

## CI/CD java application

To consolidate knowledge, in the Final Project I attempted to utilize all DevOps tools which was studied in the course, such as Terraform, Ansible, Jenkins, and Docker and build infrastructure on AWS.

In this project, I attempted to describe the entire software development process (in a simplified form) as I understand it after listening to the course.

The goal is to provide automatic delivery of the Java application to the end-user, eliminate downtime, and ensure failure tolerance.

Terraform: [https://github.com/edmitrenko/final\\_project.git](https://github.com/edmitrenko/final_project.git)

Ansible: <https://github.com/edmitrenko/ansible-roles.git>

Application: <https://github.com/edmitrenko/jenkins-java-app2.git>

I have used **Terraform** to build an infrastructure on AWS.

**Ansible** for configuring Jenkins and Tomcat on infrastructure servers.

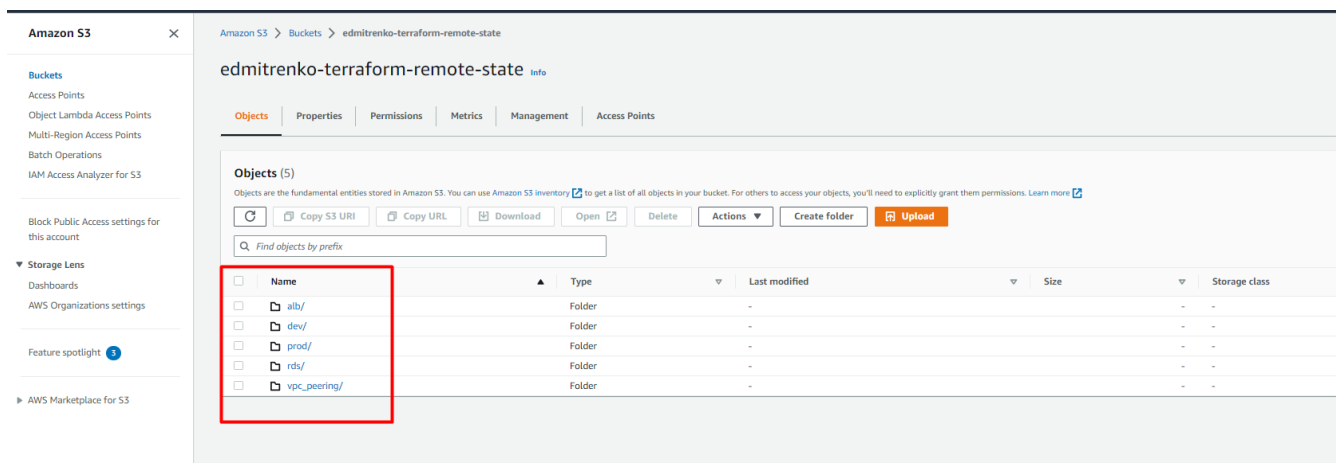
**Jenkins** - for CI/CD Java applications to Tomcat.

### Build infrastructure for the final project on AWS using Terraform.

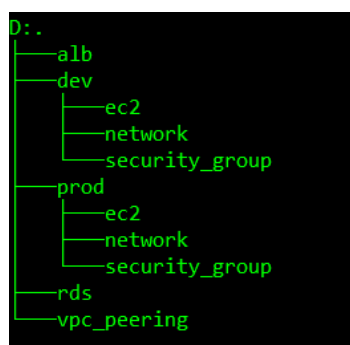
I use Terraform modules that are saved on GitHub.

[https://github.com/edmitrenko/final\\_project.git](https://github.com/edmitrenko/final_project.git)

Files of Terraform state will be saved in an AWS S3 Bucket. The S3 Bucket was specially created on AWS with this structure:



Structure of Terraform folders on my laptop:



## Build infrastructure for development environment.

### Configure network infrastructure for development environment:

Go to the "dev/network" folder containing Terraform configuration files to create the network. Then, run the following command:

**'terraform init'** to initialize the modules and set up the backend for saving the state, and ensure that the necessary Terraform provider is loaded:

```
D:\Terraform\L1\final_project_remote\final_project\dev\network>terraform init
Initializing modules...
  - downloading git::https://github.com/edmitrenko/terraform_modules.git for vpc-dev...
  - vpc-dev in .terraform\modules\vpc-dev\aws_network

Initializing the backend...

Successfully configured the backend "s3"! Terraform will automatically
use this backend unless the backend configuration changes.

Initializing provider plugins...
  - Finding latest version of hashicorp/aws...
  - Installing hashicorp/aws v4.53.0...
  - Installed hashicorp/aws v4.53.0 (signed by HashiCorp)

Terraform has created a lock file .terraform.lock.hcl to record the provider
selections it made above. Include this file in your version control repository
so that Terraform can guarantee to make the same selections by default when
you run "terraform init" in the future.

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.

D:\Terraform\L1\final_project_remote\final_project\dev\network>
```

**'terraform plan'** – we can see what will be done

```
}

Plan: 5 to add, 0 to change, 0 to destroy.

Changes to Outputs:
  + dev_public_subnet_ids = [
    + (known after apply),
  ]
  + dev_route_table_id    = (known after apply)
  + dev_vpc_cidr           = "10.20.0.0/16"
  + dev_vpc_id            = (known after apply)
```

**'terraform apply'** - to apply future changes. To confirm, enter 'YES' and press Enter (you can use the **'terraform apply -auto-approve'** command for automation). The output of the terraform apply command will be displayed. The most important information is stored in the outputs.tf file:

```
Outputs:
dev_public_subnet_ids = [
  "subnet-08fa4d2d1b34fb4a5",
]
dev_route_table_id = "rtb-04d17de2173e77a0b"
dev_vpc_cidr = "10.20.0.0/16"
dev_vpc_id = "vpc-0c1439b78911868dd"
```

As a result we have network for development environment.

### Configure security group for development environment

Go to the dev/security\_group folder with Terraform configuration files to create the security groups in the dev environment and launch the commands:

```
terraform init
terraform apply
```

As a result security groups were created for development environment.

