

Lab6. Jenkins Setup and Terraform Pipeline Configuration

Contents

| | |
|---|----|
| Start Lab | 1 |
| Task1 Create a Jenkins EC2 instance..... | 1 |
| Task2 Create an S3 Bucket for Remote State..... | 2 |
| Task3 Configure Jenkins | 2 |
| Task4 Create a Github account and repository | 2 |
| Task5 Add AWS Credentials to Jenkins | 8 |
| Task6 Configure Pipeline Job | 9 |
| Task7 Verify pipeline run and explore Jenkins | 10 |
| Task8 Updating the transformation pipeline..... | 12 |
| Task9 (Time permitting). Configure Destroy Pipeline Job | 16 |

Start Lab

1. Ensure you have completed Lab0 before attempting this lab.
2. In the IDE terminal pane, enter the following commands...

```
cd ~/environment/awslabs/06
```

3. This shifts your current working directory to awslabs/labs/06. **Ensure all IDE commands are executed in this directory**

Task1 Create a Jenkins EC2 instance

1. Examine the script file **create_ec2.sh** in awslabs/06. This will create an EC2 instance in us-west-2 into which we will install Jenkins. Make the script executable...

```
chmod +x create_ec2.sh
```

2. Run the script

```
./create_ec2.sh
```

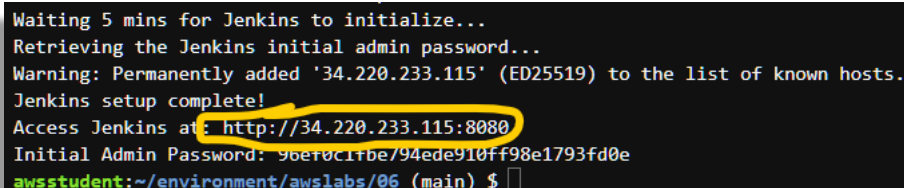
3. You can continue with the next task whilst the script runs.

Task2 Create an S3 Bucket for Remote State

1. Switch to the AWS Console.
2. Search for and then navigate to the **S3** service. Click on **Create bucket**
3. Ensure you are focussed on the **Oregon (us-west-2)** region
4. Name your bucket **jenkins-state-<your-name>**. Every bucket name must be globally unique; therefore you may get a message indicating that a bucket already exists with your chosen name. If so, then simply append a random number after your name. Record the name of this bucket in your session-info file against **Jenkins-state-bucket**
5. Leaving all settings at their default values, scroll down and select Create bucket.

Task3 Configure Jenkins

1. Open Jenkins in a new browser tab using the url displayed in your IDE. (Your IP address will differ)



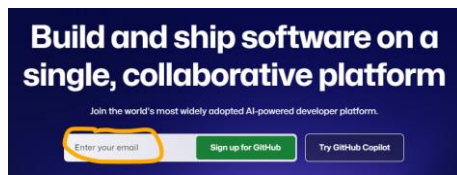
```
Waiting 5 mins for Jenkins to initialize...
Retrieving the Jenkins initial admin password...
Warning: Permanently added '34.220.233.115' (ED25519) to the list of known hosts.
Jenkins setup complete!
Access Jenkins at: http://34.220.233.115:8080
Initial Admin Password: 96et0c1f8e/94ede910ff98e1793fd0e
awsstudent:~/environment/awslabs/06 (main) $
```

2. Copy and paste the admin password from the IDE into the **Unlock Jenkins** screen the click on Continue
3. Select “**Install suggested plugins**”
4. On the “**Create First Admin User**” screen; Select “**Skip and continue as admin**”
5. Click “**Save and Finish**” to complete the Jenkins configuration.
6. Click “**Start using Jenkins**”

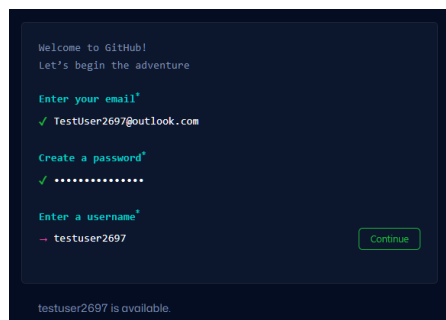
Task4 Create a Github account and repository

1. Sign up to Github using a personal email address that is not currently associated with Github...
 - a. Navigate to <https://github.com/>

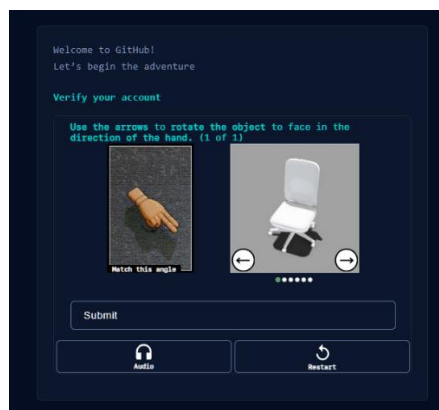
- b. Enter a personal email address and select “Sign up for Github”...



