Keycloak Deployment

Pre Requisites

- A running Kubernetes Cluster - either EKS or Minikube (**Note:** Minikube may cause some issues with port forwarding)
- Kubectl installed
- Helm installed
- Docker/Docker Desktop for Minkube
- An EBS Storage Class (AWS)

Overview

This configuration will deploy:

- a keycloak statefulset
- a postgresql statefulset and persistent volume

Steps

The following steps should be carried out within your Kubernetes environment, once authenticated to the cluster

1. Add the Bitnami Helm Repo

```
helm repo add bitnami https://charts.bitnami.com/bitnami
```

2. Create a new directory and add a values.yaml file

```
mkdir keycloak
cd keycloak
```

3. Customise the values.yaml file for initial key cloak deployment
   Note: This will also pull default values from the bitnami/keycloak helm values. Additionally, you can configure more custom users.

```
global:
  storageClass: gp2
tls:
  enabled: true
  autoGenerated: true
auth:
  adminPassword: Test
postgresql:
  auth:
    password: test
    postgresPassword: test
```

4. Before deploying the helm chart, create a namespace in the cluster

```
kubectl create ns keycloak
```

5. Install the keycloak helm chart with custom values file in the new namespace.
   Note: Make sure you are in the correct directory with the values.yaml file

```
helm upgrade --install keycloak bitnami/keycloak --values values.yaml -n keycloak
```

Instead of creating the values.yaml file, you could also declare all of these values in the helm install command e.g.

```
helm upgrade --install keycloak bitnami/keycloak --set tls.enabled=true --set tls.autoGenerated=true --set auth.adminPassword=Test --set po
```

6. Confirm that the deployment has been successful and check the logs. You should see a keycloak pod and a keycloak-postgresql pod running.

```
kubectl get pods -n keycloak
kubectl logs <name-of-pod> -n keycloak -f
```

Example of successful logs:

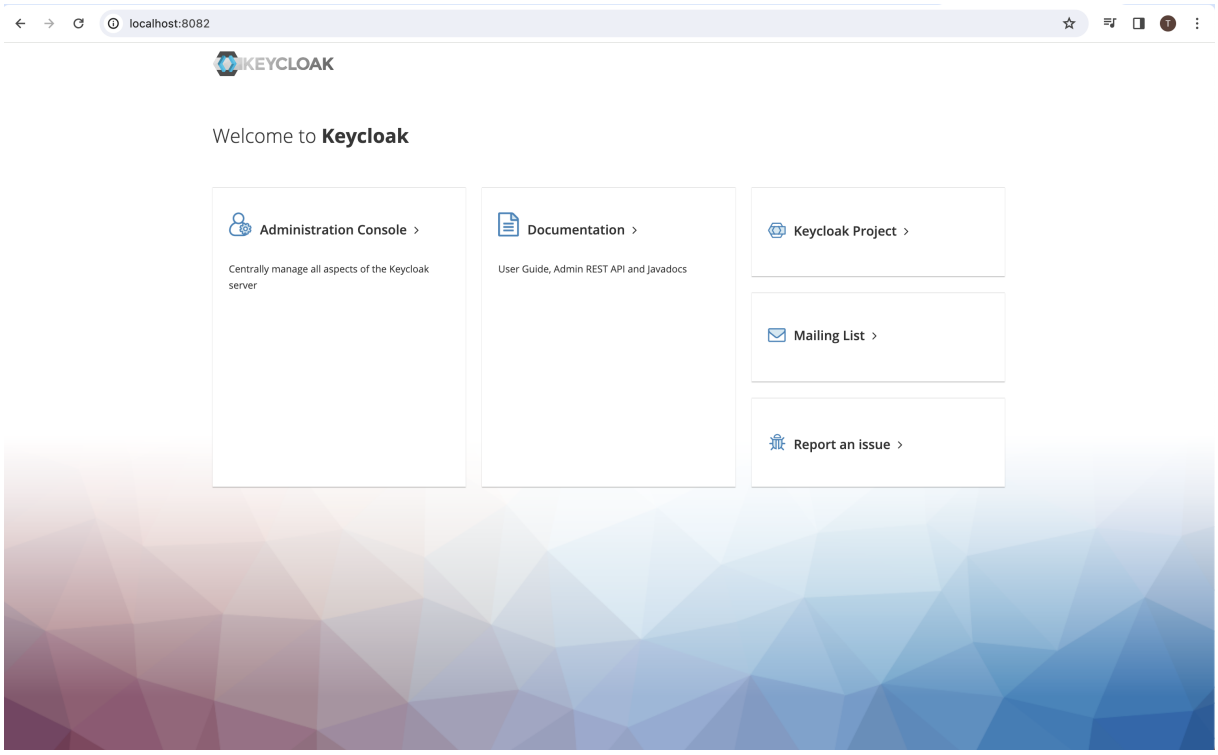
```
postgresql 10:00:21.38
postgresql 10:00:21.38 Welcome to the Bitnami postgresql container
postgresql 10:00:21.38 Subscribe to project updates by watching https://github.com/bitnami/bitnami-docker-postgresql
postgresql 10:00:21.39 Submit issues and feature requests at https://github.com/bitnami/bitnami-docker-postgresql/issues
postgresql 10:00:21.39
postgresql 10:00:21.39 DEBUG ==> Configuring libnss_wrapper...
postgresql 10:00:21.40 INFO  ==> ** Starting PostgreSQL setup **
postgresql 10:00:21.45 INFO  ==> Validating settings in POSTGRESQL_* env vars..
postgresql 10:00:21.46 INFO  ==> Loading custom pre-init scripts...
postgresql 10:00:21.46 INFO  ==> Initializing PostgreSQL database...
postgresql 10:00:21.47 DEBUG ==> Ensuring expected directories/files exist...
postgresql 10:00:21.55 INFO  ==> pg_hba.conf file not detected. Generating it...
postgresql 10:00:21.55 INFO  ==> Generating local authentication configuration
postgresql 10:00:21.56 INFO  ==> Deploying PostgreSQL with persisted data...
postgresql 10:00:21.57 INFO  ==> Configuring replication parameters
postgresql 10:00:21.65 INFO  ==> Configuring fsync
postgresql 10:00:21.74 INFO  ==> Loading custom scripts...
postgresql 10:00:21.75 INFO  ==> Enabling remote connections
postgresql 10:00:21.77 INFO  ==> ** PostgreSQL setup finished! **

postgresql 10:00:21.78 INFO  ==> ** Starting PostgreSQL **
2023-09-14 10:00:21.873 GMT [1] LOG:  pgaudit extension initialized
2023-09-14 10:00:21.873 GMT [1] LOG:  listening on IPv4 address "0.0.0.0", port 5432
2023-09-14 10:00:21.873 GMT [1] LOG:  listening on IPv6 address "::", port 5432
2023-09-14 10:00:21.880 GMT [1] LOG:  listening on Unix socket "/tmp/.s.PGSQL.5432"
2023-09-14 10:00:22.096 GMT [92] LOG:  database system was shut down at 2023-09-13 21:27:37 GMT
2023-09-14 10:00:22.309 GMT [1] LOG:  database system is ready to accept connections
2023-09-14 10:12:44.584 GMT [1] LOG:  received smart shutdown request
```

