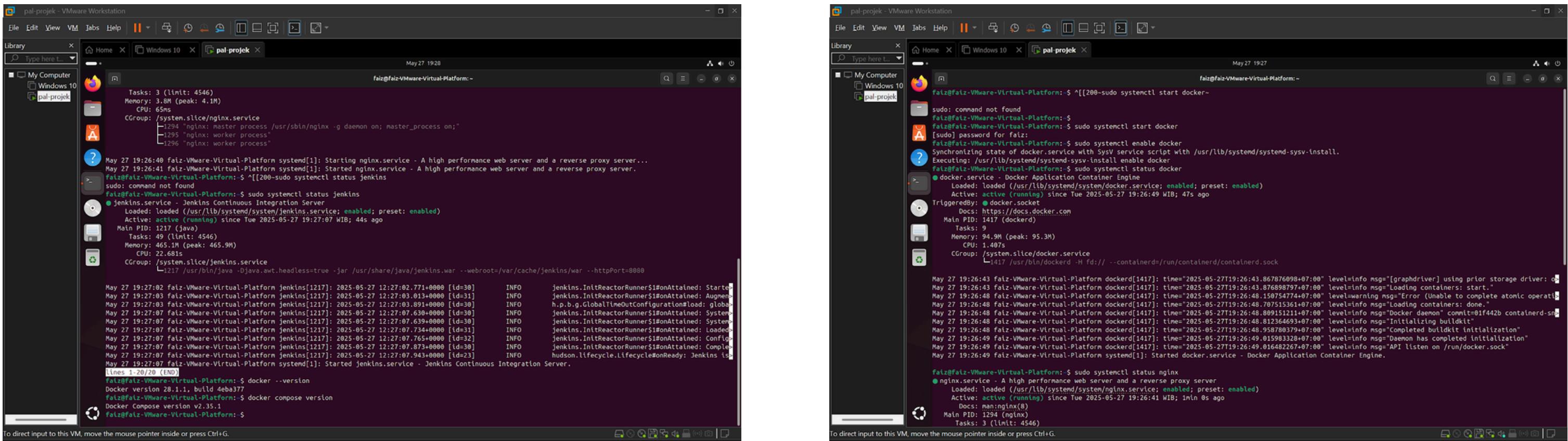
Langkah 1: Instalasi Software Pendukung di VM Ubuntu

Set up Nginx



Langkah 1: Instalasi Software Pendukung di VM Ubuntu

Instal Docker & Docker Compose



```
Tasks: 3 (limit: 4546)
Memory: 3.8M (peak: 4.1M)
CPU: 6Sns
CGroup: /system.slice/nginx.service
└─1294 "nginx: master process /usr/sbin/nginx -g daemon on; master_process on;"
  ├─1295 "nginx: worker process"
  ├─1296 "nginx: worker process"

May 27 19:26:40 faiz-VMware-Virtual-Platform systemd[1]: Starting nginx.service - A high performance web server and a reverse proxy server...
May 27 19:26:41 faiz-VMware-Virtual-Platform systemd[1]: Started nginx.service - A high performance web server and a reverse proxy server.

faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl status jenkins
sudo: command not found
jenkins.service - Jenkins Continuous Integration Server
   Loaded: loaded (/usr/lib/systemd/system/jenkins.service; enabled; preset: enabled)
     Active: active (running) since Tue 2023-05-27 19:27:07 WIB; 44s ago
       Docs: https://docs.docker.com
      Main PID: 1217 (java)
         Tasks: 49 (limit: 4546)
        Memory: 465.1M (peak: 465.9M)
          CPU: 22.68s
         CGroup: /system.slice/jenkins.service
             └─1217 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenkins/war --httpPort=8080

May 27 19:27:02 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:02.771+0000 [id:30] INFO Jenkins.InitReactorRunner$1#onAttained: Started Jenkins
May 27 19:27:03 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:03.013+0000 [id:31] INFO Jenkins.InitReactorRunner$1#onAttained: Augmenting Jenkins
May 27 19:27:03 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:03.891+0000 [id:30] INFO h.p.b.g.GlobalLifecycleOutConfiguration#load: global configuration loaded
May 27 19:27:07 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:07.630+0000 [id:30] INFO Jenkins.InitReactorRunner$1#onAttained: System
May 27 19:27:07 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:07.639+0000 [id:30] INFO Jenkins.InitReactorRunner$1#onAttained: System
May 27 19:27:07 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:07.769+0000 [id:31] INFO Jenkins.InitReactorRunner$1#onAttained: Loaded
May 27 19:27:07 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:07.734+0000 [id:31] INFO Jenkins.InitReactorRunner$1#onAttained: Loaded
May 27 19:27:07 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:07.765+0000 [id:32] INFO Jenkins.InitReactorRunner$1#onAttained: Configured
May 27 19:27:07 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:07.873+0000 [id:30] INFO Jenkins.InitReactorRunner$1#onAttained: Completed
May 27 19:27:07 Falz-VMware-Virtual-Platform jenkins[1217]: 2023-05-27 12:27:07.943+0000 [id:33] INFO hudson.lifecycle.Lifecycle#onReady: Jenkins is ready
May 27 19:27:08 Falz-VMware-Virtual-Platform systemd[1]: Started Jenkins.service - Jenkins Continuous Integration Server.
May 27 19:27:08 Falz-VMware-Virtual-Platform systemd[1]: Started docker.service - Docker Application Container Engine.

|lines 1-20/20 (END)|

faiz@faiz-VMware-Virtual-Platform:~$ docker --version
Docker version 28.1.1, build 4ebab77
faiz@faiz-VMware-Virtual-Platform:~$ docker compose version
Docker Compose version v2.35.1
faiz@faiz-VMware-Virtual-Platform:~$
```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

```
faiz@faiz-VMware-Virtual-Platform:~$ [[200-sudo systemctl start docker-
sudo: command not found
faiz@faiz-VMware-Virtual-Platform:~$ 
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl start docker
[sudo] password for faiz:
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl enable docker
Synchronizing state of docker.service with sysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable docker
faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl enable docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/usr/lib/systemd/system/docker.service; enabled; preset: enabled)
     Active: active (running) since Tue 2023-05-27 19:26:49 WIB; 47s ago
       Docs: https://docs.docker.com
      Main PID: 1417 (dockerd)
         Tasks: 9
        Memory: 94.9M (peak: 95.3M)
          CPU: 1.407s
         CGroup: /system.slice/docker.service
             └─1417 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

May 27 19:26:43 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:43.867876098-07:00" level=info msg="[graphdriver] using prior storage driver: overlay2"
May 27 19:26:43 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:43.876996797-07:00" level=info msg="Loading containers: start."
May 27 19:26:48 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:48.150754774-07:00" level=warning msg="Error: Unable to complete atomic operation on /var/run/docker.sock: failed to lock fd: Resource busy"
May 27 19:26:48 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:48.150753614-07:00" level=info msg="Loading containers: done."
May 27 19:26:48 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:48.809151211-07:00" level=info msg="Docker daemon" commit=d0f9442b containerd=80ec0979c8278e67f84a8b8554693
May 27 19:26:48 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:48.812364693-07:00" level=info msg="Initializing buildkit"
May 27 19:26:48 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:48.889780379-07:00" level=info msg="Completed buildkit initialization"
May 27 19:26:48 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:49.015983328-07:00" level=info msg="Daemon has completed initialization"
May 27 19:26:49 Falz-VMware-Virtual-Platform dockerd[1417]: time="2023-05-27T19:26:49.016482267-07:00" level=info msg="API listen on /run/docker.sock"
May 27 19:26:49 Falz-VMware-Virtual-Platform systemd[1]: Started docker.service - Docker Application Container Engine.

faiz@faiz-VMware-Virtual-Platform:~$ sudo systemctl status nginx
● nginx.service - A high performance web server and a reverse proxy server
  Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: enabled)
    Active: active (running) since Tue 2023-05-27 19:26:41 WIB; 1min 0s ago
      Docs: man:nginx(8)
     Main PID: 1294 (nginx)
        Tasks: 3 (limit: 4546)

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.
```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