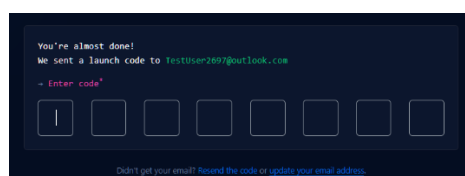
- c. Enter a password and a unique username of your choice..



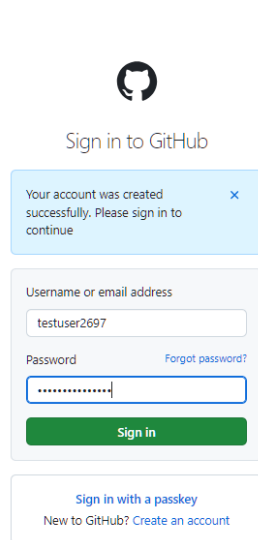
- d. Record and save your chosen **username** and **password** in your session-info file for safekeeping.
- e. Complete the challenge to prove you are a human...



- f. An email will be sent containing your launch code. Retrieve this and enter it..

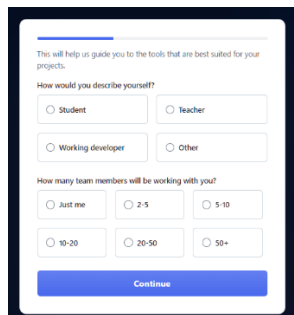


- g. You will then be prompted to log into github using your new account..



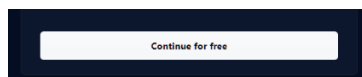
The image shows the GitHub sign-in page. At the top is the GitHub logo. Below it is the text "Sign in to GitHub". A blue notification box states: "Your account was created successfully. Please sign in to continue". The main form has two input fields: "Username or email address" with the value "testuser2697" and "Password" with masked characters. A "Forgot password?" link is next to the password field. Below the fields is a green "Sign in" button. At the bottom, there is a link "Sign in with a passkey" and a link "New to GitHub? Create an account".

h. Complete the questionnaire...



The image shows a questionnaire form titled "This will help us guide you to the tools that are best suited for your projects." It has two sections. The first section, "How would you describe yourself?", has four radio button options: "Student", "Teacher", "Working developer", and "Other". The second section, "How many team members will be working with you?", has six radio button options: "Just me", "2-5", "5-10", "10-20", "20-50", and "50+". A blue "Continue" button is at the bottom.

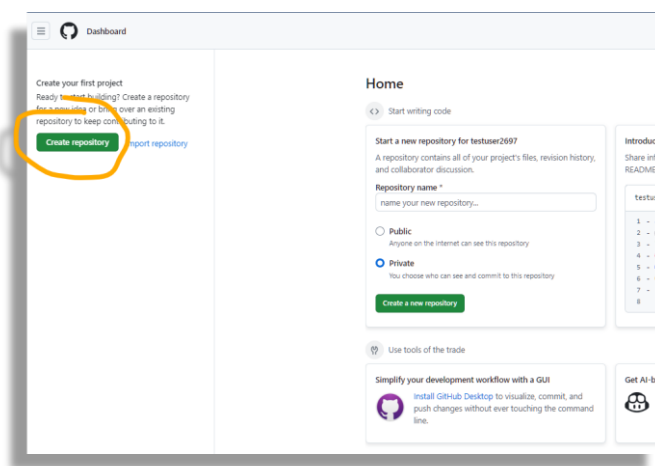
i. When asked to select a subscription, select “Continue for free”..



The image shows a dark blue button with the text "Continue for free" in white.

2. Create a public repository ...

a. Click on New ...

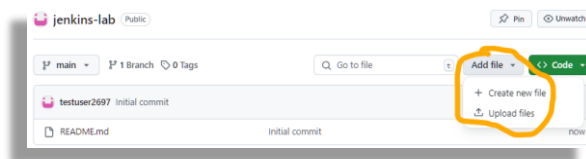


The image shows the GitHub Dashboard. On the left, under "Create your first project", there is a green "Create repository" button circled in orange. The main content area is titled "Home" and contains several cards. The first card is "Start a new repository for testuser2697", which has a form for "Repository name" and two radio button options: "Public" (selected) and "Private". Below the form is a green "Create a new repository" button. Other cards include "Introduce", "Use tools of the trade", and "Simplify your development workflow with a GUI".