### Configure servers for development environment:

Go to the dev/ec2 folder with Terraform config files for creating EC2 servers in the dev environment and launch the commands:

```
terraform init
terraform apply
```

As a result, servers were created for the dev environment. In the output, we get the result of the terraform apply command. The most important information is entered in the outputs.tf file:

```
Apply complete! Resources: 3 added, 0 changed, 0 destroyed.
Outputs:
dev-ansible_arn = "arn:aws:ec2:eu-west-2:860300666219:instance/i-089066eb144f44844"
dev-ansible_id = "i-089066eb144f44844"
dev-ansible_private_ip = "10.20.1.242"
dev-ansible_public_ip = "18.130.175.71"
dev-jenkins_arn = "arn:aws:ec2:eu-west-2:860300666219:instance/i-040f47875614843b4"
dev-jenkins_id = "i-040f47875614843b4"
dev-jenkins_private_ip = "10.20.1.178"
dev-jenkins_public_ip = "35.177.60.28"
dev-tomcat_arn = "arn:aws:ec2:eu-west-2:860300666219:instance/i-05a0ba901f1a91490"
dev-tomcat_id = "i-05a0ba901f1a91490"
dev-tomcat_private_ip = "10.20.1.10"
dev-tomcat_public_ip = "18.135.96.70"
```

As a result, we have three servers:

**dev-jenkins** - CI/CD Jenkins server from which Pipelines will be launched

**dev-ansible** - the server on which the Configuration Management Tool (Ansible) will be installed and used for the initial configuration of the prod environment. This server will also be added as the second node of Jenkins, and Docker will be installed on it to run future pipelines in Docker. The required software (Java, Docker, Ansible) will be automatically installed using the user\_data script during the server configuration in AWS EC2.

user\_data script:

```
#!/bin/bash
amazon-linux-extras install -y ansible2 java-openjdk11
yum update -y
yum install -y git docker
usermod -aG docker ec2-user
EOT

#!/bin/bash
apt install -y apt-transport-https ca-certificates curl software-properties-common
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
add-apt-repository -y "deb [arch=amd64] https://download.docker.com/linux/ubuntu focal stable"
add-apt-repository --yes --update ppa:ansible/ansible
apt update
apt install -y software-properties-common
apt install -y ansible default-jdk git docker-ce
usermod -aG docker ubuntu
EOT
```

**dev-tomcat** – machine for the Tomcat server in dev environment

I have created the SSH key in advance in the appropriate AWS region

**Build infrastructure for the Production environment.**

**Configure network infrastructure for prod environment**

Go to the prod/network folder with Terraform configuration files to create the network and launch the commands:

**terraform init**

**terraform apply**

As a result, the network was created for the prod environment.

**Configure security group for the production environment**

Go to the prod/security\_group folder with Terraform config files for creating security groups in the prod environment and launch the commands:

**terraform init**

**terraform apply**

As a result, security groups were created for the prod environment:

<input type="checkbox"/>	Name ▾	Security group ID ▾	Security group name ▾	VPC ID ▾	Description ▾	C
<input type="checkbox"/>	prod-80-tcp	sg-06d4fb541f4fc8886b	prod-80-tcp	vpc-0fa0ed7e9750d6bd3 <a href="#">🔗</a>	Security Group manag...	8
<input type="checkbox"/>	-	sg-075b9e487f3cd1fc6	default	vpc-0fa0ed7e9750d6bd3 <a href="#">🔗</a>	default VPC security gr...	8
<input type="checkbox"/>	prod-3306-tcp	sg-033c0d86dc542421f	prod-3306-tcp	vpc-0fa0ed7e9750d6bd3 <a href="#">🔗</a>	Security Group manag...	8
<input type="checkbox"/>	-	sg-02da5293fb2657a80	default	vpc-0c1439b78911868dd <a href="#">🔗</a>	default VPC security gr...	8
<input type="checkbox"/>	prod-all-icmp	sg-01c7a1f4de23ac84f	prod-all-icmp	vpc-0fa0ed7e9750d6bd3 <a href="#">🔗</a>	Security Group manag...	8
<input type="checkbox"/>	dev-all-icmp	sg-0457ec53056c9ca23	dev-all-icmp	vpc-0c1439b78911868dd <a href="#">🔗</a>	Security Group manag...	8
<input type="checkbox"/>	dev-8080-tcp	sg-00585226e5dfdb2b2	dev-8080-tcp	vpc-0c1439b78911868dd <a href="#">🔗</a>	Security Group manag...	8
<input type="checkbox"/>	prod-22-tcp	sg-06694fc3bc51f43e9	prod-22-tcp	vpc-0fa0ed7e9750d6bd3 <a href="#">🔗</a>	Security Group manag...	8
<input type="checkbox"/>	-	sg-0adfc95835b56b4a9	default	vpc-0601d3201c5fb8e0c <a href="#">🔗</a>	default VPC security gr...	8
<input type="checkbox"/>	prod-tomcat	sg-0dcd6a545ff889d5a	prod-tomcat	vpc-0fa0ed7e9750d6bd3 <a href="#">🔗</a>	Security Group manag...	8
<input type="checkbox"/>	dev-80-tcp	sg-0c06ffeabe8f69708	dev-80-tcp	vpc-0c1439b78911868dd <a href="#">🔗</a>	Security Group manag...	8
<input type="checkbox"/>	dev-22-tcp	sg-0d6ee4bf34abd9be6	dev-22-tcp	vpc-0c1439b78911868dd <a href="#">🔗</a>	Security Group manag...	8

## Configure servers for prod environment.

Go to the prod/ec2 folder with Terraform config files for creating EC2 servers in the prod environment and launch the commands:

**terraform init**

**terraform apply**

As a result, a server for the prod environment was created. In the output, we get the result of the terraform apply command. The most important information is entered in the outputs.tf file:

```
Apply complete! Resources: 2 added, 0 changed, 0 destroyed.

Outputs:

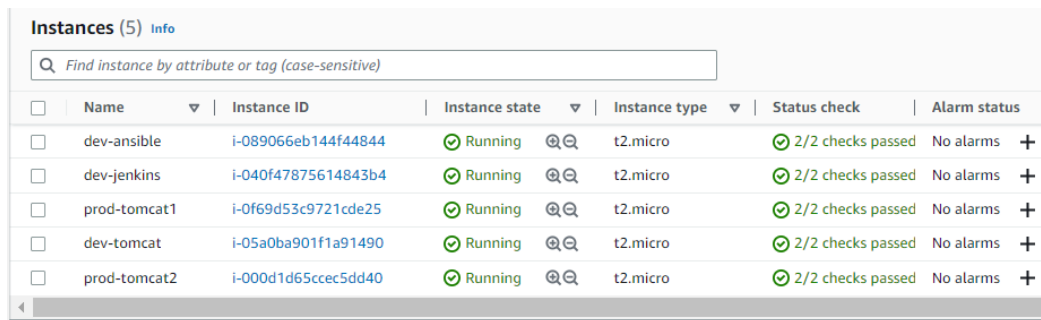
prod-tomcat1_arn = "arn:aws:ec2:eu-west-2:860300666219:instance/i-0f69d53c9721cde25"
prod-tomcat1_id = "i-0f69d53c9721cde25"
prod-tomcat1_private_ip = "10.30.1.228"
prod-tomcat1_public_ip = "13.40.73.162"
prod-tomcat2_arn = "arn:aws:ec2:eu-west-2:860300666219:instance/i-000d1d65ccec5dd40"
prod-tomcat2_id = "i-000d1d65ccec5dd40"
prod-tomcat2_private_ip = "10.30.1.25"
prod-tomcat2_public_ip = "3.8.77.49"
```

As a result, two servers were created:

## prod-tomca1 prod-tomca2

A cluster of two Tomcat servers will be configured to ensure failure tolerance (using Ansible). The servers will work using an AWS Application Load Balancer (which we will configure later with Terraform).