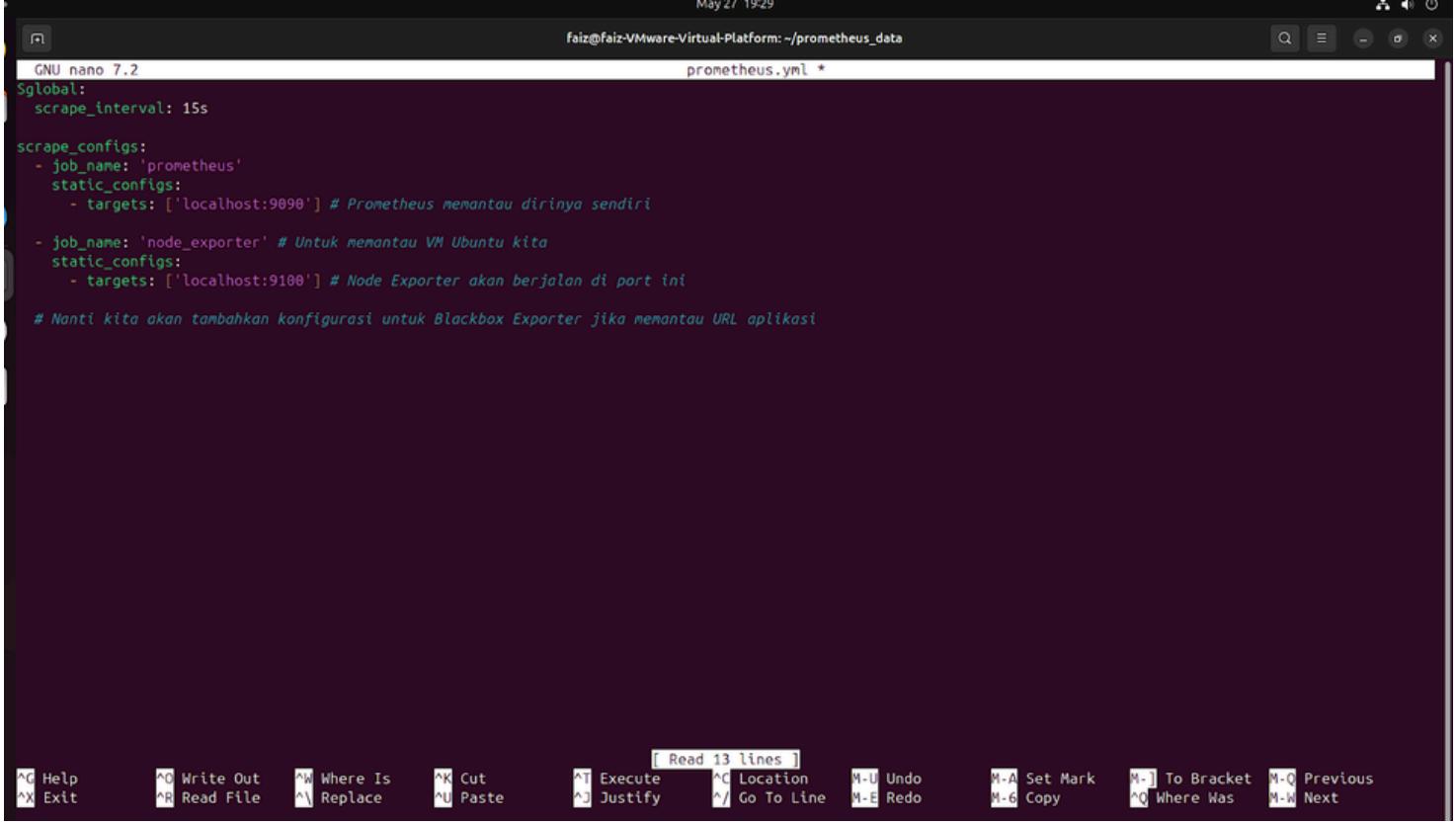
Langkah 1: Instalasi Software Pendukung di VM Ubuntu