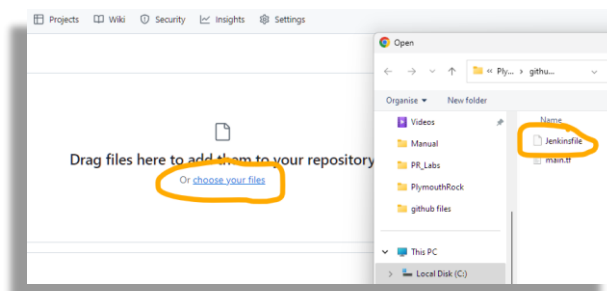
- b. Enter a Repository name of your choice. Ensure **Public** is selected and check the **'Add a README file'** option. Then click on **Create repository...**

The screenshot shows the 'Create a new repository' page on GitHub. The 'Repository name' field is filled with 'jenkins-lab' and a green checkmark indicates it is available. The 'Owner' is 'testuser2697'. The 'Public' radio button is selected. The 'Add a README file' checkbox is checked. The 'Create repository' button is at the bottom right.

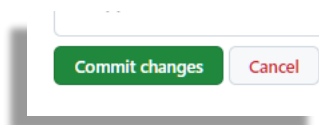
- c. Click on **Add file, Upload file..**



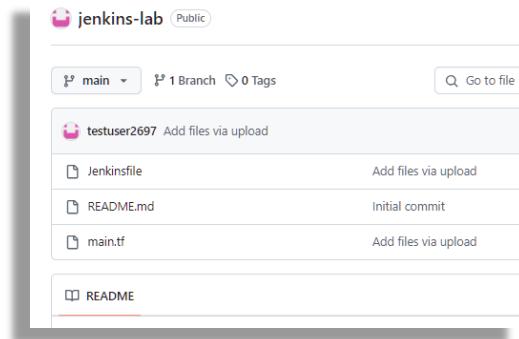
- d. Select the file **Jenkinsfile** from the **awslabs/Lab Instructions/lab6** folder of your student bundle files that you downloaded at the start of the course



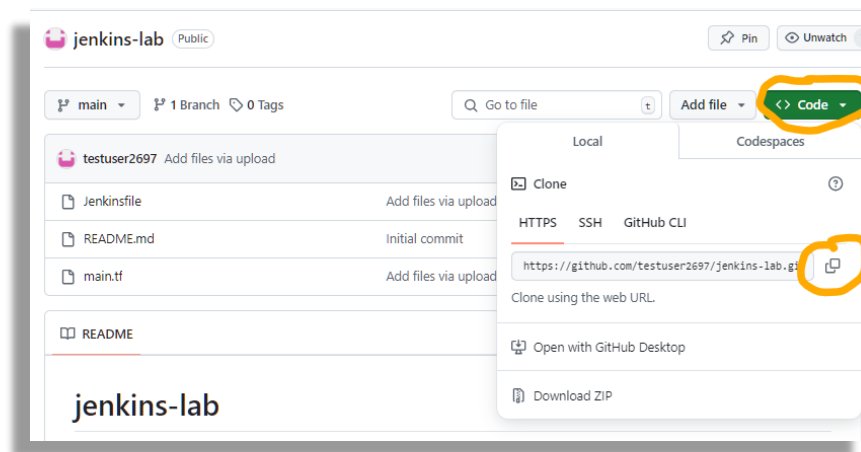
- e. Click on Commit changes..



- f. Repeat the previous 2 steps to upload the **main.tf** file from the **aws-labs/Lab Instructions/lab6** folder
- g. The 2 files should now be listed..



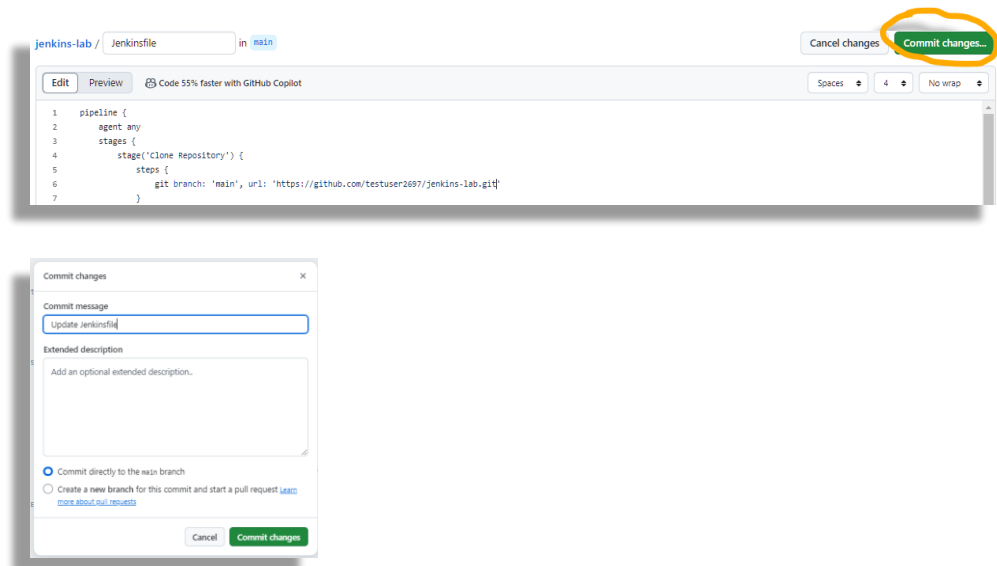
- h. Copy the URL of your repository to your clipboard..



