

Lab 5- Actual CI/CD pipeline

In this demo we'll be automating the deployment of a simple website.

There are 3 main components to this application:

- Frontend
A HTML and JavaScript website that makes calls to the Backend service.
This website is hosted with NGINX as a webserver
- Backend
A Python Flask server which can connect to a database
- Database
MySQL Database.

Prerequisites

- Jenkins installed on an Ubuntu machine, ideally in EC2.
- Full `sudo` access for the `jenkins` user with no password required.
- Jenkins must not be installed in a Docker container for this demo.
- Ports `8080` and `80` accessible from the Jenkins server.

1. Fork and clone the Git repositories

For these three GitHub repositories:

- <https://github.com/qa-apprenticeships/devops-backend>
- <https://github.com/qa-apprenticeships/devops-database>
- <https://github.com/qa-apprenticeships/devops-frontend>

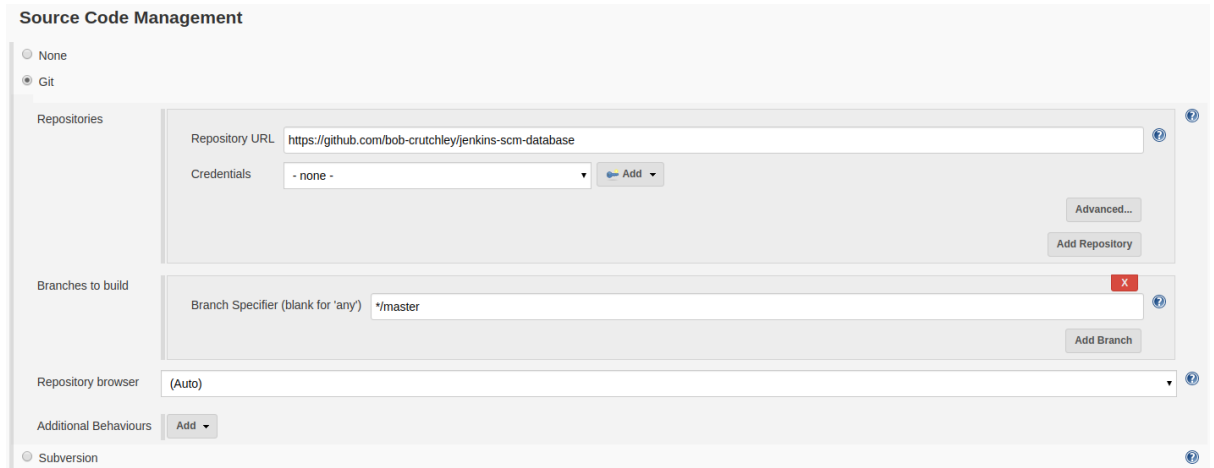
Then clone each of them onto your local PC.

2. Create the Jenkins Jobs

You will need a Jenkins job for each GitHub repository; `frontend`, `backend` and `database`.

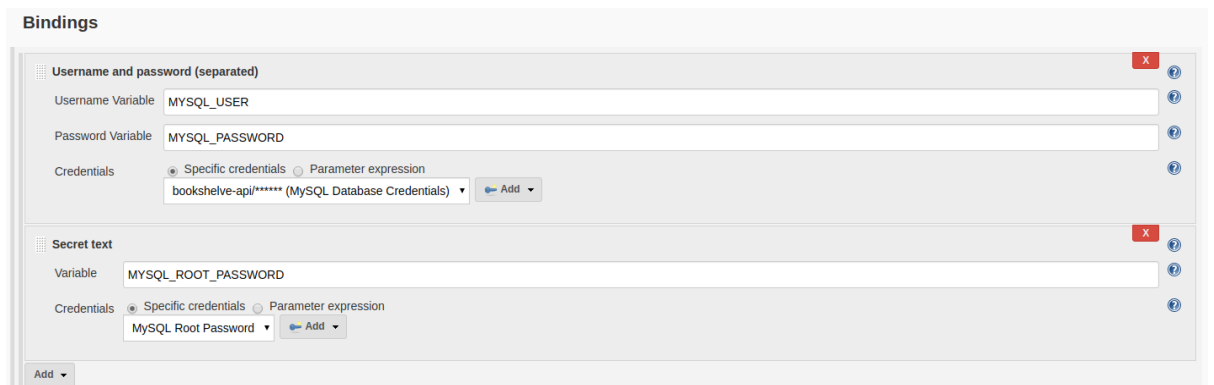
Lets create the database job first.

- Configure the source code management section to download the master branch from devops-database GitHub repository.