Instal Prometheus & Node Exporter

Buat direktori untuk konfigurasi Prometheus:

```
faiz@faiz-VMware-Virtual-Platform:~$ mkdir ~/prometheus_data
faiz@faiz-VMware-Virtual-Platform:~$ cd ~/prometheus_data
faiz@faiz-VMware-Virtual-Platform:~/prometheus_data$ nano prometheus.yml
faiz@faiz-VMware-Virtual-Platform:~/prometheus_data$
```

Buat file konfigurasi prometheus.yml:



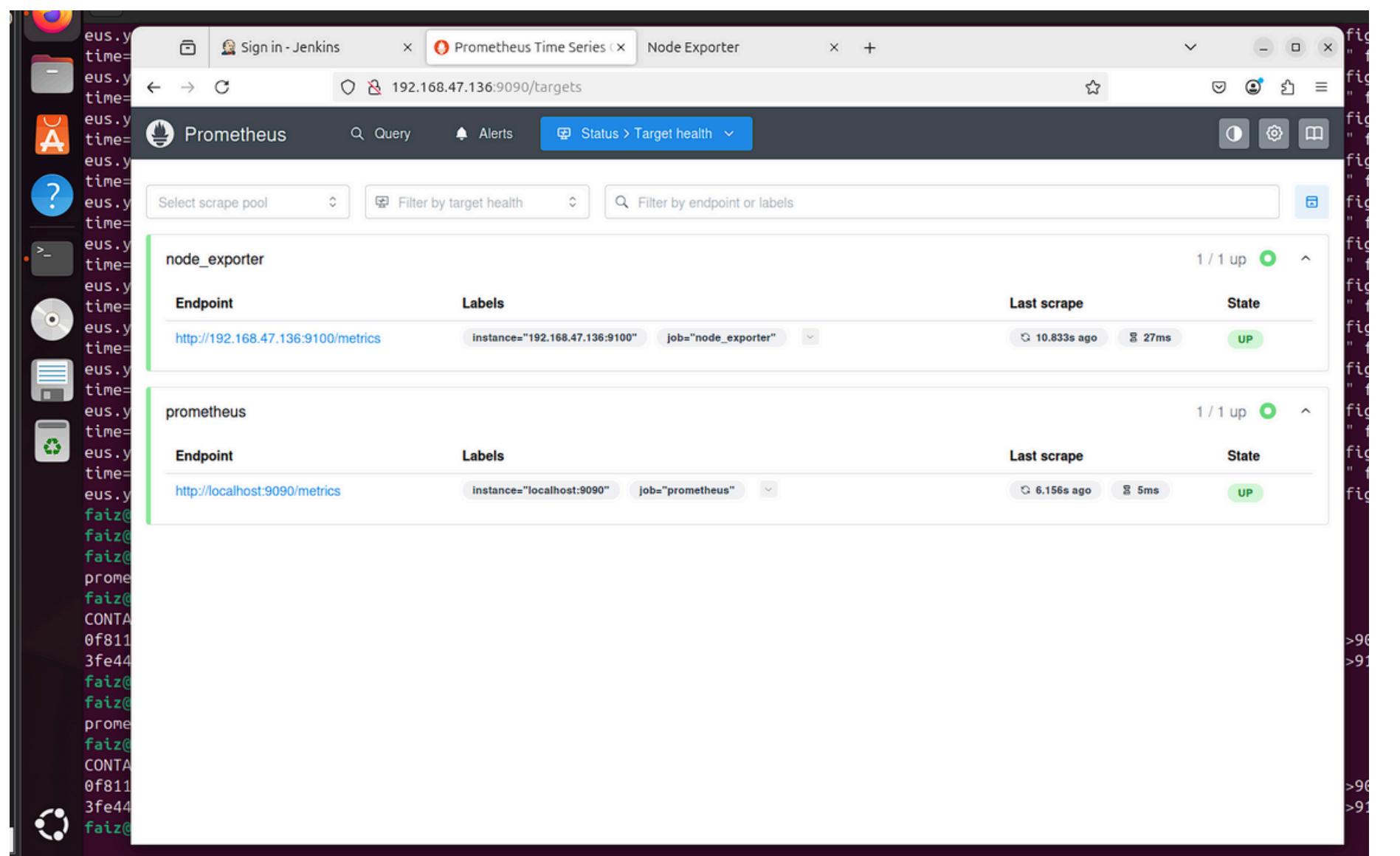
The screenshot shows a terminal window titled "GNU nano 7.2" with the command "prometheus.yml *" in the title bar. The window displays the following YAML configuration:

```
scrape_interval: 15s
scrape_configs:
  - job_name: 'prometheus'
    static_configs:
      - targets: ['localhost:9090'] # Prometheus menantau dirinya sendiri
  - job_name: 'node_exporter' # Untuk menantau VM Ubuntu kita
    static_configs:
      - targets: ['localhost:9100'] # Node Exporter akan berjalan di port ini
# Nanti kita akan tambahkan konfigurasi untuk Blackbox Exporter jika menantau URL aplikasi
```

The terminal window has a dark background and light-colored text. At the bottom, there is a menu bar with various keyboard shortcut icons and labels.