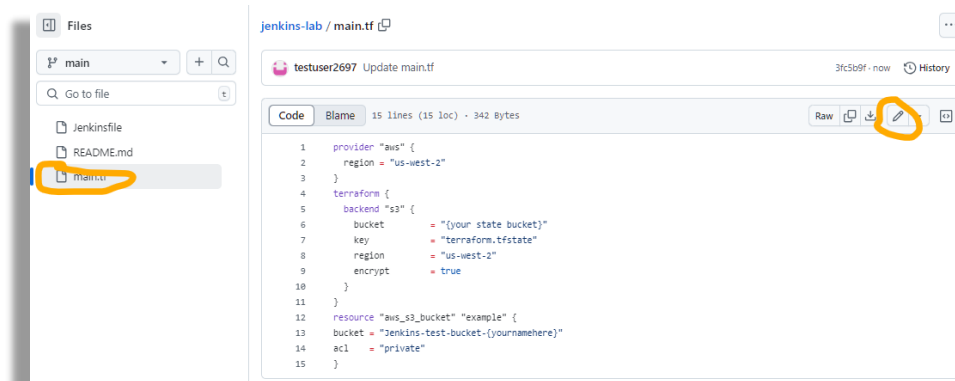
- i. Record this URL in your **session-info** file against **Repo-URL**
- j. Click on the file **Jenkinsfile** and then click on the **edit** icon to open the file for editing...



- k. On line 6, replace **{your github repo url here}**, including the braces, with your **Repo-URL** and then click on **Commit changes** twice...



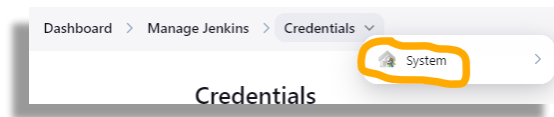
- l. Click on **main.tf** and then open it for edits...



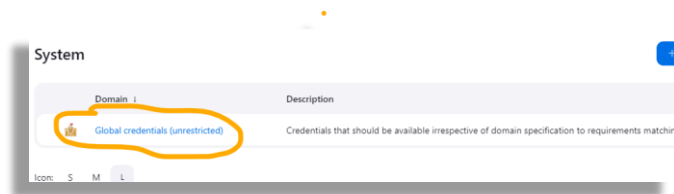
- m. On line 6, replace **{your state bucket}**, including the braces, with the name of the bucket you created in Task1 (recorded as **Jenkins-state-bucket** in your session-info file). This is where your statefile will be created when you initialize Terraform
- n. On line 13, replace **{yournamehere}**, including the braces, with your name followed by 2 random digits (to guarantee uniqueness). This will be the name of the bucket that Terraform will create when we run a Jenkins pipeline.
- o. Commit these changes as before.
- p. Leave the Github tab open as we will return to it later.

Task5 Add AWS Credentials to Jenkins

1. In order to use Terraform on Jenkins to interact with AWS, we must supply it with credentials to use. In your **Jenkins** browser session; Navigate to **Manage Jenkins > Credentials**.
2. On the breadcrumb menu; click on the **Credentials** dropdown and then select **System ...**



3. Click on “**Global credentials (unrestricted)**”...



4. Click on “**Add Credentials**”
5. For Username: Enter the **Access key ID** generated for your lab user. (This and the Secret Access key required next, can be found in your **session-info** file)
6. For Password: Enter the **Secret Access key** generated for your lab user
7. For ID: enter **aws_user**
8. Select “**Create**”

New credentials

Kind
Username with password

Scope ?
Global (Jenkins, nodes, items, all child items, etc)

Username ?
AKIAX7JSH46JHVQSQS7M8

☐ Treat username as secret ?

Password ?
.....

ID ?
aws_user

Description ?