The screenshot shows the 'Source Code Management' configuration page in Jenkins. The 'Git' radio button is selected. Under 'Repositories', the 'Repository URL' is set to 'https://github.com/bob-crutchley/jenkins-scm-database' and 'Credentials' is set to 'none'. The 'Branches to build' section has a 'Branch Specifier (blank for \'any\')' set to '*/master'. The 'Repository browser' is set to '(Auto)'. There are buttons for 'Advanced...', 'Add Repository', and 'Add Branch'. At the bottom, there is an 'Additional Behaviours' section with an 'Add' button and a 'Subversion' radio button.

- Check the **GitHub hook trigger for GITScm polling** option under the **Build Triggers** section.
- Under **Build Environment**, select **Use secret text(s) or file(s)**. Add a **Username and Password (separated)** and a **Secret text** binding. Use the add button to create credentials for these and name the variables as shown below:



The screenshot shows the 'Bindings' configuration page in Jenkins. It has two sections: 'Username and password (separated)' and 'Secret text'. In the 'Username and password (separated)' section, the 'Username Variable' is 'MYSQL_USER' and the 'Password Variable' is 'MYSQL_PASSWORD'. The 'Credentials' dropdown is set to 'bookshelve-api/***** (MySQL Database Credentials)'. In the 'Secret text' section, the 'Variable' is 'MYSQL_ROOT_PASSWORD' and the 'Credentials' dropdown is set to 'MySQL Root Password'. There are 'Add' buttons at the bottom of each section and a general 'Add' button at the very bottom.

The actual value of the credentials (password contents etc) can be whatever you like -- the Jenkins job will (shortly) use the username and password you enter to setup a MySQL database with that username and password as its "root" user account. If you're stuck, try using "bookshelve-api" and "Abcd1234". For the root password, again, you're specifying what you want it to be setup as, try "Defg5678".

- Add an `Execute shell` build step with the following configured as the command:

```
export MYSQL_USER
export MYSQL_PASSWORD
export MYSQL_ROOT_PASSWORD
export MYSQL_HOST="localhost"
export MYSQL_DATABASE="bookshelve"

chmod +x setup.sh

./setup.sh
```

- Build the job to make sure that it succeeds

Now that you have a working Job for the database, complete the same steps as above for the backend and frontend projects in GitHub.

Make sure to reuse any credentials that you made previously - don't create new ones.

Note: if during the setup of the backend service, your EC2 crashes during the [Install] stage, you may need to do this:

- stop and restart your EC2 instance (note it will be given a new IP address)
- restart your Jenkins service, via PuTTY/SSH:
 - `sudo systemctl restart jenkins`
- Run the Jenkins job again

Note: to test the backend (API) project is working, use PuTTY/SSH to run the following command:

- `curl localhost:8000/api/books`

Note: if you get an error to do with database access, make sure the mysql docker container is running, using the PuTTY/SSH command:

- `sudo docker container start mysql`

3. See the Application Working

You should now be able to navigate to your EC2 machine's address on port `80` to see the application working.

If you can't access the website remotely, try accessing it locally from within PuTTY/SSH, using:

- `curl localhost/index.html`

Then check your inbound IP rules on the EC2 instance if you still have issues accessing the website from outside.

4. Web hook Configuration

We have already configured the Jenkins jobs to accept web hooks as triggers so now we just need to setup the web hook on a Git service provider like GitHub etc.

For this example we will be discussing how you can use GitHub to send Web Hooks to your instance of Jenkins, do the following for each of the GitHub projects that you have created:

1. On your GitHub project navigate to the `Settings` tab.
2. Click on `Webhooks`, then `Add webhook`
3. Set the `Payload URL` to be `http://[JENKINS_IP]:8080/github-webhook/`
Don't forget the trailing `/` on the end of the Payload URL!
4. Set the `Content type` to be `application/json`
5. Select `Add Webhook`

5. Push a New Change

We can now have a look at making some changes on the remote repositories to trigger automatic deployments of our new changes.

Frontend

Add `<h1>UPDATE</h1>` after line `9` in the `frontend/index.html` file.

Push the new changes to the GitHub repository, then then you should see the frontend Job automatically build.

Now try navigating to the site to see your changes.

Database

We can add a new item into the database to see the changes.

In the `database/setup.sql` append the statement shown below, then push the changes to the database repository:

```
INSERT INTO Books (  
    Name, Author, Image  
) VALUES (  
    "Harry Potter and the Philosopher's Stone",  
    "J.K. Rowling",  
    "https://books.google.com/books/content/images/frontcover/39iYWTb6n6cC?fife=w200-h300"  
) ;
```

The changes that you made should then be reflected on the running site.