Langkah 1: Instalasi Software Pendukung di VM Ubuntu

Set up Prometheus



Langkah 2: Setup Aplikasi Web Sederhana

Clone repository ke direktori home di VM (git clone <https://github.com/faizfznn/automasi-projek-web.git>)

```
ratz@ratz-VMware-Virtual-Platform:~/projectneus_data$ cd  
faiz@faiz-VMware-Virtual-Platform:~$ git clone https://github.com/faizfznn/automasi-projek-web.git  
Cloning into 'automasi-projek-web'...  
remote: Enumerating objects: 28, done.  
remote: Counting objects: 100% (28/28), done.  
remote: Compressing objects: 100% (27/27), done.  
remote: Total 28 (delta 0), reused 28 (delta 0), pack-reused 0 (from 0)  
Receiving objects: 100% (28/28), 4.98 MiB | 234.00 KiB/s, done.  
faiz@faiz-VMware-Virtual-Platform:~$
```

Langkah 3: Konfigurasi Jenkins untuk CI/CD

a. Konfigurasi Credentials di Jenkins

Di VM Ubuntu, buat SSH key baru (jika belum punya):
ssh-keygen -t rsa -b 4096 -C "jenkins@<nama_vm_mu>"

```
faiz@faiz-VMware-Virtual-Platform:~$ ssh-keygen -t rsa -b 4096 -C "jenkins@faiz"
Generating public/private rsa key pair.
Enter file in which to save the key (/home/faiz/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/faiz/.ssh/id_rsa
Your public key has been saved in /home/faiz/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:4nQJW4abvnsz+KDyJhuaX/xbvItldo+BNWD02U0f1s jenkins@faiz
The key's randomart image is:
----[RSA 4096]----+
|          o      |
|          + =     |
| . . . B .     |
| +..o o . E    |
| = S..o . o    |
| +.* + .       |
| = .*+ =       |
| * o.+oBoo     |
| +.... BB*=.   |
-----[SHA256]-----
```

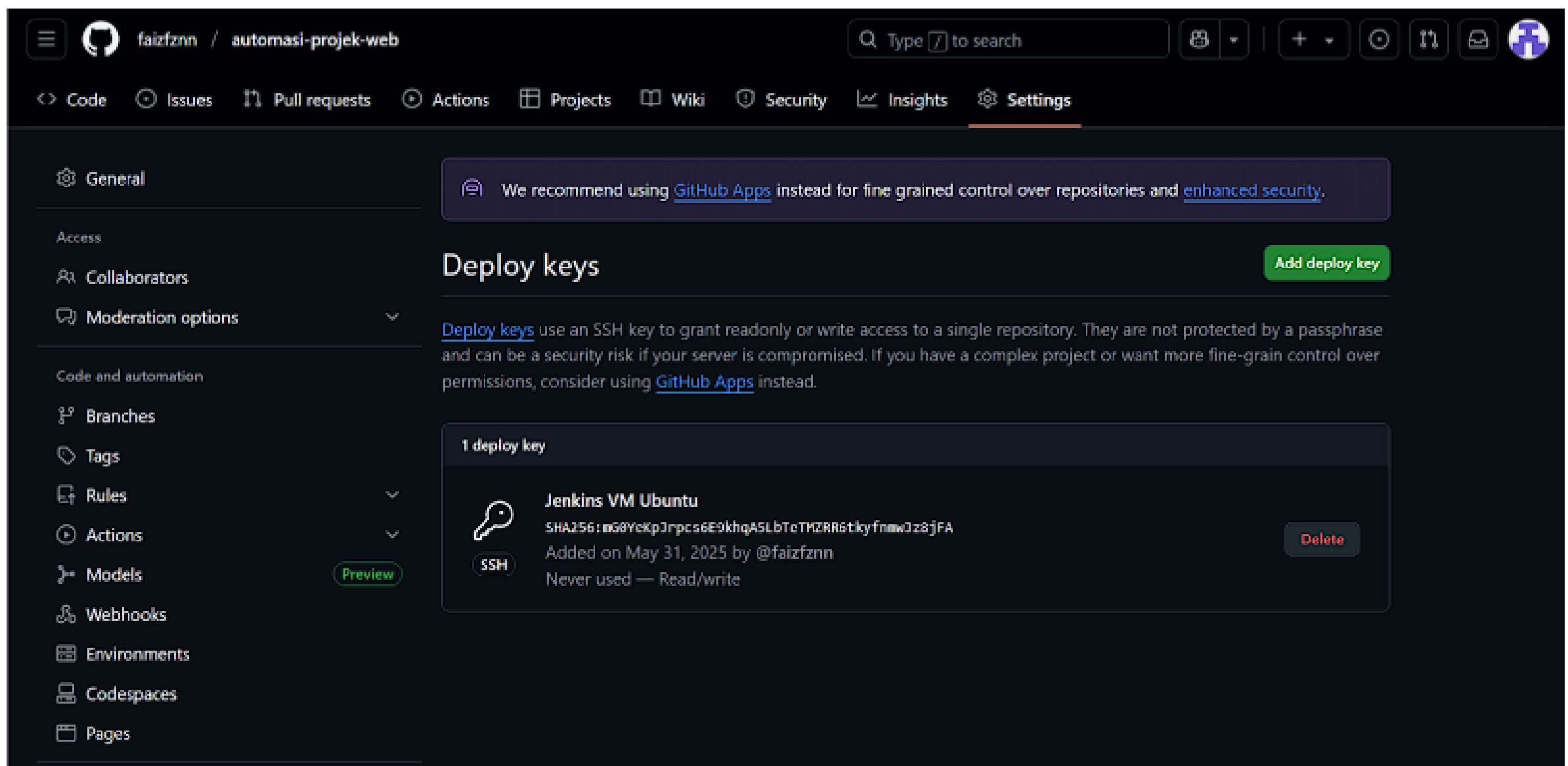
Tampilkan public key

```
+----[SHA256]----+
faiz@faiz-VMware-Virtual-Platform:~$ cat ~/.ssh/id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAQABAAQOp4LX0tD0gGmUUy31Guhc8phmv+d+D5P3tKY8x07n3F4nGzeffeoMXNoYF6gUc1ad/ciqY+cGskznSDreZt0o0swJ7KwC1eXEdFJ/LuMtyTtdSTCXeLcq8Eti8JUL
Qc8B5qTs62qcyVF01sR5lh+nJZk6d8KA+qj8ykKtI5808kv7TEyFn0odVwjNzdgzdBpW0Wele7jI3JLrY20m0dRTxh9FMyca5DPVfkE3ChU9ALm3vSp58N8ADjs8H4F9mITqxx5w647bz10dbZawmN/LF198yilz9E
cl9BLr+Gjyg1fYUW8EgYLFak+BrD8XJ5GcF92j+NdfWPky8L8dUxtXWA2irRcsqFK23fwhD8jlx7LWFAlzE9vwL8PtvF7XQe8Pw7gkp2sJaVP00EsrvDV+N0c0LHWXj0XUuvMyxXS/ePRWIhr0RX56h4hW62pC/RN0e
sJPLNIU8LGEP9d7mlUqdm3CaSt7THKcmVQPW7A7ONzc08hTKRoOZuaeZlDC/0jj/gtBbT/lQ/MXGZqdErxpLNFxh5zfqtYNKWB3gHaZCms+crkLYCd+O5hl9uc9N86qbjhZunkskB3gN28bdtWKSyNTB8tKex6CUH
ytCZSG3+SaiknY7Xezt8g5JACTDBCSNxr+rnvW1zNroSyod8UaEpKoc/NsE8N0t73gCJYQ== jenkins@faiz
faiz@faiz-VMware-Virtual-Platform:~$
```