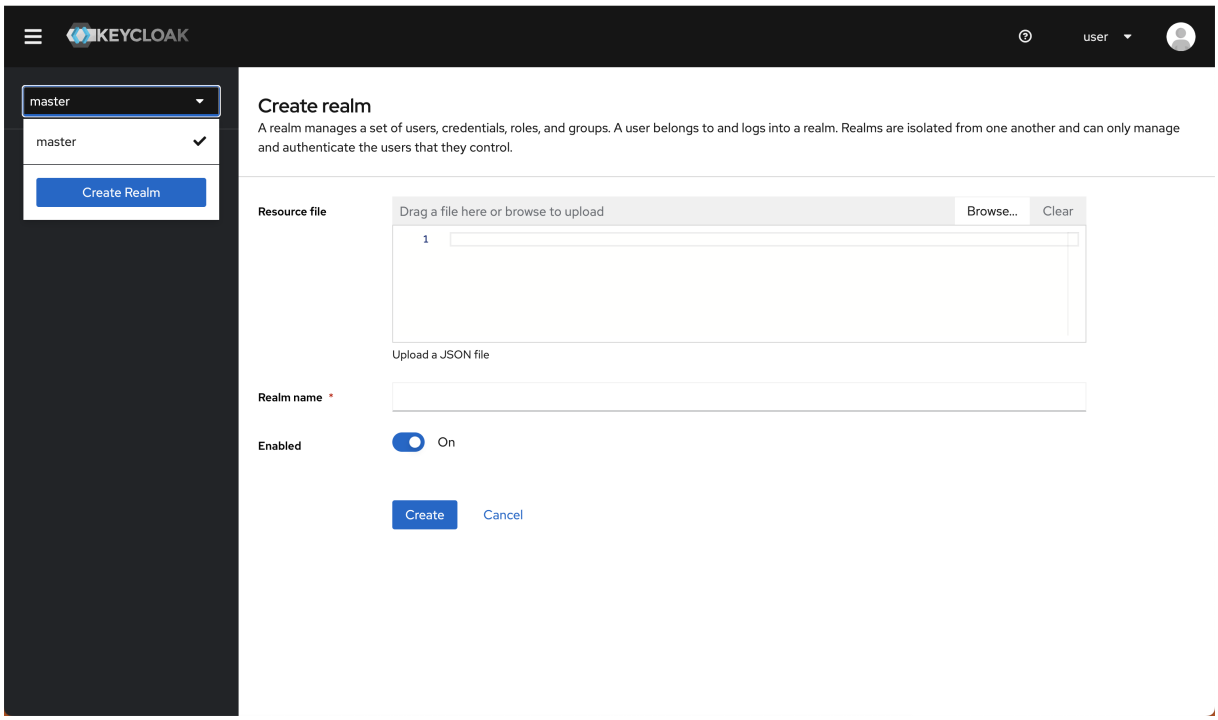
7. Lets port-forward the keycloak service to access the UI in a browser