As a result, in the AWS console, we have five servers:



<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status
<input type="checkbox"/>	dev-ansible	i-089066eb144f44844	Running	t2.micro	2/2 checks passed	No alarms
<input type="checkbox"/>	dev-jenkins	i-040f47875614843b4	Running	t2.micro	2/2 checks passed	No alarms
<input type="checkbox"/>	prod-tomcat1	i-0f69d53c9721cde25	Running	t2.micro	2/2 checks passed	No alarms
<input type="checkbox"/>	dev-tomcat	i-05a0ba901f1a91490	Running	t2.micro	2/2 checks passed	No alarms
<input type="checkbox"/>	prod-tomcat2	i-000d1d65ccec5dd40	Running	t2.micro	2/2 checks passed	No alarms

## Configuring VPC Peering between the Dev and Prod Environment networks

Go to the vpc\_peering folder with Terraform configuration files to configure VPC peering and launch the commands:

```
terraform init
terraform apply
```

As a result, a connection will be established between the networks in the Dev and Prod environments.

## Configuring an AWS RDS MySQL database

The base will be necessary for the future application.

Go to the RDS folder that contains Terraform configuration files to configure the RDS database and launch the necessary commands:

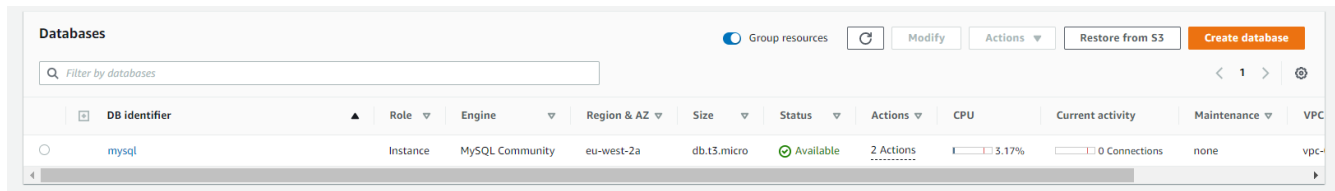
```
terraform init
terraform apply
```

As a result, a database for future applications was created. The output of the 'terraform apply' command provides the result. The most important information is entered in the 'outputs.tf' file:

```
Outputs:

db_instance_address = "mysql.cruawvpngh1q.eu-west-2.rds.amazonaws.com"
db_instance_arn     = "arn:aws:rds:eu-west-2:860300666219:db:mysql"
db_instance_endpoint = "mysql.cruawvpngh1q.eu-west-2.rds.amazonaws.com:3306"
db_instance_name     = "UserDB"
db_instance_password = "x89hysWZ1q4"
db_instance_port     = 3306
db_instance_username = "admin"
```

RDS Database in AWS Console:



By using Terraform, I created a table in the RDS database using the 'rds/initial.sql' script.

## Configuring the Application Load Balancer for Prod Environment

Go to the ALB folder that contains Terraform configuration files to configure the application load balancer and launch the necessary commands:

```
terraform init
terraform apply
```

The data of the command's output is noted. It will be required to access the application in the future.

```
Outputs:
dns_name_alb = "tomcat1.dmitrenko.pp.ua"
```

As a result, the application load balancer for the production environment was created. The application load balancer is necessary to balance the load between the nodes of Tomcat servers in the production environment. The application load balancer connects to the **tomcat1.dmitrenko.pp.ua** DNS name. The DNS zone 'dmitrenko.pp.ua' was connected to AWS Route 53 during the completion of the AWS homework.

EC2 > Load balancers > terraform-alb

**terraform-alb**

**Details**

arn:aws:elasticloadbalancing:eu-west-2:86030066219:loadbalancer/app/terraform-alb/407ffc1f11a358bf

Load balancer type Application	DNS name terraform-alb-136800102.eu-west-2.elb.amazonaws.com (A Record)	Status Active	VPC vpc-0fa0ed7e9750d6bd3
IP address type IPv4	Scheme Internet-facing	Availability Zones subnet-06c711d4:05b8f0b0 eu-west-2a (euw2-az2) subnet-040d5c13f43e01ed9 eu-west-2b (euw2-az3)	Hosted zone ZHURV8PSTC4K8
Date created February 5, 2023, 15:50 (UTC+03:00)			

**Listeners (1)**

A listener checks for connection requests on its port and protocol. Traffic received by the listener is routed according to its rules.

Protocol:Port	ARN	Security policy	Default SSL cert	Default routing rule	Rules	Tags
HTTP:80	ARN	Not applicable	Not applicable	<b>Forward to</b> <ul style="list-style-type: none"><li>Target-group-tomcat-node1: 1 (50%)</li><li>Target-group-tomcat-node2: 1 (50%)</li><li>Group-level stickiness: Off</li></ul>	1	0

## Configure Jenkins using Ansible

Access the **dev-ansible** server via the SSH protocol using the MobaXterm program (using the address obtained from the Terraform outputs during the configuration of servers in the Development Environment, as well as the SSH key that was pre-generated via the AWS Console for the region in which the infrastructure was configured).

I have configured Ansible on that server through the 'user\_data' script for AWS EC2 during the configuration of servers in the development environment using Terraform:

```
ubuntu@ip-10-20-1-242:~$ ansible --version
ansible [core 2.14.2]
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/ubuntu/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  ansible collection location = /home/ubuntu/.ansible/collections:/usr/share/ansible/collections
  executable location = /usr/bin/ansible
  python version = 3.10.6 (main, Nov 14 2022, 16:10:14) [GCC 11.3.0] (/usr/bin/python3)
  jinja version = 3.0.3
  libyaml = True
```

Clone the Ansible roles for Jenkins and Tomcat from GitHub:

**git clone** <https://github.com/edmitrenko/ansible-roles.git>

Add the SSH key for the appropriate region to the "dev-ansible" server. I just copied the contents of the key to a file and added the necessary permissions to the key:



```
touch key.pem
nano key.pem (insert key content)
chmod 400 key.pem
```

Go to the **ansible-jenkins** folder and edit the **hosts** file - add the IP address of the 'dev-jenkins' server (data from the Terraform output from one of the previous steps), add the username and path to the SSH key:

[jenkins]

10.20.1.178 ansible\_user=ubuntu ansible\_ssh\_private\_key\_file=/home/ubuntu/key.pem

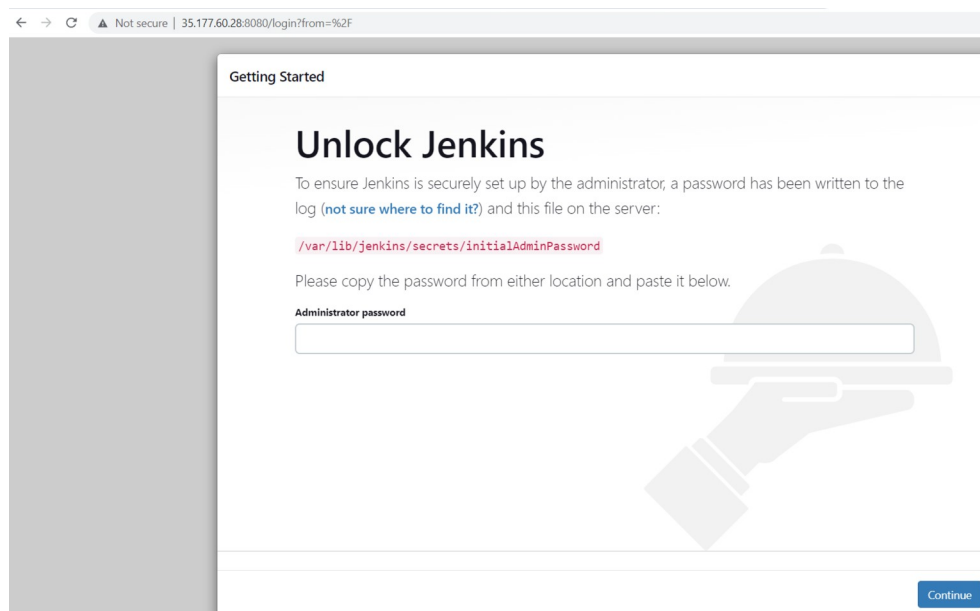
Run playbook:

**ansible-playbook -i hosts playbook-jenkins.yml**

As a result we obtain the password for further Jenkins configuration:

```
TASK [jenkins : print init password jenkins] *****
ok: [10.20.1.178] => {
  "result.stdout": "ec55dd45f7dc4a18948688b0efb322ec"
}
PLAY RECAP *****
10.20.1.178 : ok=16  changed=5  unreachable=0  failed=0  skipped=2  rescued=0  ignored=0
ubuntu@ip-10-20-1-242:~/ansible-jenkins$
```

Go to the Jenkins web interface for further configuration (the IP address of Jenkins can be obtained from the Terraform outputs from one of the previous steps):



Enter the Administrator password which we obtained in the previous step. Select the necessary plugins (in my case: SSH Agent, SSH Build Agents, Copy Artifact, Deploy to Container, pipeline, git, docker, docker pipeline) and press the 'Continue' button. Add a new user and password, and then we can access Jenkins.

Add credentials for connecting to the second node in Jenkins and for connecting to the Tomcat servers:

## Manage jenkins → Credentials → System → Global Credential → Add Credentials

[Dashboard](#) > [Manage Jenkins](#) > [Credentials](#) > [System](#) > [Global credentials \(unrestricted\)](#) >

### Global credentials (unrestricted)

[+ Add Credentials](#)

Credentials that should be available irrespective of domain specification to requirements matching.

ID	Name	Kind	Description	
<a href="#">node-1</a>	ubuntu (node-1)	SSH Username with private key	node-1	
<a href="#">tomcat-server-prod</a>	ubuntu (tomcat-server-prod)	SSH Username with private key	tomcat-server-prod	
<a href="#">tomcat-server-dev</a>	ubuntu (tomcat-server-dev)	SSH Username with private key	tomcat-server-dev	

Icons: [S](#) [M](#) [L](#)

Add second node to Jenkins server:

## Manage jenkins → Mange Nodes and Clouds → New Node → set name Node-1

You need to specify the following:

- **Remote root directory:** /tmp
- **Labels:** it will be used in the Jenkinsfile to specify on which node the Jenkins task will be performed (if you want to specify multiple labels, separate them with a space)
- **Launch method:** Launch Agent via SSH.

Dashboard > Manage Jenkins > Nodes >

2 Idle

Remote root directory ?

/tmp

Labels ?

docker java ansible

Usage ?

Use this node as much as possible

Launch method ?

Launch agents via SSH

Host ?

10.20.1.242

Credentials ?

ubuntu (node-1)

+ Add

Host Key Verification Strategy ?

Manually trusted key Verification Strategy

☐ Require manual verification of initial connection ?

Advanced...

Availability ?

Keep this agent online as much as possible

Node Properties

☐ Disable deferred wipeout on this node ?

☐ Environment variables

☐ Prepare jobs environment ?

☐ Tool Locations

Now Jenkins is ready to work.

## Configuring Tomcat via Ansible

Enter the 'dev-ansible' server via the SSH protocol using the MobaXterm program (using the address that was obtained from Terraform outputs during configuring servers in the Dev Environments, as well as the SSH key that was pre-generated via the AWS console for the region in which the infrastructure was configured) or return to the ssh console that was open in the previous step.

Go to the ansible-tomcat folder and edit the hosts file - add the IP address of the 'dev-tomcat' server and the addresses of the 'prod-tomcat' servers (data from Terraform output in one of the previous steps), add the username and path to the ssh key:

**[dev]**

**10.20.1.10 ansible\_user=ubuntu ansible\_ssh\_private\_key\_file=/home/ubuntu/key.pem**

**[prod1]**

**10.30.1.228 ansible\_user=ubuntu ansible\_ssh\_private\_key\_file=/home/ubuntu/key.pem**

**[prod2]**

**10.30.1.25 ansible\_user=ubuntu ansible\_ssh\_private\_key\_file=/home/ubuntu/key.pem**

Also, you need to configure the `playbook-tomcat.yml` file. To configure the Tomcat server in the Prod environment, it is necessary to specify the port numbers on which the Tomcat server will operate. To set up the Tomcat server cluster, the port numbers should differ on the first and second node.