Langkah 3: Konfigurasi Jenkins untuk CI/CD

a. Konfigurasi Credentials di Jenkins

Tambahkan Public Key ke GitHub Repository

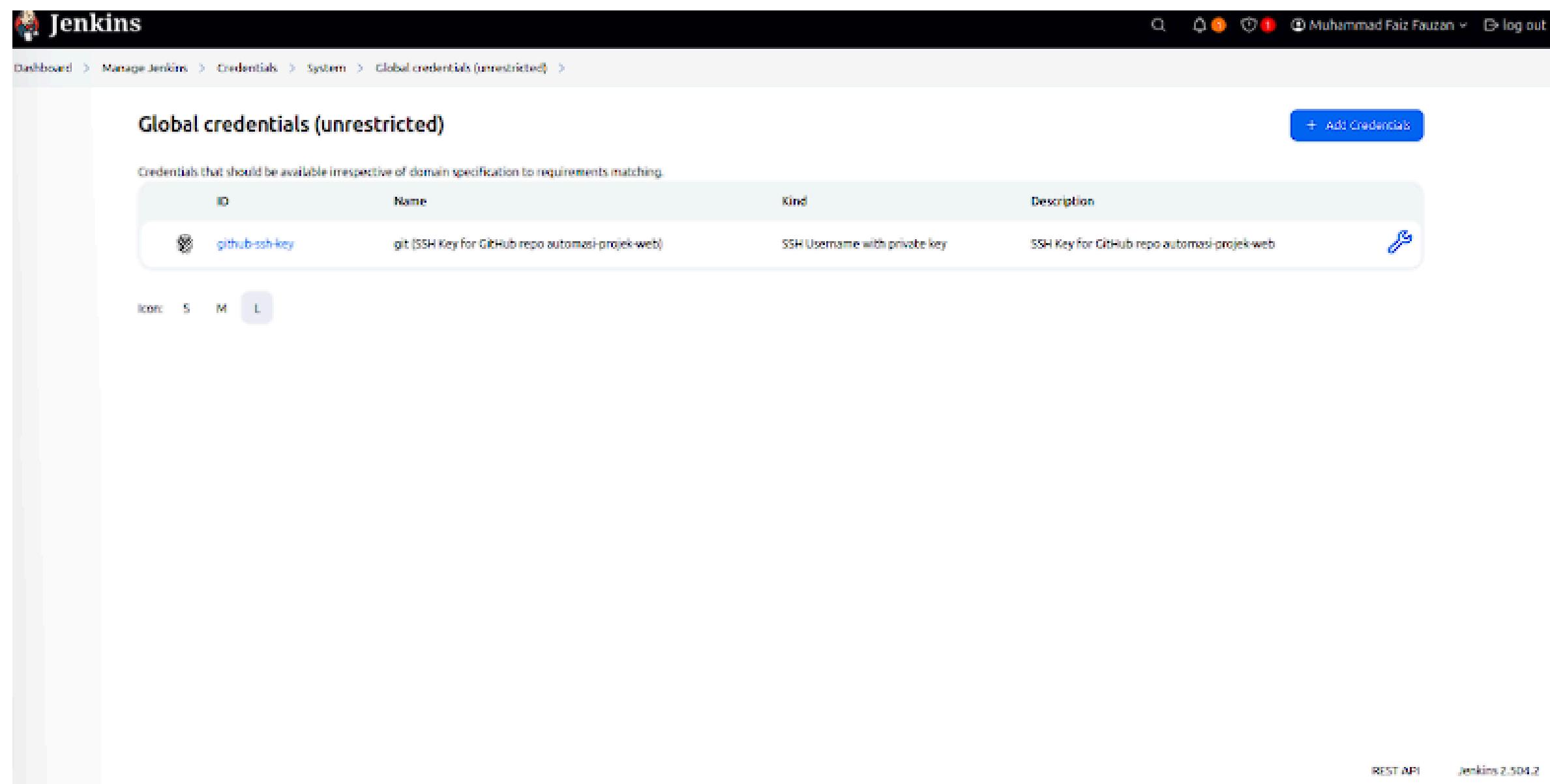


The screenshot shows the GitHub repository settings page for 'faizfznn / automasi-projek-web'. The 'Settings' tab is selected. On the left, there's a sidebar with options like General, Collaborators, Moderation options, Branches, Tags, Rules, Actions, Models, Webhooks, Environments, Codespaces, and Pages. The main content area is titled 'Deploy keys' and contains a sub-section for 'SSH'. It shows one key named 'Jenkins VM Ubuntu' with the SHA256 fingerprint: 'SHA256:mg8yekpJrpCs6E9khqASLbTeTMZRR6tkyfnnw0z8jFA'. It was added on May 31, 2025 by @faizfznn and has never been used, with a 'Read/write' permission level. A 'Delete' button is visible next to the key details.

Langkah 3: Konfigurasi Jenkins untuk CI/CD

a. Konfigurasi Credentials di Jenkins