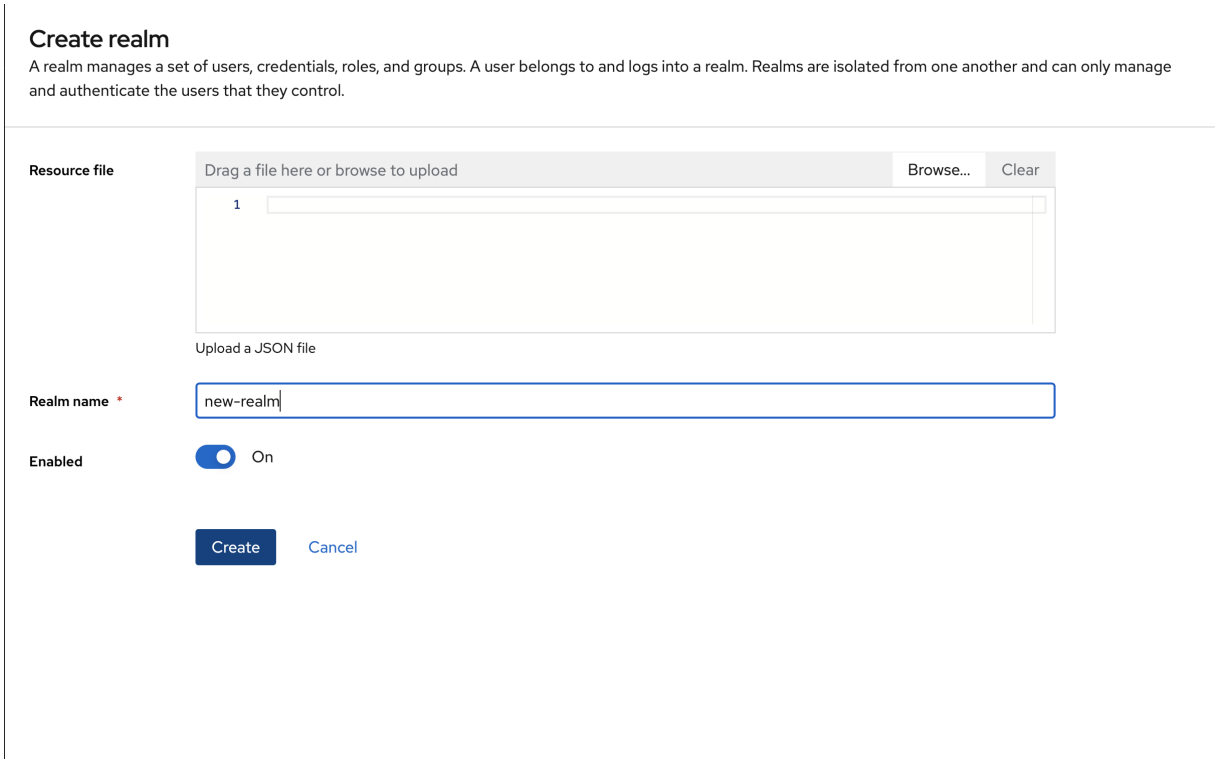
```
kubectl get svc -n keycloak
kubectl port-forward svc/<keycloak-service> -n keycloak <port-to-expose>/80
```

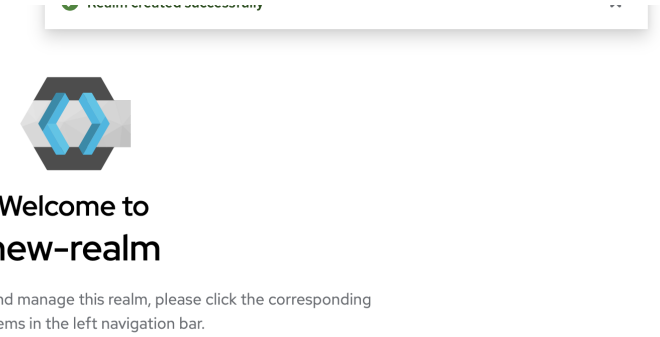
8. Navigate to a browser and access `localhost:<port-to-expose>`



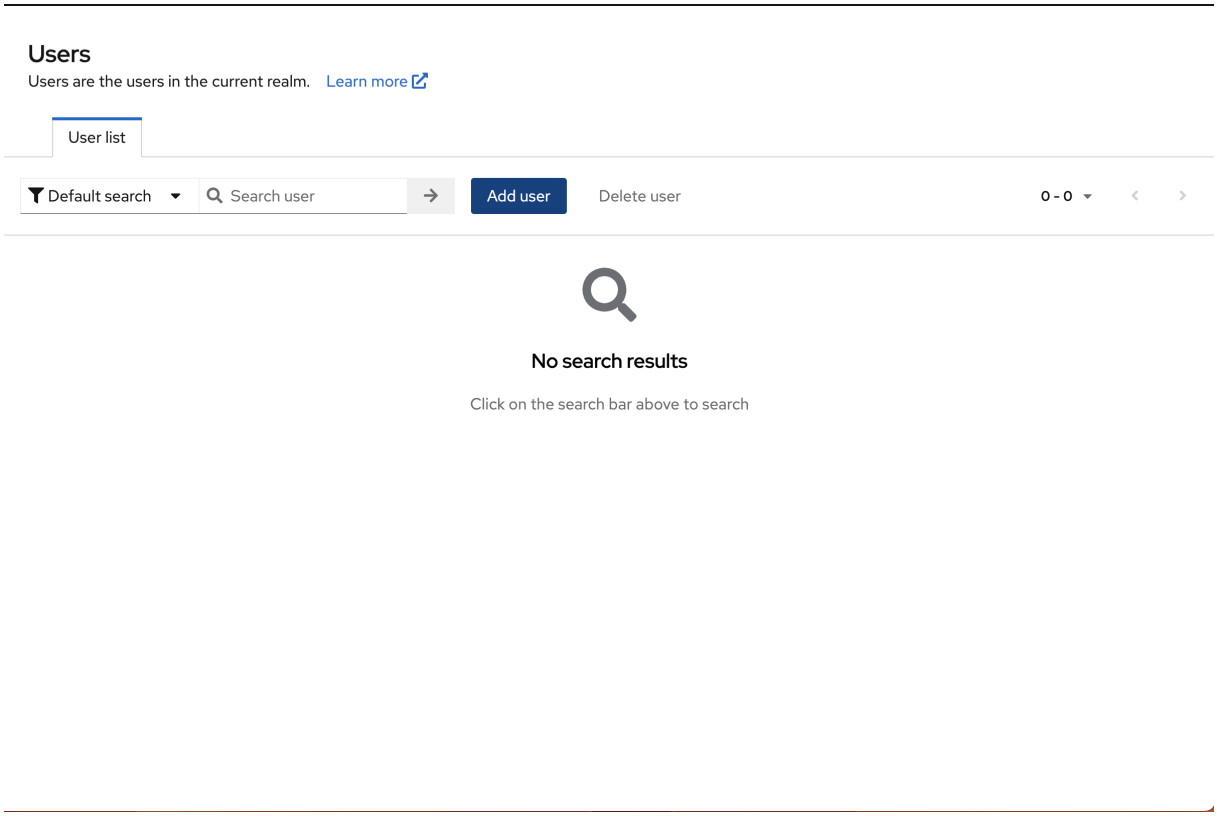
9. Go to Administration Console - it will prompt you for a username and password. The default username is **user** and we set the new password to **Test.**
   Create a Realm.