Create

Task6 Configure Pipeline Job

1. Select “**+ New Item**” from the Jenkins **dashboard**
2. Enter “**Terraform Pipeline**” as the item name
3. Select “**Pipeline**” as the item type
4. Click “**OK**”
5. On the **General** page displayed next, scroll down to the **Pipeline** section. Use the dropdown list to change the **Definition** from “**Pipeline script**” to “**Pipeline script from SCM**”
6. Select “**Git**” from the **SCM** dropdown list
7. In the **Repository URL**: Enter **your** Github repository URL, recorded in your session-info file as **Repo-URL**
8. In “**Branches to build**,” “**Branch Specifier**,” change from ***/master** to ***/main**

Pipeline

Definition

Pipeline script from SCM

SCM ?

Git

Repositories ?

Repository URL ?

https://github.com/qatip/jenkins-demo.git

Credentials ?

- none -

Add Repository

Branches to build ?

Branch Specifier (blank for 'any') ?

*/main

9. Click **“Save”**
10. Click **“Build Now”**

Task7 Verify pipeline run and explore Jenkins

1. In Jenkins, return to the Dashboard. A record of the pipeline will be displayed showing run success and failure. Refresh the page until a result of the pipeline run is displayed...

Dashboard >

+ New Item

Build History

Project Relationship

Check File Fingerprint

Manage Jenkins

My Views

Build Queue

No builds in the queue.

Build Executor Status

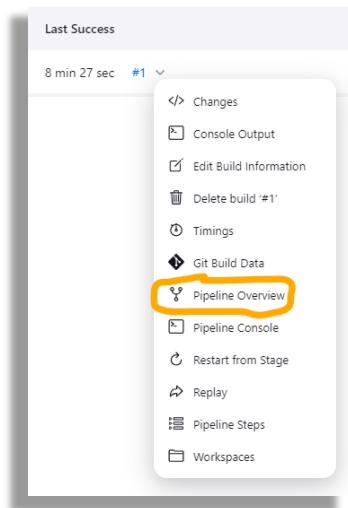
0/2

All +

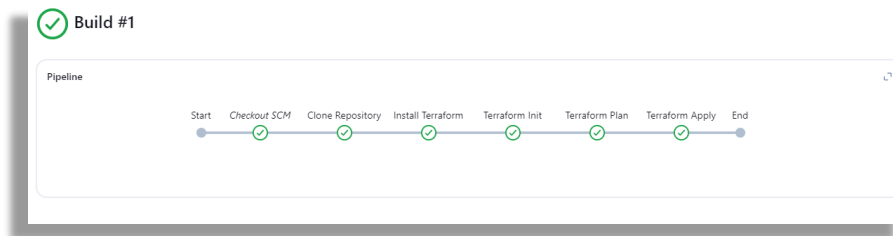
| S | W | Name | Last Success | Last Failure | Last Duration |
|---|---|--------------------|-----------------|--------------|---------------|
| ✓ | ☀ | Terraform Pipeline | 1 min 30 sec #1 | N/A | 30 sec |

Icons: S M L

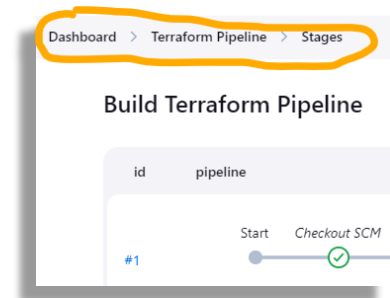
2. Select the drop-down menu against **#1** and choose Pipeline Overview..



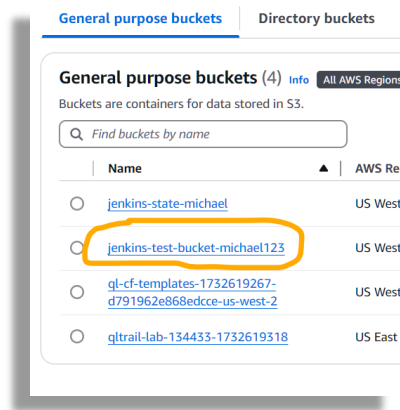
3. The stages of the pipeline are shown, with ticks (or crosses) indicating success or failure at that stage...



4. Spend a little time exploring the Jenkins interface, using the bread-crumbs menu to navigate around, and finally return to the main Dashboard...