Tambahkan Private Key ke Jenkins Credentials



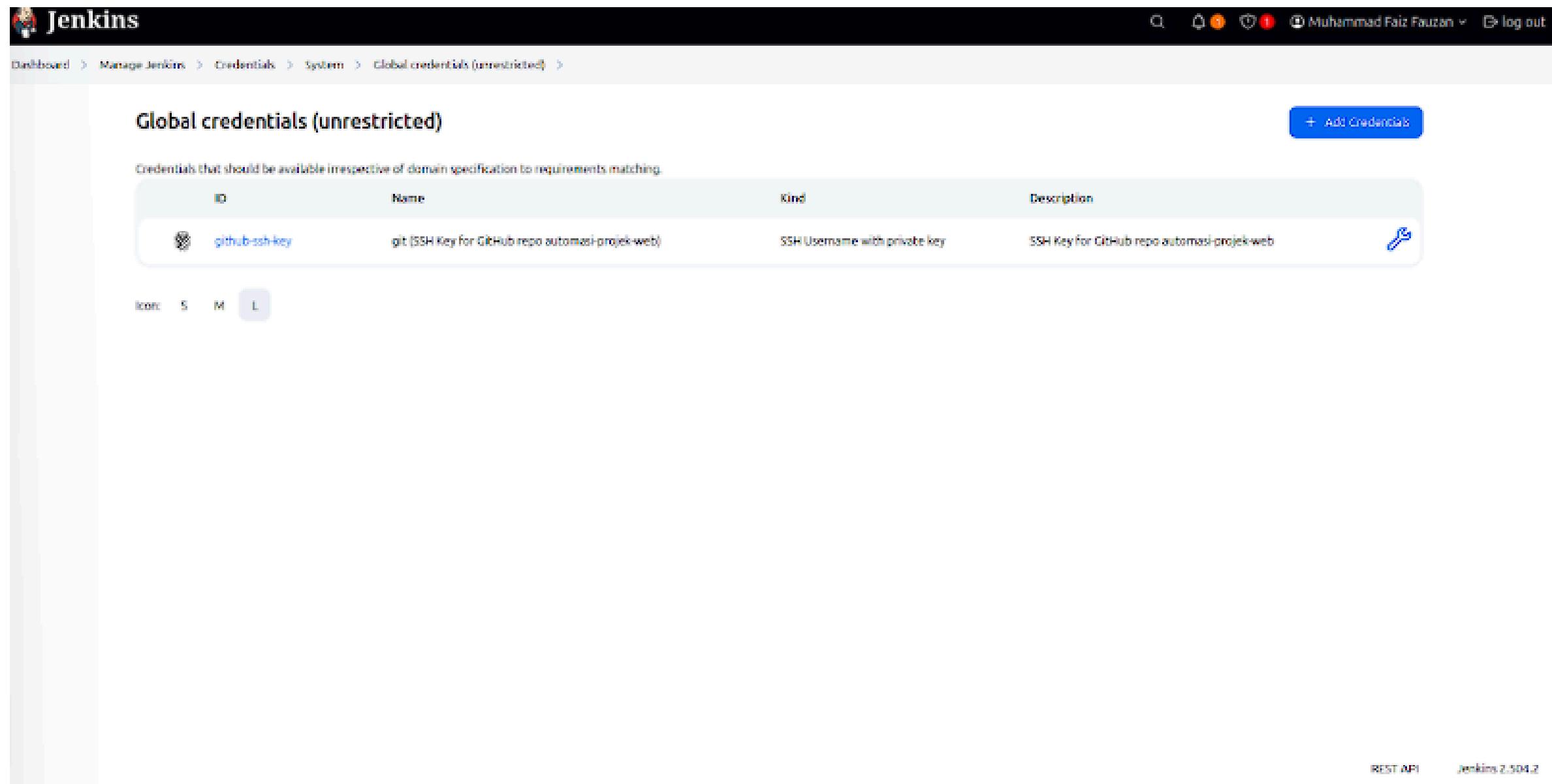
The screenshot shows the Jenkins Global credentials (unrestricted) management interface. At the top, there is a navigation bar with links for Dashboard, Manage Jenkins, Credentials, System, and Global credentials (unrestricted). A user profile for "Muhammad Faiz Fauzan" is shown on the right. Below the navigation, the title "Global credentials (unrestricted)" is displayed, followed by a sub-instruction: "Credentials that should be available irrespective of domain specification to requirements matching." A table lists a single credential entry:

ID	Name	Kind	Description
git	git (SSH Key for GitHub repo automasi-projek-web)	SSH Username with private key	SSH Key for GitHub repo automasi-projek-web

Below the table, there are icons for sorting (Icon), and buttons for "S" (Small), "M" (Medium), and "L" (Large). At the bottom right of the table, there is a blue "Edit" icon.