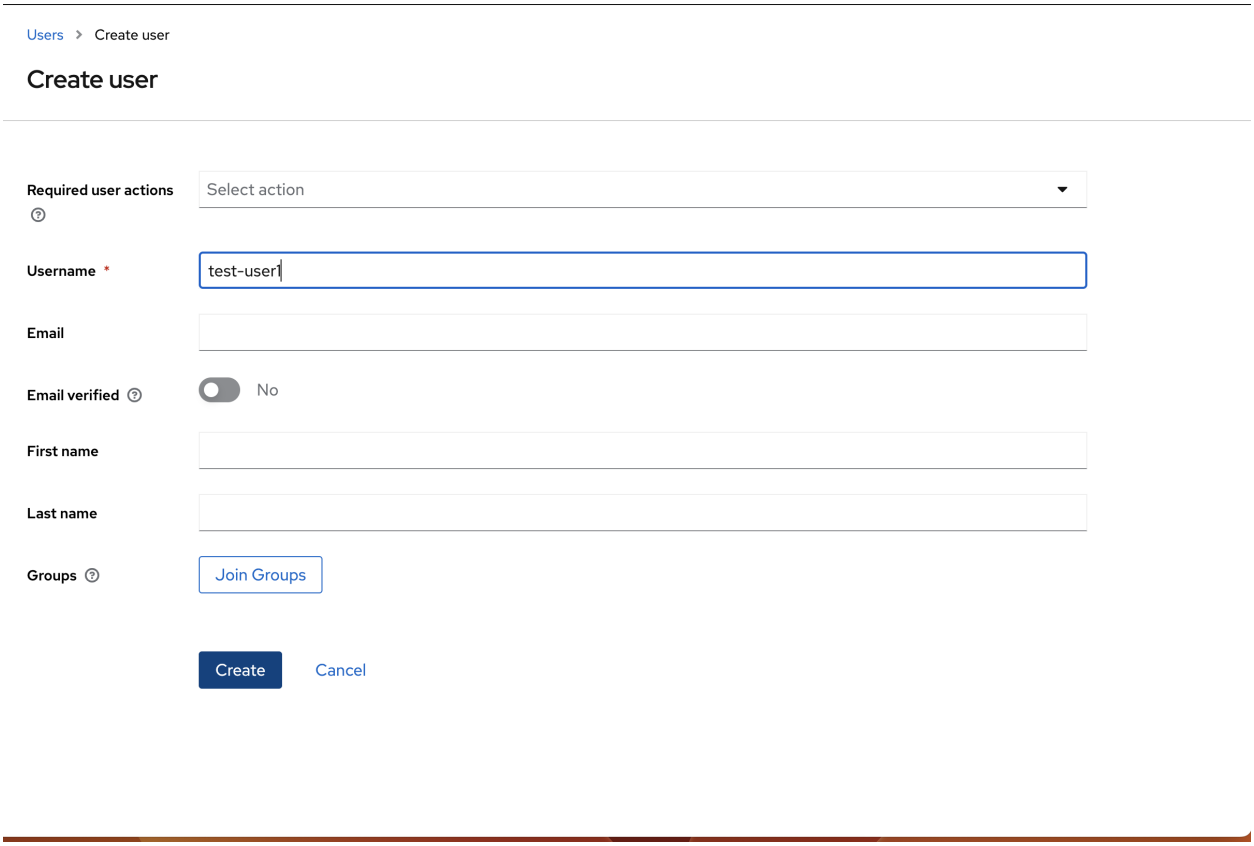

KEYCLOAK
user
master
master
Create Realm
Create realm
A realm manages a set of users, credentials, roles, and groups. A user belongs to and logs into a realm. Realms are isolated from one another and can only manage and authenticate the users that they control.
Resource file
Drag a file here or browse to upload
Browse...
Clear
1
Upload a JSON file
Realm name *
Enabled
On
Create
Cancel


Create realm
A realm manages a set of users, credentials, roles, and groups. A user belongs to and logs into a realm. Realms are isolated from one another and can only manage and authenticate the users that they control.
Resource file
Drag a file here or browse to upload
Browse...
Clear
1
Upload a JSON file
Realm name *
new-realm
Enabled
On
Create
Cancel