Install the Tomcat server on `dev-tomcat` by using the correct `playbook-tomcat.yml`:

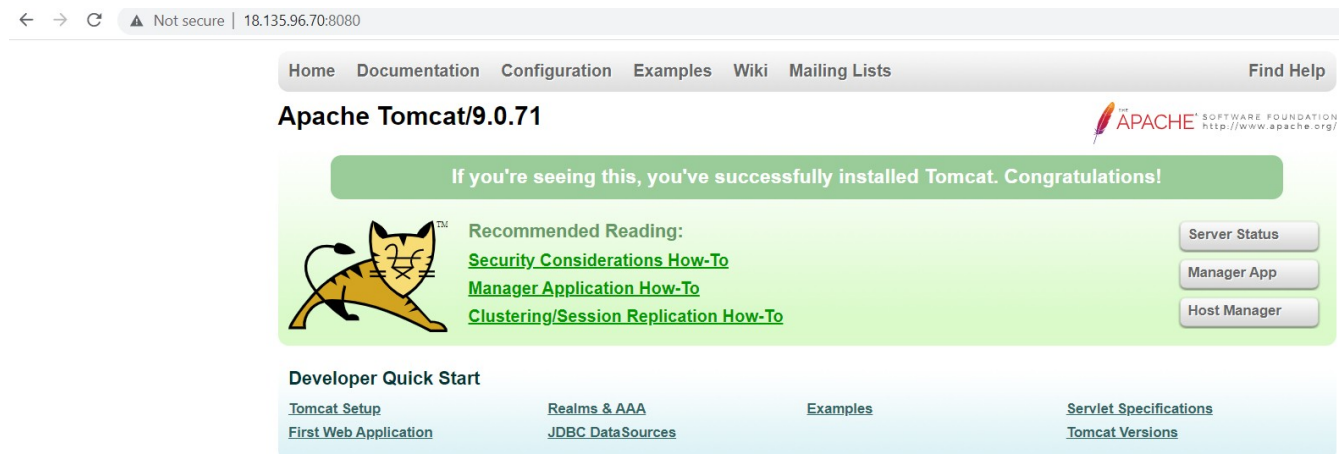
**hosts: dev**

**env: dev**

and start:

**ansible-playbook -i hosts playbook-tomcat.yml**

As a result, we have a tomcat server running on `dev-tomcat`, whose IP address can be obtained from the Terraform outputs taken in an earlier step:



Install tomcat server on `prod-tomcat1`. Configure `playbook-tomcat.yml`:

**hosts: prod1**

**env: prod**

**server\_port: 8006**

**http\_port: 8081**

**arj\_port: 8009**

and start:

**ansible-playbook -i hosts playbook-tomcat.yml**

Install tomcat server on '`prod-tomcat2`'. Configure `playbook-tomcat.yml`:

**hosts: prod2**

**env: prod**

**server\_port: 8007**

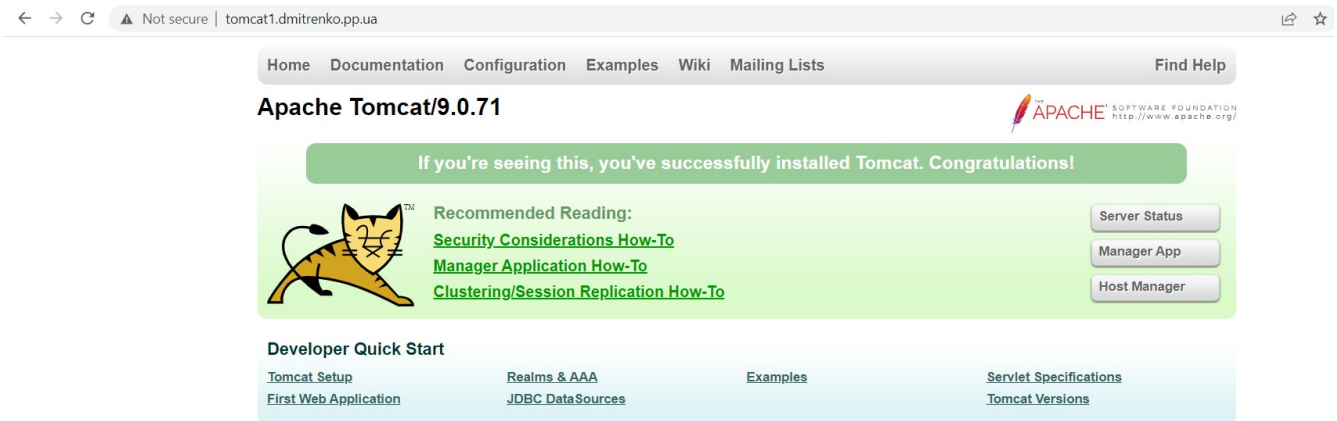
**http\_port: 8082**

**arj\_port: 8010**

and start:

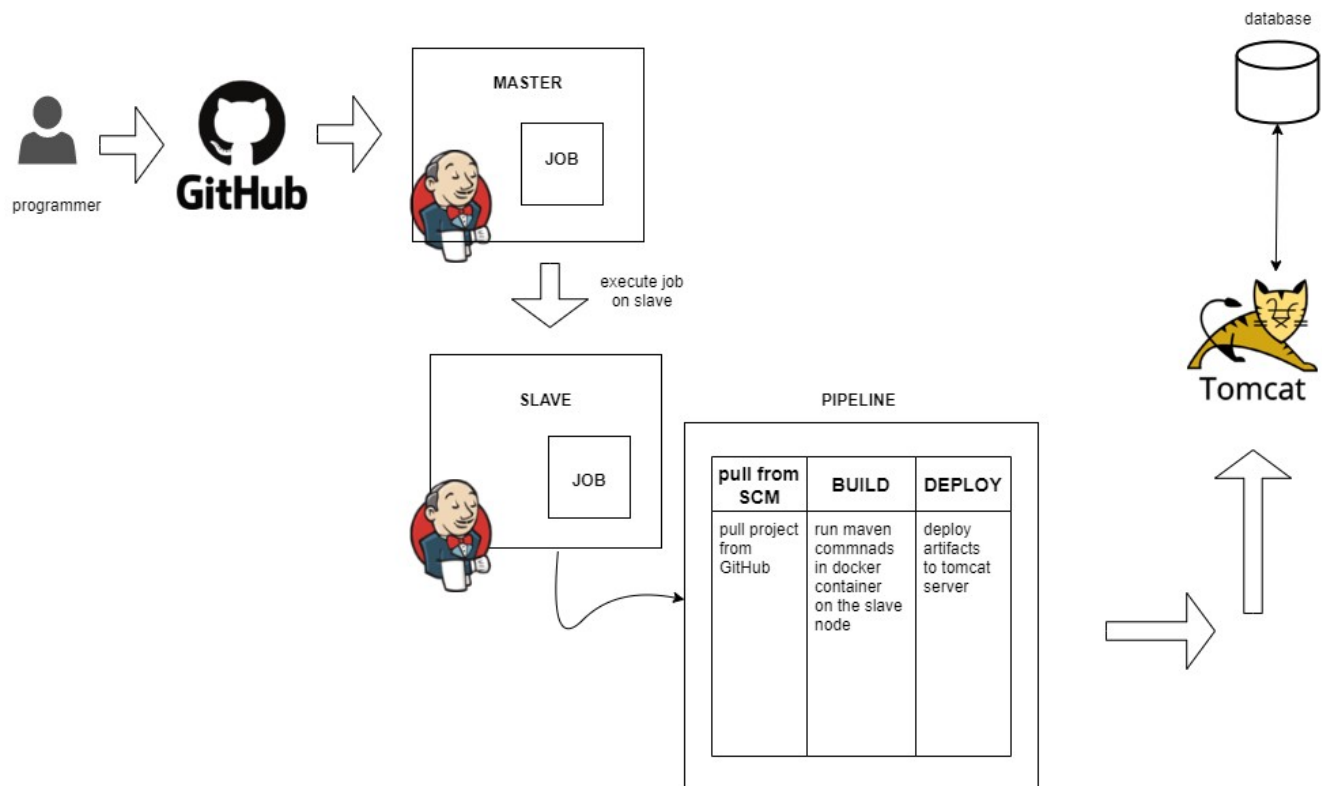
**ansible-playbook -i hosts playbook-tomcat.yml**