Langkah 3: Konfigurasi Jenkins untuk CI/CD

b. Buat Jenkins Pipeline Job

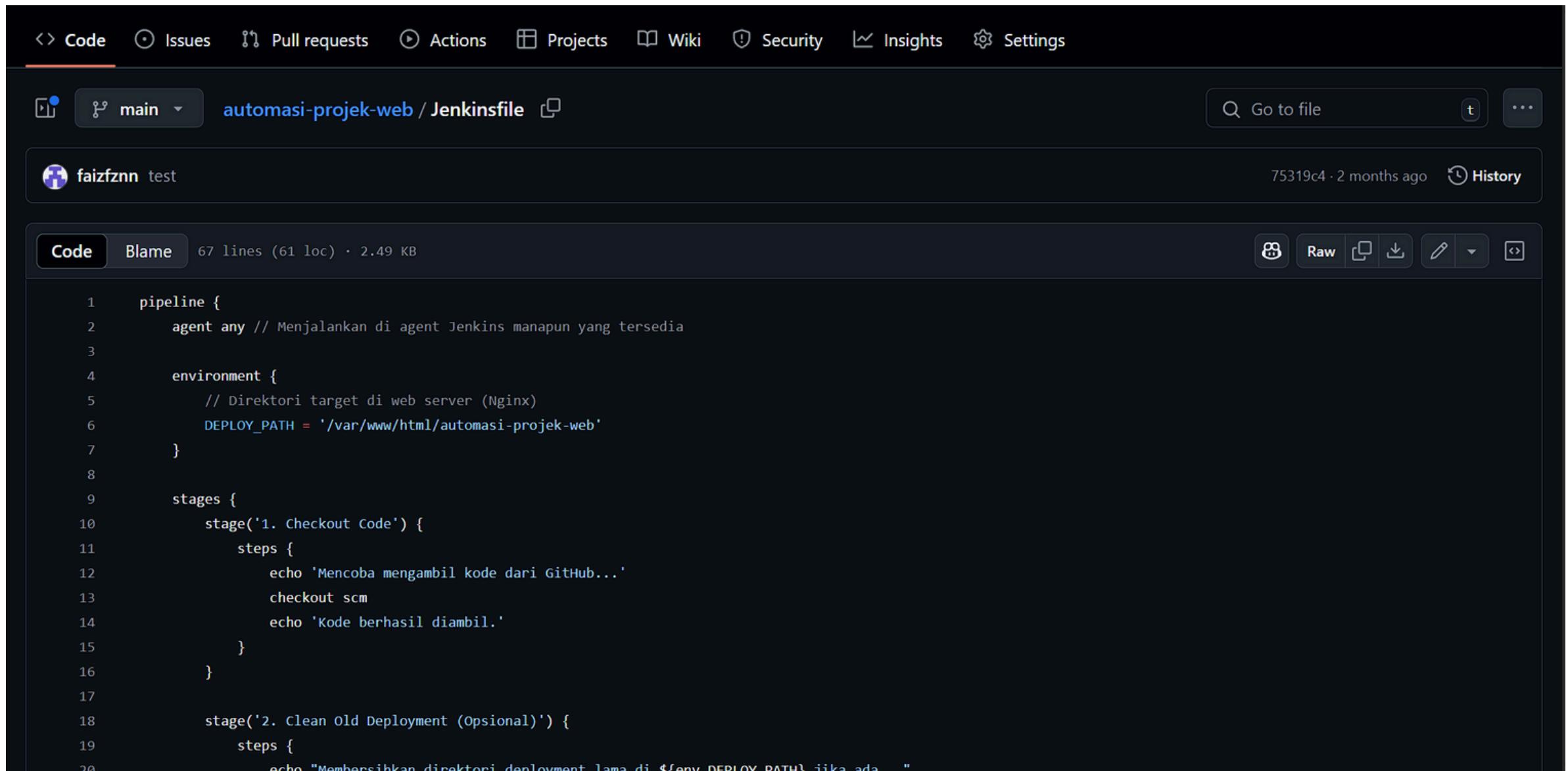


The screenshot shows the Jenkins Global credentials (unrestricted) page. At the top, there is a navigation bar with icons for search, refresh, and system status, followed by the user name "Muhammad Faiz Fauzan" and a "log out" button. Below the navigation bar, the breadcrumb navigation shows: Dashboard > Manage Jenkins > Credentials > System > Global credentials (unrestricted). The main content area is titled "Global credentials (unrestricted)" and contains a table with one row. The table has columns for "ID", "Name", "Kind", and "Description". The single row shows an ID of "github-ssh-key", a Name of "git (SSH Key for GitHub repo automasi-projek-web)", a Kind of "SSH Username with private key", and a Description of "SSH Key for GitHub repo automasi-projek-web". There is also a blue "Edit" icon next to the description. At the bottom of the table, there are buttons for "Icon: S M L". The footer of the page includes links for "REST API" and "Jenkins 2.504.2".