5. In the AWS console, navigate to the S3 service and verify the existence of your new storage bucket..

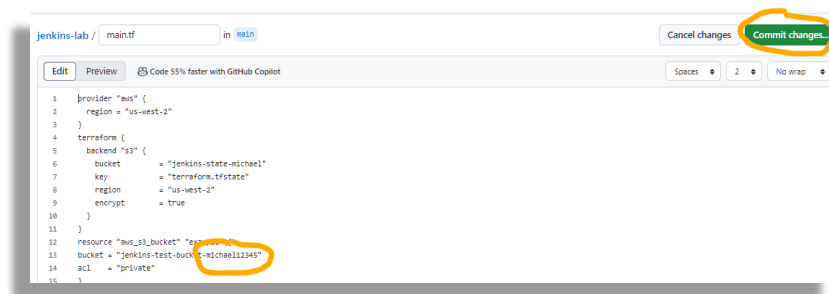


Task8 Updating the transformation pipeline

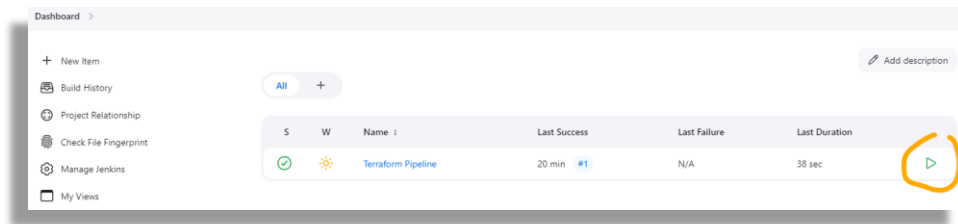
In a production environment developers would now check-out the contents of the Github repo to their local machine, make updates to the terraform files and then check them back into the repo for approval. Once approved these changes would be merged with the current files and deployed by triggering a new pipeline run. This can be done manually in Jenkins or automatically using Webhooks, whereby Github notifies Jenkins of the changed files, and the pipeline run starts automatically to deploy these changes.

In this task we will modify the terraform files directly in Github before manually triggering a new pipeline run in Jenkins. We will then set up Webhooks to show how changes in Github can automatically trigger the pipeline run.

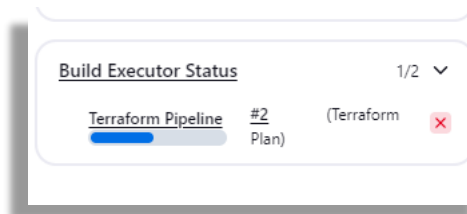
1. Return to your Github repository, logging back in if necessary.
2. Open main.tf for editing
3. Change the name of the bucket to be created by adding addition digits to the existing name. This will cause the original bucket to be deleted and a new one to be created. Commit this change..



4. Switch to Jenkins and click on the play icon to schedule a manual running of the pipeline..

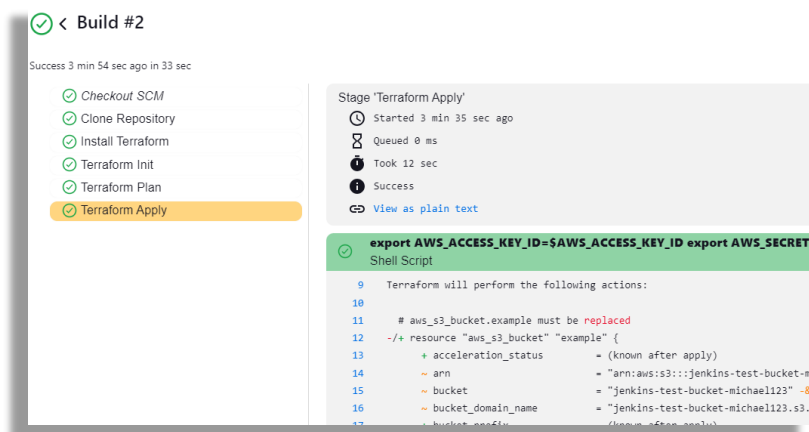


5. The build Executor Status will show the progress of the run..

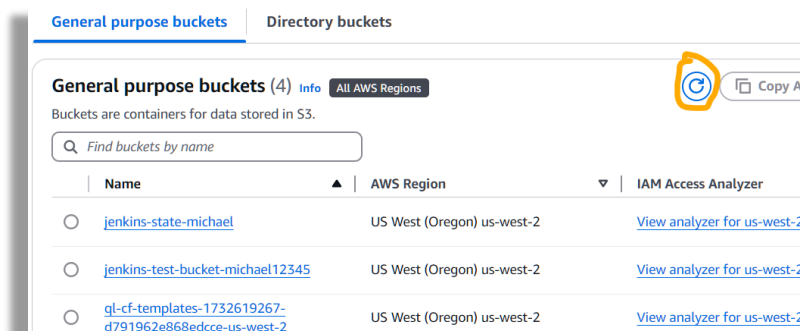


6. The success runs count should increase to #2 indicating successful manual running of the pipeline. (You may need to refresh the page)

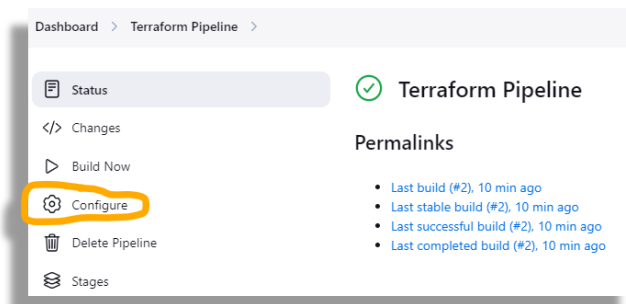
7. Looking at the logs for the **Terraform Apply** phase we see that the old bucket was replaced as bucket names are immutable and cannot be changed...