Now we can use the DNS name of the application load balancer to connect to the Tomcat cluster - <http://tomcat1.dmitrenko.pp.ua/>:



## Configure Pipeline in Jenkins

How the architecture looks like:



For the final project, I have selected a small Java web application that has a database for storing user accounts.

This application will be built with Maven on a Jenkins node in a Docker container (the latest Docker Image Maven will be used). As a result, we will have a .war file.

Delivery of artifacts will occur using the Jenkins-SSH Agent plugin (for storing credentials) and by starting a shell scp command to copy the .war file. The .war file will be in the format of **name##version**.

The old version of the application will be deleted from the Tomcat servers.

server.xml:

```
<Host name="localhost" appBase="webapps"
      unpackWARs="true" autoDeploy="true"
      undeployOldVersions="true" >

    <Valve className="org.apache.catalina.valves.AccessLogValve" directory="logs"
          prefix="localhost_access_log" suffix=".txt"
          pattern="%h %l %u %t &quot;%r&quot; %s %b" />
</Host>
```

I also reduced the session timeout to 5 minutes in the web.xml file:

```
<session-config>
  <session-timeout>5</session-timeout>
</session-config>
```

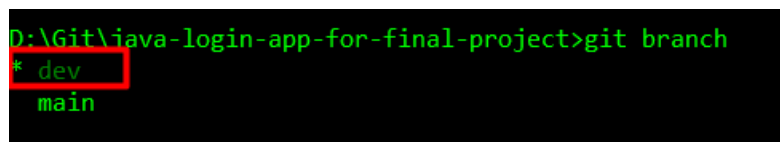
The Java application is located on GitHub:

<https://github.com/edmitrenko/jenkins-java-app2.git>

The Jenkins file is also located in this repository.

Before configuring the pipeline in Jenkins, we need to edit the Jenkinsfile and specify the addresses of the Tomcat servers. We also need to point to the path to the database that was created previously. The information about the database can be obtained from the Terraform outputs from previous steps. This information can be found in **src\main\resources\application.properties**.

A programmer should clone the Git repository to their local computer and create a new branch, such as **dev**, for development. All changes should be pushed to the central repository, and after they have been checked, the **dev** branch should be merged with the main branch:



```
D:\Git\java-login-app-for-final-project>git branch
* dev
main
```

A programmer pushes changes to the central repository and creates a pull request. Then, a GitHub webhook is triggered, which starts the pipeline in Jenkins. All changes from the dev branch are deployed to the dev-tomcat server.

After the branches are merged (dev with main), the GitHub webhook is triggered again, and the Jenkins pipeline starts to build and deploy the application to the prod servers.

## Create Jenkins pipeline for dev server

**Configure**

- General
- Advanced Project Options
- Pipeline

**General**

Description

dev-java-maven

[Plain text] [Preview](#)

☒ Discard old builds ?

Strategy

Log Rotation

Days to keep builds  
if not empty, build records are only kept up to this number of days

5

Max # of builds to keep  
if not empty, only up to this number of build records are kept

5

[Advanced...](#)

☐ Do not allow concurrent builds

☐ Do not allow the pipeline to resume if the controller restarts

☒ GitHub project

Project url ?

<https://github.com/edmitrenko/jenkins-java-app2.git>

[Advanced...](#)

☐ Permission to Copy Artifact

☐ Pipeline speed/durability override ?

☐ Preserve stashes from completed builds ?

Rebuild options: ?

☐ Rebuild Without Asking For Parameters

☐ Disable Rebuilding for this job

☐ This project is parameterized ?

☐ Throttle Concurrent Builds

☐ Throttle builds ?

☐ Prepare an environment for the run ?

## Configure



General



Advanced Project Options



Pipeline

### Build Triggers

- ☐ Build after other projects are built ?
- ☐ Build periodically ?
- ☐ Build when a change is pushed to BitBucket
- ☒ GitHub hook trigger for GITScm polling ?
- ☐ Perform triggered build.
- ☐ Poll SCM ?
- ☐ Quiet period ?
- ☐ Trigger builds remotely (e.g., from scripts) ?

### Advanced Project Options

Advanced...

### Pipeline

#### Definition

Pipeline script from SCM

SCM ?

Git

Repositories ?

Repository URL ?

https://github.com/edmitrenko/jenkins-java-app2.git

Credentials ?

- none -

+ Add

Advanced...

Add Repository

Branches to build ?

Branch Specifier (blank for 'any') ?

\*/dev

Add Branch



## Configure

General

Advanced Project Options

Pipeline

### Pipeline

#### Definition

Pipeline script from SCM

SCM ?

Git

Repositories ?

Repository URL ?

https://github.com/edmitrenko/jenkins-java-app2.git

Credentials ?

- none -

+ Add

Advanced...

Add Repository

Branches to build ?

Branch Specifier (blank for 'any') ?

\*/dev

Add Branch

Repository browser ?

(Auto)

Additional Behaviours

Add ~

Script Path ?

Jenkins/Jenkinsfile\_dev

☒ Lightweight checkout ?

[Pipeline Syntax](#)

Save

Apply

Add a github webhook:

General

Access

- Collaborators
- Moderation options

Code and automation

- Branches
- Tags
- Actions
- Webhooks**
- Environments
- Codespaces
- Pages

Security

- Code security and analysis
- Deploy keys
- Secrets and variables

Integrations

- GitHub apps
- Email notifications

## Webhooks / Manage webhook

Settings Recent Deliveries

We'll send a POST request to the URL below with details of any subscribed events. You can also specify which data format you'd like to receive (JSON, x-www-form-urlencoded, etc). More information can be found in [our developer documentation](#).