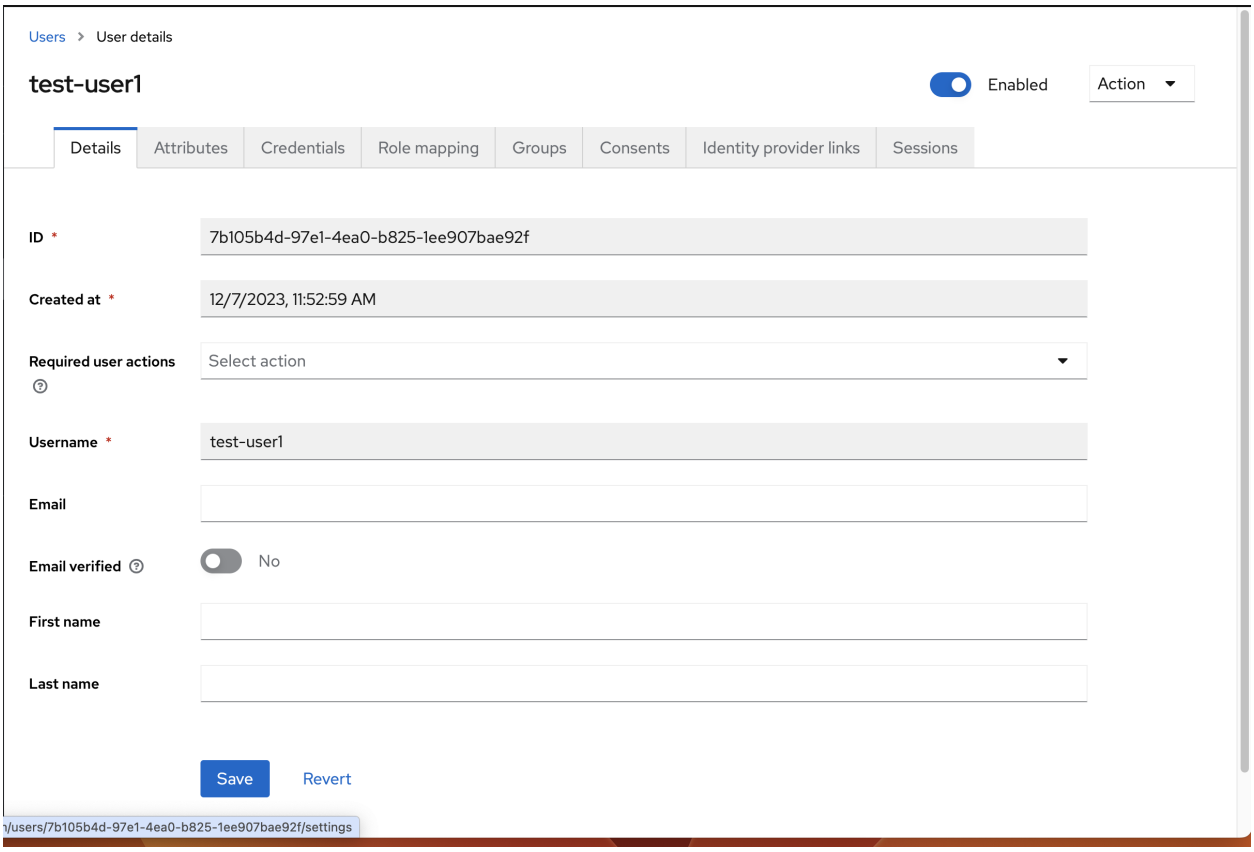


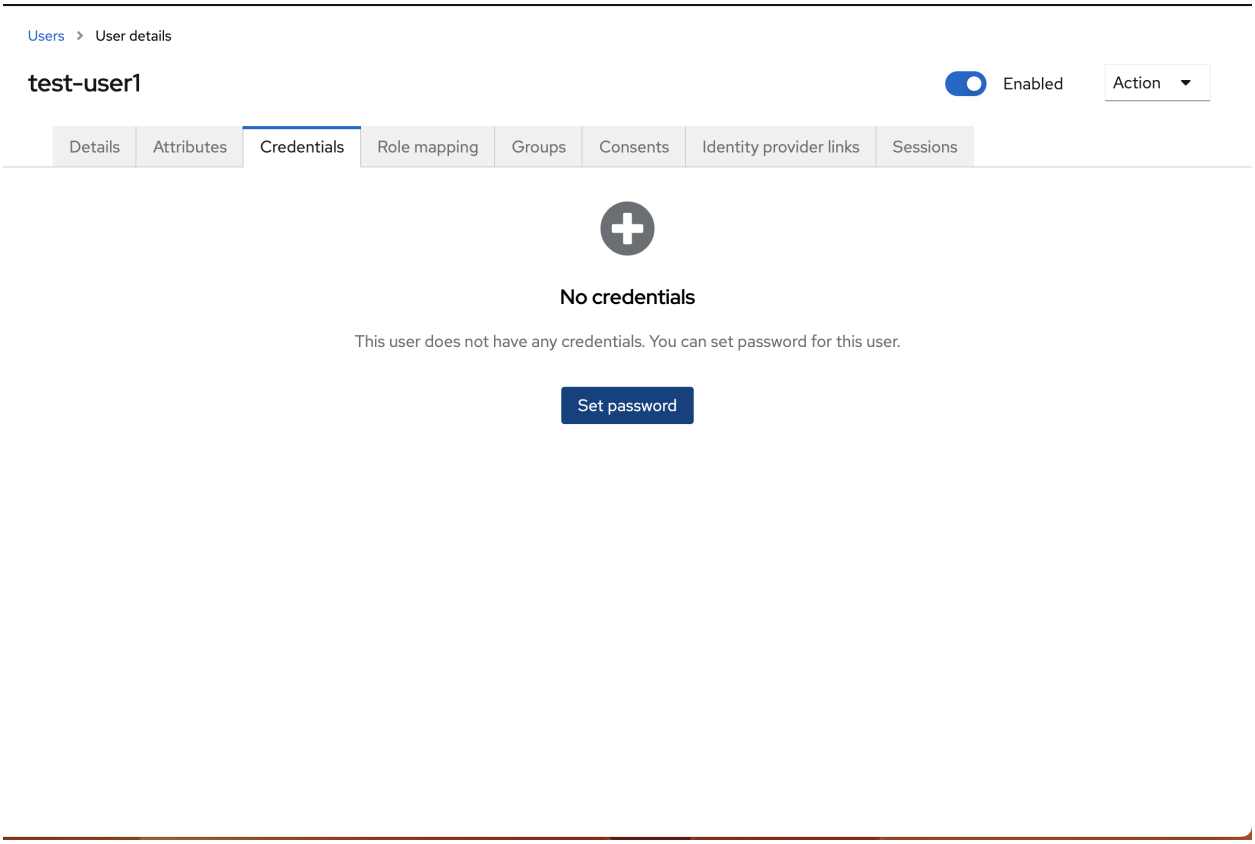
10. Create a new user in the new realm

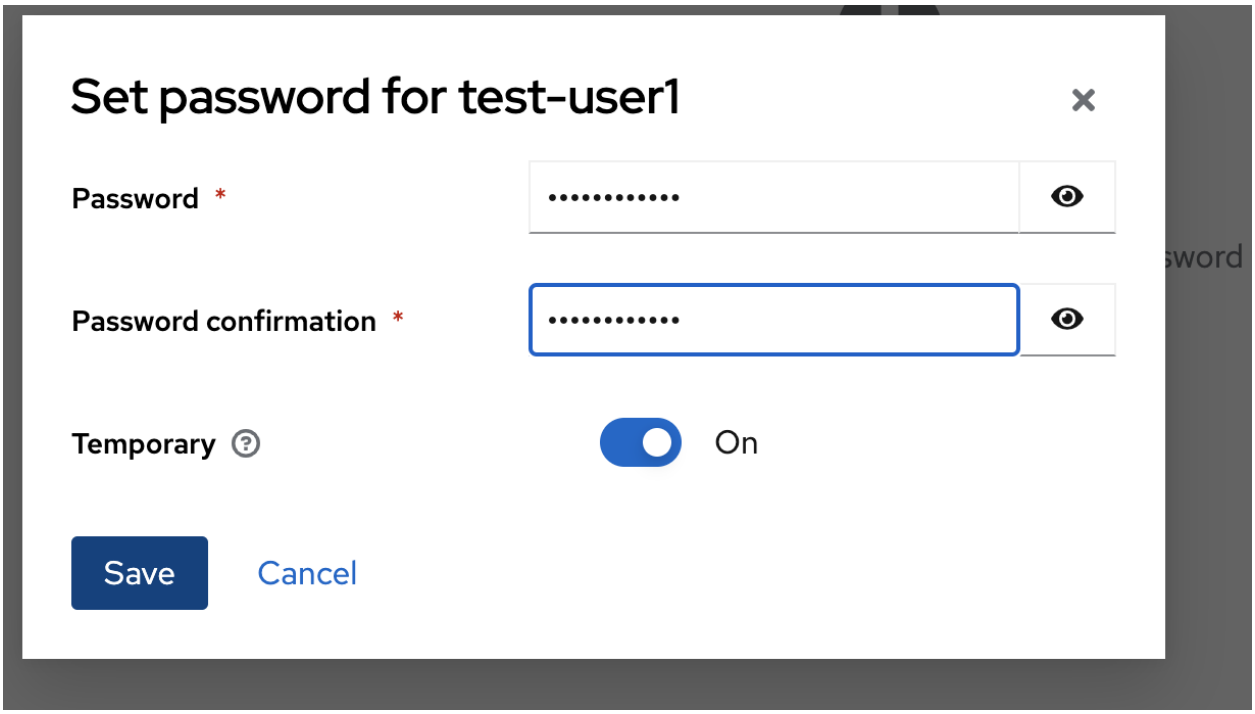


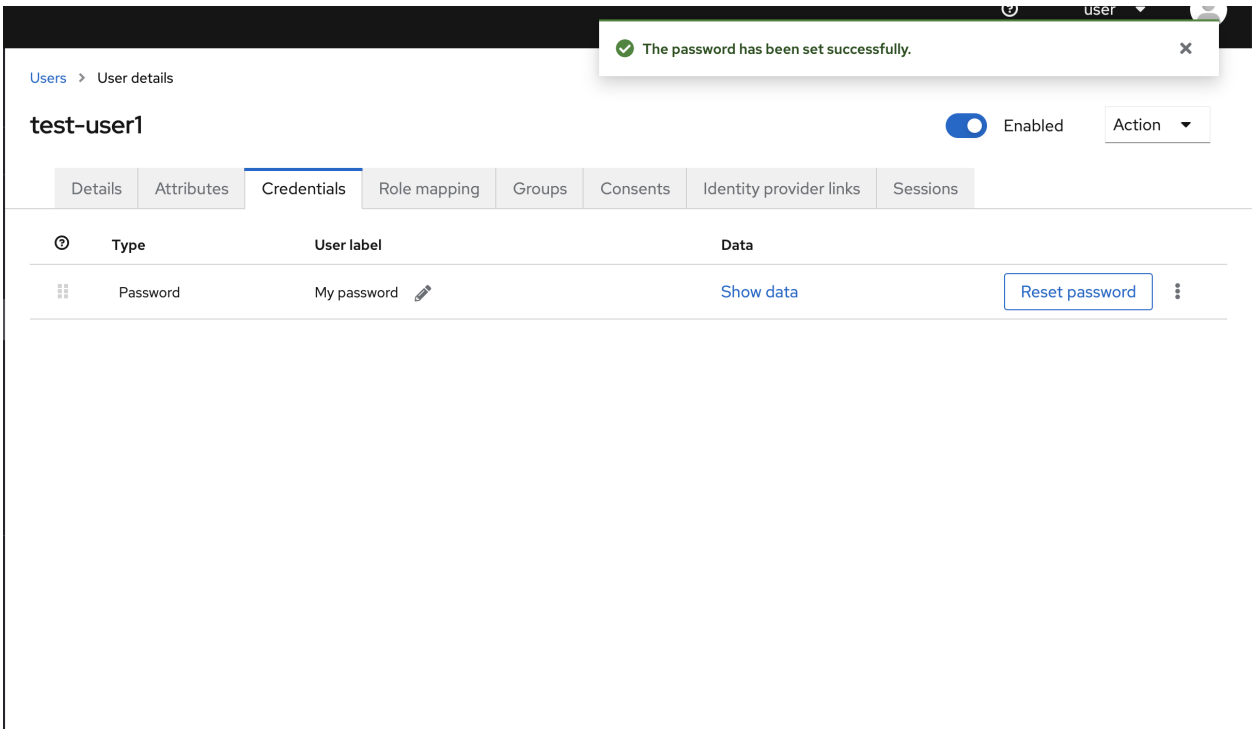


11. Update the new users password

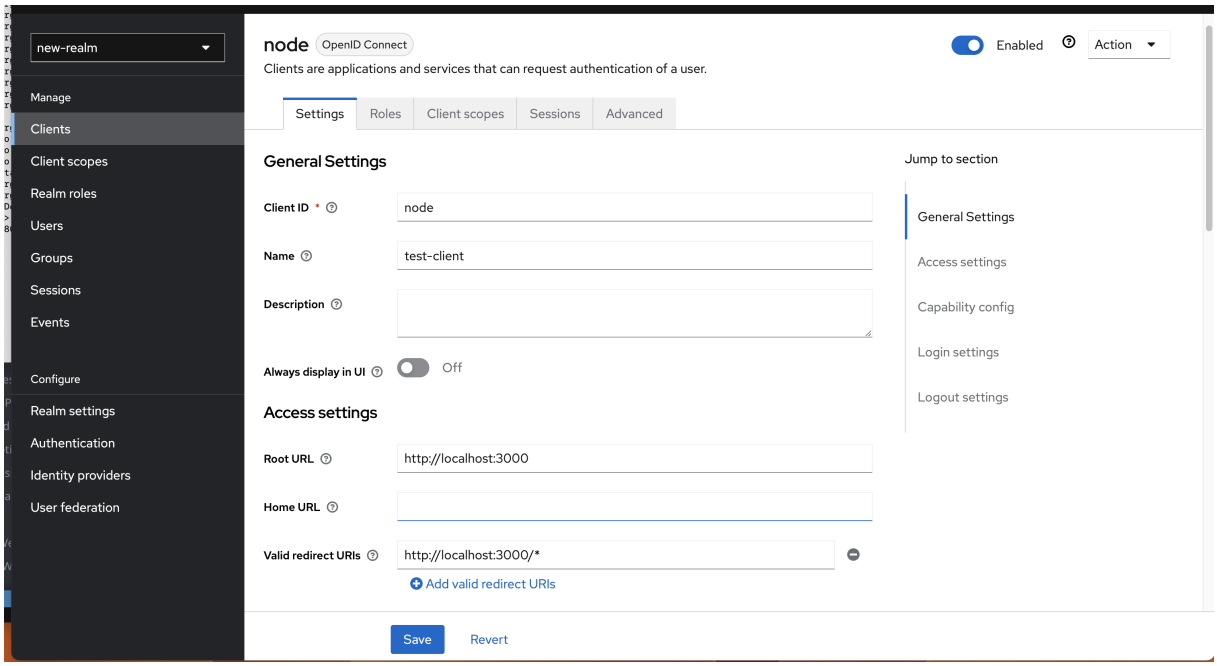

Users
User details
test-user1
Enabled
Action
Details
Attributes
Credentials
Role mapping
Groups
Consents
Identity provider links
Sessions
ID *
7b105b4d-97e1-4ea0-b825-1ee907bae92f
Created at *
12/7/2023, 11:52:59 AM
Required user actions
Select action
Username *
test-user1
Email
Email verified
No
First name
Last name
Save
Revert
/users/7b105b4d-97e1-4ea0-b825-1ee907bae92f/settings


Users
User details
test-user1
Enabled
Action
Details
Attributes
Credentials
Role mapping
Groups
Consents
Identity provider links
Sessions
No credentials
This user does not have any credentials. You can set password for this user.
Set password