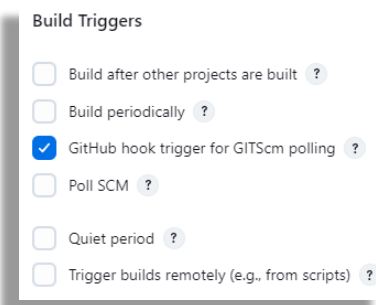
8. Switch to your console and, in S3, verify the deletion of the old bucket and the creation of a new one, refreshing the display..



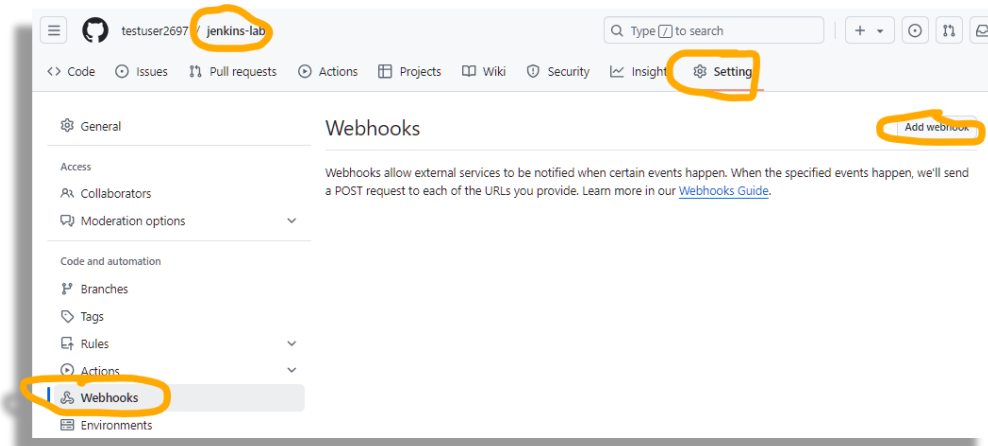
9. To configure automatic pipeline running; **In Jenkins**, configure the pipeline by first selecting it on the main dashboard and then choosing the “Configure” option..



10. Scroll down to the **Build Triggers** section, select “Github hook trigger for GITScm polling” and click on **Save ...**



11. **Switch to Github.** Select the **Settings** for your repo. Scroll down and select **Webhooks**. Click on **Add webhook** (you may be prompted to re-authenticate at this point)...



12. For **Payload URL**; enter **http://{Jenkins Public IP}:8080/github-webhook/** replacing {Jenkins Public IP} with the Public IP address of your Jenkins instance
13. For Content type; select application/json
14. Select to disable **SSL verification** for this lab environment.

15. Verify your settings as shown in example below (your IP will differ) before clicking on **Add 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://54.187.113.98:8080/github-webhook/

Content type *

application/json

Secret

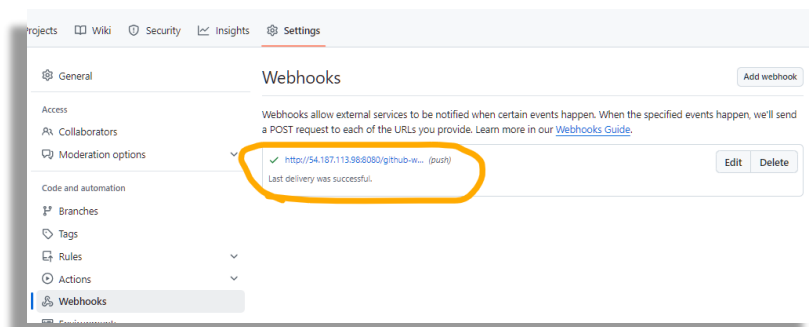
SSL verification

☐ By default, we verify SSL certificates when delivering payloads.

☐ Enable SSL verification ☒ Disable (not recommended)

16. Make another change to the name of your bucket in main.tf and commit the changes (refer to steps 2 and 3 above if you need guidance)

17. Re-visit your Webhooks setting and you should see confirmation that there was a successful push of the changes to Jenkins...



18. Switch to Jenkins. Return to the Dashboard and check that there is now a record of a third successful running of the pipeline...