**Payload URL \***

http://35.177.60.28:8080/github-webhook/

**Content type**

application/json

**Secret**

Which events would you like to trigger this webhook?

- ☒ Just the push event.
- ☐ Send me **everything**.
- ☐ Let me select individual events.

☒ **Active**  
We will deliver event details when this hook is triggered.

**Update webhook** **Delete webhook**

Push changes to Github:

```
D:\Git\java-login-app-for-final-project>git add .
D:\Git\java-login-app-for-final-project>git commit -m "final_v1.0"
[dev 1125efb] final_v1.0
 2 files changed, 2 insertions(+), 2 deletions(-)
D:\Git\java-login-app-for-final-project>git push --set-upstream origin dev
Enumerating objects: 9, done.
Counting objects: 100% (9/9), done.
Delta compression using up to 4 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (5/5), 425 bytes | 425.00 KiB/s, done.
Total 5 (delta 3), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (3/3), completed with 3 local objects.
To https://github.com/edmitrenko/jenkins-java-app2.git
   0ee700d..1125efb  dev -> dev
branch 'dev' set up to track 'origin/dev'.
```

The Jenkins pipeline has started:

Dashboard > dev-java-maven >

Status

</> Changes

▶ Build with Parameters

⚙️ Configure

🗑️ Delete Pipeline

🔍 Full Stage View

🌐 GitHub

✎ Rename

🛡️ Embeddable Build Status

📝 Build Review

❓ Pipeline Syntax

📄 GitHub Hook Log

## Pipeline dev-java-maven

dev-java-maven

### Stage View

	Declarative: Checkout SCM	Build	Deploy
Average stage times: (Average full run time: ~29s)	2s	34s	1s
#6 Feb 05 20:32 1 commit	847ms	24s	1s
#5 Feb 05 20:25 1 commit	3s	25s	1s
#4 Feb 05 20:10 No Changes	902ms	26s	1s
#3 Feb 05 20:00 No Changes	5s	1min 2s	1s failed
#2 Feb 05 19:46 No Changes			

Build History

trend ▼

🔍 Filter builds... /

✓ #6 Feb 5, 2023, 5:32 PM

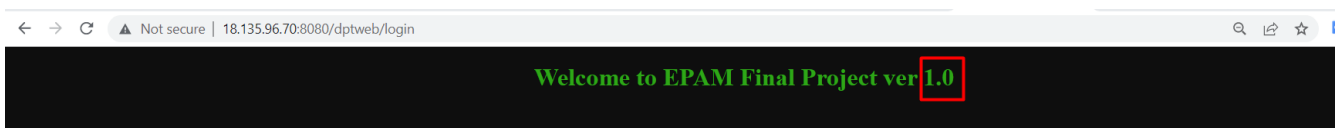
✓ #5 Feb 5, 2023, 5:25 PM

✓ #4 Feb 5, 2023, 5:10 PM

✗ #3 Feb 5, 2023, 5:00 PM


✗ #2 Feb 5, 2023, 4:46 PM

As a result, the application version 1.0 was deployed to the dev-tomcat server:






Configure the Jenkins pipeline for the prod environment similarly to the dev environment, but change the path to the Jenkinsfile and the GitHub branch.

Create a pull request:

 dev had recent pushes 24 minutes ago


Compare & pull request









 main  2 branches  0 tags

Go to file


Add file ▾


<> Code ▾


 edmitrenko Merge pull request #2 from edmitrenko/dev ... 658d6cb 19 hours ago 🕒 91 commits

 .mvn/wrapper	fix	2 weeks ago
 Jenkins	build in docker	19 hours ago
 src	build in docker	19 hours ago
 HELP.md	first	3 weeks ago
 README.md	first	3 weeks ago
 mvnw	fix	2 weeks ago
 mvnw.cmd	first	3 weeks ago
 pom.xml	build in docker	19 hours ago

Merge the pull request:



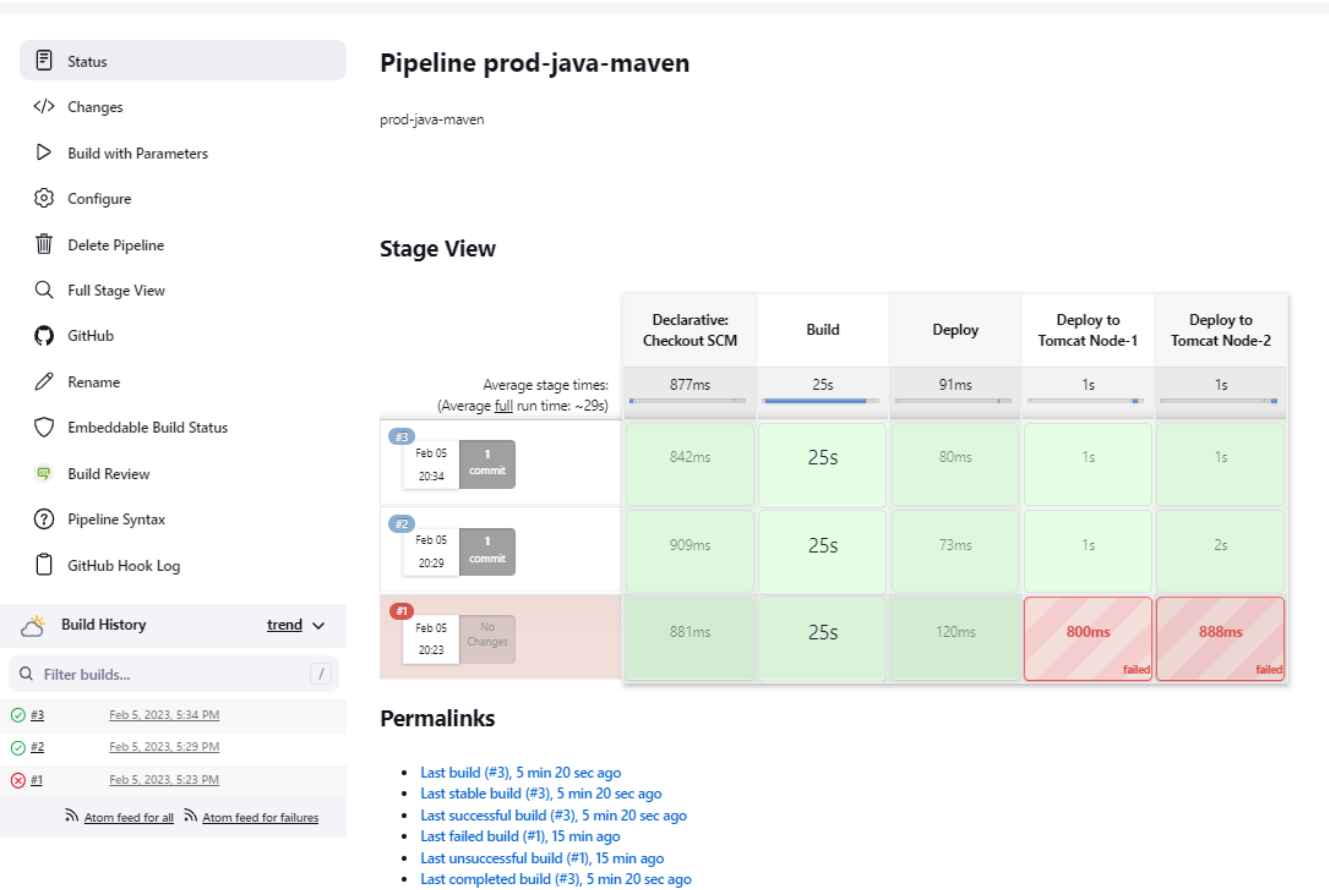
 Continuous integration has not been set up  
[GitHub Actions](#) and [several other apps](#) can be used to automatically catch bugs and enforce style.