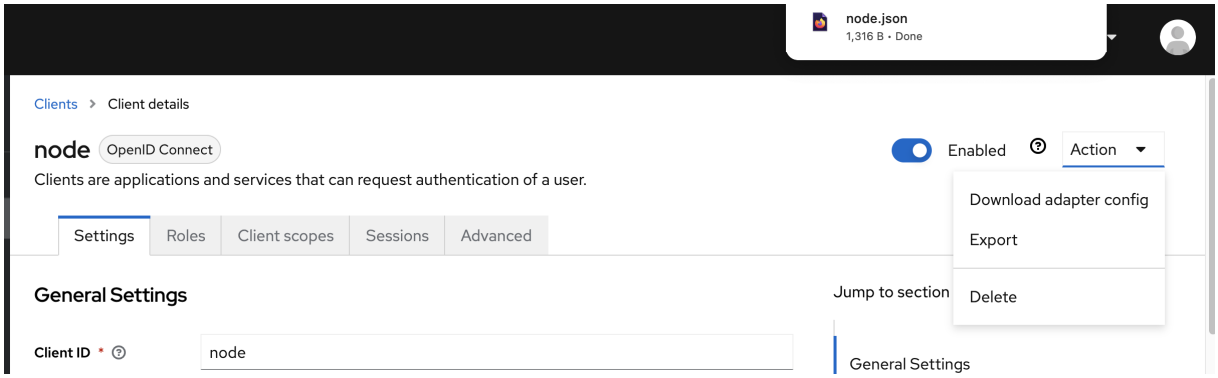




12. Create a new client - passing in rootURL. This port used here is the port where the application will be running.



13. Once created, you will need to export the json of the client from the Action tab > Export. This will download the client.json



```
{
  "clientId": "node",
  "name": "test-client",
  "description": "",
  "rootUrl": "http://localhost:3000",
  "adminUrl": "http://localhost:3000",
  "baseUrl": "",
  "surrogateAuthRequired": false,
  "enabled": true,
  "alwaysDisplayInConsole": false,
  "clientAuthenticatorType": "client-secret",
  "redirectUris": [
    "http://localhost:3000/*"
  ],
  "webOrigins": [
    "http://localhost:3000"
  ],
  "notBefore": 0,
  "bearerOnly": false,
  "consentRequired": false,
  "standardFlowEnabled": true,
  "implicitFlowEnabled": false,
  "directAccessGrantsEnabled": true,
  "serviceAccountsEnabled": false,
  "publicClient": true,
  "frontchannelLogout": true,
  "protocol": "openid-connect",
  "attributes": {
    "oidc.ciba.grant.enabled": "false",
    "oauth2.device.authorization.grant.enabled": "false",
    "backchannel.logout.session.required": "true",
    "backchannel.logout.revoke.offline.tokens": "false"
  },
  "authenticationFlowBindingOverrides": {},
  "fullScopeAllowed": true,
  "nodeReRegistrationTimeout": -1,
  "defaultClientScopes": [
    "web-origins",
    "acr",
    "profile",
    "roles",
    "email"
  ],
  "optionalClientScopes": [
    "address",
    "phone",
    "offline_access",
    "microprofile-jwt"
  ],
  "access": {
```

14. You will then need to integrate this json with the application programming language that you choose. The steps to do this is simple to replicate and can vary. Keycloak comes with client adapters for most popular languages including Node.js, Python, Java etc.

Customise Helm Chart to Deploy Realm, Client and User with Client URL.

To avoid carrying out these manual steps, we can customise the helm values file to deploy keycloak with a new realm, users, roles and clients that will configure the rootUrl of the client

Note: The rootUrl and adminUrl need to specified here with the Client URL

Update values.yaml with the json

```
keycloakConfigCli:
  enabled: true
  configuration:
    realm1.json: |
      {
        "realm": "realm-test1",
        "enabled": "true",
        "roles": {
            "realm": [
              {
                "name": "user",
                "composite": false,
                "clientRole": false
              },
              {
                "name": "admin",
                "composite": false,
                "clientRole": false
              }
          ]
        },
        "users": [
            {
              "username": "realm-test-user1",
              "enabled": true,
              "realmRoles": [
                "user"
              ],
              "credentials": [
                {
                  "type": "password",
                  "value": "test"
                }
              ]
            }
        ],
        clients: [
          {
            "clientId": "client-test",
            "enabled": "true",
            "directAccessGrantsEnabled": true,
            "redirectUris": [""],
            "webOrigins": [""],
            "bearerOnly": false,
            "rootUrl": "http://localhost:3000",
            "adminUrl": "http://localhost:3000"
          }
        ]
      }
```

Conclusion

The final values file will look like this:

```
global:
  storageClass: gp2
tls:
  enabled: true
  autoGenerated: true
auth:
  adminPassword: Test
postgresql:
  auth:
    password: test
    postgresPassword: test
keycloakConfigCli:
  enabled: true
  configuration:
    realm1.json: |
      {
        "realm": "realm-test1",
        "enabled": "true",
        "roles": {
            "realm": [
              {
                "name": "user",
                "composite": false,
                "clientRole": false
              },
              {
                "name": "admin",
                "composite": false,
                "clientRole": false
              }
          ]
        },
        "users": [
            {
              "username": "realm-test-user1",
              "enabled": true,
              "realmRoles": [
                "user"
              ],
              "credentials": [
                {
                  "type": "password",
                  "value": "test"
                }
              ]
            }
        ],
        clients: [
          {
            "clientId": "client-test",
            "enabled": "true",
            "directAccessGrantsEnabled": true,
            "redirectUris": [""],
            "webOrigins": [""],
            "bearerOnly": false,
            "rootUrl": "http://localhost:3000",
            "adminUrl": "http://localhost:3000"
          }
        ]
      }
```