Dashboard

+ New Item

Build History

Project Relationship

Check File Fingerprint

Manage Jenkins

My Views

All +

Add description

| S | W | Name | Last Success | Last Failure | Last Duration |
|---|---|--------------------|------------------------|--------------|---------------|
| ✓ | ☀ | Terraform Pipeline | 7 min 52 sec <u>#3</u> | N/A | 35 sec |

19. Switch to your AWS console, navigate to S3, refresh the display if necessary and verify the new bucket has been created.

Task9 (Time permitting). Configure Destroy Pipeline Job

1. Select “**+ New Item**” from the Jenkins **dashboard**
2. Enter “**Terraform Pipeline Destroy**” as the item name
3. Select “**Pipeline**” as the item type
4. Click “**OK**”
5. On the **General** page displayed next, scroll down to the **Pipeline** section. Use the dropdown list to change the **Definition** from “**Pipeline script**” to “**Pipeline script from SCM**”
6. Select “**Git**” from the **SCM** dropdown list
7. In the **Repository URL**: Enter **your** Github repository URL, recorded in your session-info file as **Repo-URL**
8. In “**Branches to build**,” “**Branch Specifier**,” change from ***/master** to ***/main**

The screenshot shows the Jenkins Pipeline configuration page. The 'Definition' dropdown is set to 'Pipeline script from SCM'. The 'SCM' dropdown is set to 'Git'. The 'Repository URL' field contains the text 'https://github.com/qatip/jenkins-demo.git'. The 'Credentials' dropdown is set to '- none -'.

The screenshot shows the 'Branches to build' configuration section. The 'Branch Specifier (blank for 'any')' field is set to '*/main'.

Branch Specifier (blank for 'any') ?

*/main

Add Branch

Repository browser ?

(Auto)

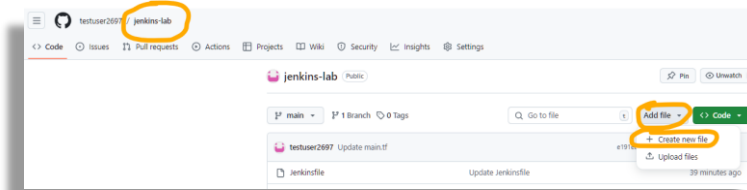
Additional Behaviours

Add ▼

Script Path ?

destroy/Jenkinsfile

9. Save the new pipeline **but do not build it yet**
10. Switch to your Github account
11. Create a new empty Jenkinsfile in a new folder “destroy”...



jenkins-lab / Name your file... in main

jenkins-lab / destroy in main

Note: Entering **destroy/** will create the **destroy** folder

jenkins-lab / destroy / Jenkinsfile in main

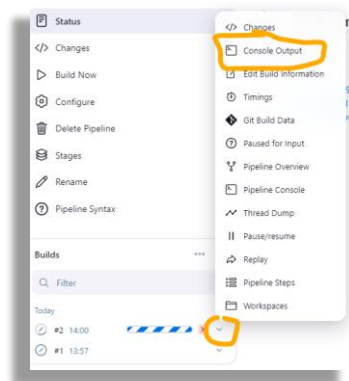
12. In your IDE, navigate to and to open **Jenkinsfile.txt** in your **Lab Instructions/lab6_Files/destroy** folder and copy the contents into your new github file. Then commit the changes..



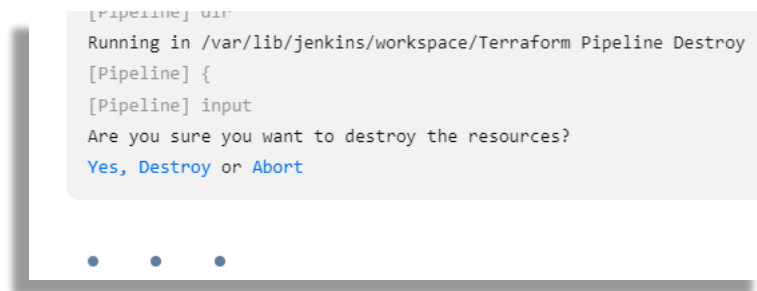
13. Switch back to Jenkins and **Build** the pipeline

14. This Jenkinsfile mandates that approval must be granted for the deletion to proceed.

15. Click on the pipeline and under **Builds**, select the running Terraform Pipeline Destroy job and select **Console Output**..



16. The run is waiting for approval to continue...



17. Click on **Yes** to confirm the deletion

18. The destruction should now proceed. Switch to **S3** to verify the deletion of your test bucket.

***** Congratulations, you have completed the final lab of the course. Your instructor will end your lab environment for you which will destroy all AWS resources created. Destroy your Github repository at your own discretion or retain it for future use *****