 This branch has no conflicts with the base branch  
Merging can be performed automatically.

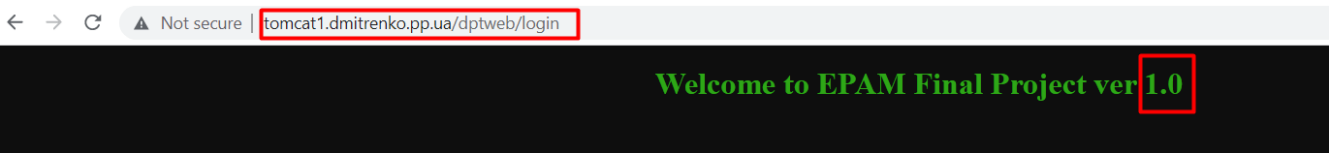
Merge pull request ▾

You can also [open this in GitHub Desktop](#) or view [command line instructions](#).

The pipeline for the prod environment was started:



As a result, the application version 1.0 was deployed to the prod-Tomcat servers:



We can see version 1.0 of the application in the Tomcat manager:

Tomcat Web Application Manager

Message:

OK

Manager

List Applications

HTML Manager Help

Manager Help

Applications

Path	Version	Display Name	Running	Sessions	Commands
/	None specified	Welcome to Tomcat	true	0	<div>StartStopReloadUndeploy</div> <div>Expire sessions with idle ≥ 5 minutes</div>
/docs	None specified	Tomcat Documentation	true	0	<div>StartStopReloadUndeploy</div> <div>Expire sessions with idle ≥ 5 minutes</div>
/dptweb	1.0		true	0	<div>StartStopReloadUndeploy</div> <div>Expire sessions with idle ≥ 5 minutes</div>
/examples	None specified	Servlet and JSP Examples	true	0	<div>StartStopReloadUndeploy</div> <div>Expire sessions with idle ≥ 5 minutes</div>
/host-manager	None specified	Tomcat Host Manager Application	true	0	<div>StartStopReloadUndeploy</div> <div>Expire sessions with idle ≥ 5 minutes</div>
/manager	None specified	Tomcat Manager Application	true	1	<div>StartStopReloadUndeploy</div> <div>Expire sessions with idle ≥ 5 minutes</div>

We make changes in the code, such as changing the version on the web page and the version in the Pom.xml file, and send the changes to GitHub in the dev branch.

As a result, the Jenkins pipeline **dev-java-maven** should automatically start, build, and deploy the new version of the application to the dev-tomcat server

Dashboard >

+ New Item

People

Build History

Project Relationship

Check File Fingerprint

Manage Jenkins

My Views

P4 Trigger

All +

S	W	Name ↓	Last Success
		dev-java-maven	12 min #6
		prod-java-maven	10 min #3

Icon: S M L

Build Queue

No builds in the queue.

Build Executor Status

Built-In Node

1 Idle

2 Idle

node-1

1 dev-java-maven #7 (Build)

Not secure | 18.135.96.70:8080/dptweb/login

Welcome to EPAM Final Project ver 2.0

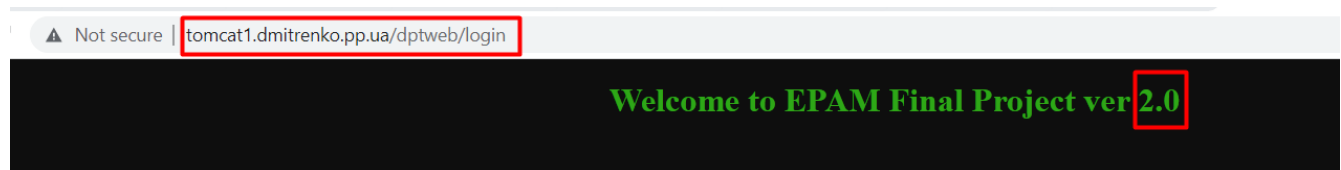
On GitHub, create a pull request → merge request → confirm merge. The GitHub webhook is triggered, and the Jenkins pipeline **prod-java-maven** for the prod environment should start automatically:

The screenshot shows the Jenkins dashboard with a sidebar on the left containing links: + New Item, People, Build History, Project Relationship, Check File Fingerprint, Manage Jenkins, My Views, and P4 Trigger. The main area displays a table of recent builds:

S	W	Name ↓	Last Success
✓	☁	dev-java-maven	12 min #6
✓	☁	prod-java-maven	10 min #3

Below the table, there are filters for 'Icon' (S, M, L) and a 'Build Queue' section showing 'No builds in the queue.' The 'Build Executor Status' section shows two idle executors and one executor named 'node-1' currently running the 'prod-java-maven' build (#4).

And the new version of the application was built and deployed to the prod servers:



And we can see the version of the application on the Tomcat manager page:



## Tomcat Web Application Manager

Message: OK

### Manager

[List Applications](#)

[HTML Manager Help](#)

[Manager Help](#)

### Applications

Path	Version	Display Name	Running	Sessions	Commands
/	None specified	Welcome to Tomcat	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ 5 minutes
/docs	None specified	Tomcat Documentation	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ 5 minutes
/dpweb	2.0		true	2	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ 5 minutes
/examples	None specified	Servlet and JSP Examples	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ 5 minutes
/host-manager	None specified	Tomcat Host Manager Application	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ 5 minutes
/manager	None specified	Tomcat Manager Application	true	1	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ 5 minutes

### Deploy

Deploy directory or WAR file located on server