ID	Name	Kind	Description
github-ssh-key	git (SSH Key for GitHub repo automasi-projek-web)	SSH Username with private key	SSH Key for GitHub repo automasi-projek-web

Langkah 3: Konfigurasi Jenkins untuk CI/CD

c. Buat Jenkinsfile di Repository GitHub-mu



The screenshot shows a GitHub repository named "automasi-projek-web". The "Jenkinsfile" is displayed in the code editor. The file contains Jenkins Pipeline code:

```
1 pipeline {
2     agent any // Menjalankan di agent Jenkins manapun yang tersedia
3
4     environment {
5         // Direktori target di web server (Nginx)
6         DEPLOY_PATH = '/var/www/html/automasi-projek-web'
7     }
8
9     stages {
10        stage('1. Checkout Code') {
11            steps {
12                echo 'Mencoba mengambil kode dari GitHub...'
13                checkout scm
14                echo 'Kode berhasil diambil.'
15            }
16        }
17
18        stage('2. Clean Old Deployment (Opsional)') {
19            steps {
20                echo "Membersihkan direktori deployment lama di $env.DEPLOY_PATH jika ada."
21            }
22        }
23    }
24
25    post {
26        success {
27            echo 'Deployment berhasil.'
28        }
29        failure {
30            echo 'Deployment gagal.'
31        }
32    }
33}
```

Langkah 4: Uji Coba Alur CI/CD

Sebelum

Kode awal github saat di clone di virtual machine



Langkah 4: Uji Coba Alur CI/CD

Sesudah
Kode diubah dan di push ke github

The screenshot shows the homepage of the FILKOMreserV website. At the top, there is a section titled "Testimoni Pengguna" (User Testimonials) featuring three cards with user profiles and quotes. Below this is the main content area with sections for "FILKOMreserV", "Informasi Kontak" (Contact Information), and "Legal". The footer contains copyright information.

Testimoni Pengguna

FILKOMreserV

Sistem yang memudahkan mahasiswa dan dosen untuk memesan ruangan di Fakultas Ilmu Komputer.

Kemudahan akses, efisiensi waktu, dan transparansi adalah fokus utama kami.

Informasi Kontak

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Status Jenkins

The screenshot shows the Jenkins dashboard for the "Proyek-Web-Automasi" job. The left sidebar has links for Status, Changes, Build Now, Configure, Delete Pipeline, Stages, Rename, Pipeline Syntax, GitHub Hook Log, and Git Polling Log. The "Changes" link is selected, showing a single entry for build #2. The "Builds" section shows two builds: #2 (9:13 PM) and #1 (8:55 PM), both marked as successful (green).

Changes

#2 (May 31, 2025, 9:13:31 PM)

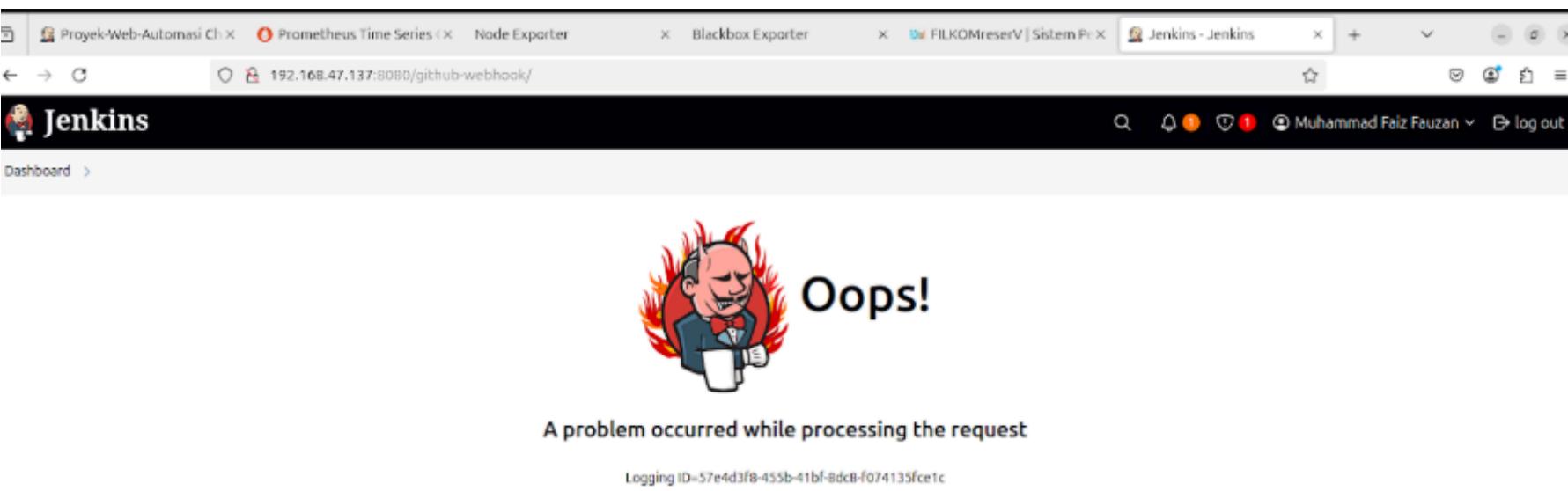
1. update/test CI/CD — [faiz130005/githubweb](#)

Builds

Today

#2 9:13 PM
#1 8:55 PM

Masalah yang ditemui dan solusi · · yang dilakukan



Saya mencoba menambahkan webhook GitHub ke Jenkins dengan mengakses URL <http://192.168.47.137:8080/github-webhook/> melalui browser. Namun, halaman memunculkan error “Oops!”. Setelah dicari tahu, Endpoint tersebut memang hanya menerima HTTP POST dari GitHub, bukan untuk akses manual melalui browser (HTTP GET).

Masalah yang ditemui dan solusi :

yang dilakukan

- • • •
- • • •
- • • •

Namun, tantangan utama muncul karena Jenkins berjalan di VM lokal dengan IP 192.168.x.x, yang tidak dapat diakses langsung oleh server GitHub di internet. Tanpa konfigurasi jaringan tambahan seperti port forwarding atau layanan tunneling (misalnya ngrok), webhook tidak akan bisa mencapai Jenkins.

Untuk mengatasi ini, dengan memakai Poll SCM di Jenkins. Dengan metode ini, Jenkins secara berkala memeriksa repository GitHub apakah ada commit baru. Maka web utama akan mengalami perubahan otomatis, dengan diatur secara berkala 2 menit sekali.

Terima
Kasih



kubernetes