



**Ganpat
University**

॥ विद्यया समाजोत्कर्षः ॥

**Institute of
Computer
Technology**

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Branch: CBA

Batch:71

-----PRACTICAL 14-----

You're tasked with securing a new application that requires user authentication, role-based access control, and identity management. To achieve this, you decide to explore for its extensive IAM (Identity and Access Management) capabilities.

Explore the options available in Keycloak that can help you set up and manage user authentication, including features like , , , (e.g., social logins), , and (for securing individual applications or APIs).

1. Pull docker image of keycloak

Command: `docker pull keycloak/keycloak`

```
>_ pwsh PRACTICAL-14 55ms
>> docker pull keycloak/keycloak
Using default tag: latest
latest: Pulling from keycloak/keycloak
c0d9c0d24a3e: Download complete
3398cc2759de: Download complete
fcc8361add52: Download complete
8e15100c32db: Download complete
88df1c9dc179: Download complete
Digest: sha256:a93d22e13b8641c683b7d5ccf6802a8ee177a21357ab7950228c7517ad1896c0
Status: Downloaded newer image for keycloak/keycloak:latest
docker.io/keycloak/keycloak:latest
```

2. Run keycloak container with admin user and password specified as envs and go to the localhost URL for authentication
Command:

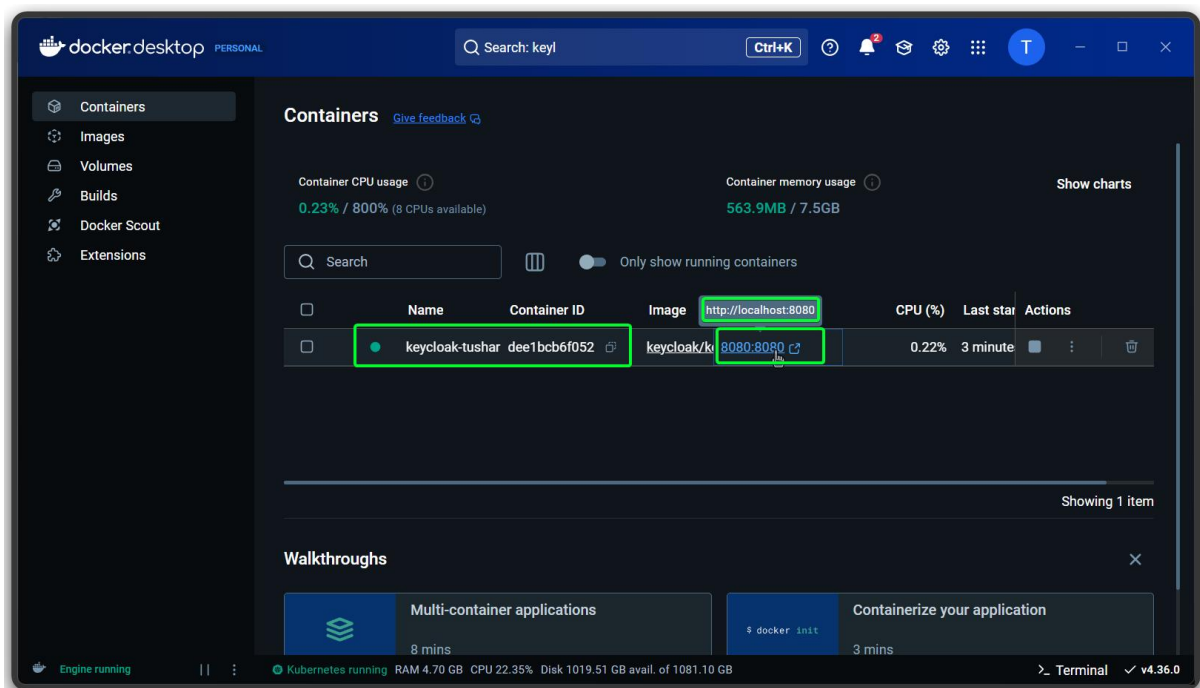
```
docker run --name keycloak-tushar -p 8080:8080 -e KEYCLOAK_ADMIN=admin -e KEYCLOAK_ADMIN_PASSWORD=admin keycloak/keycloak start-dev
```

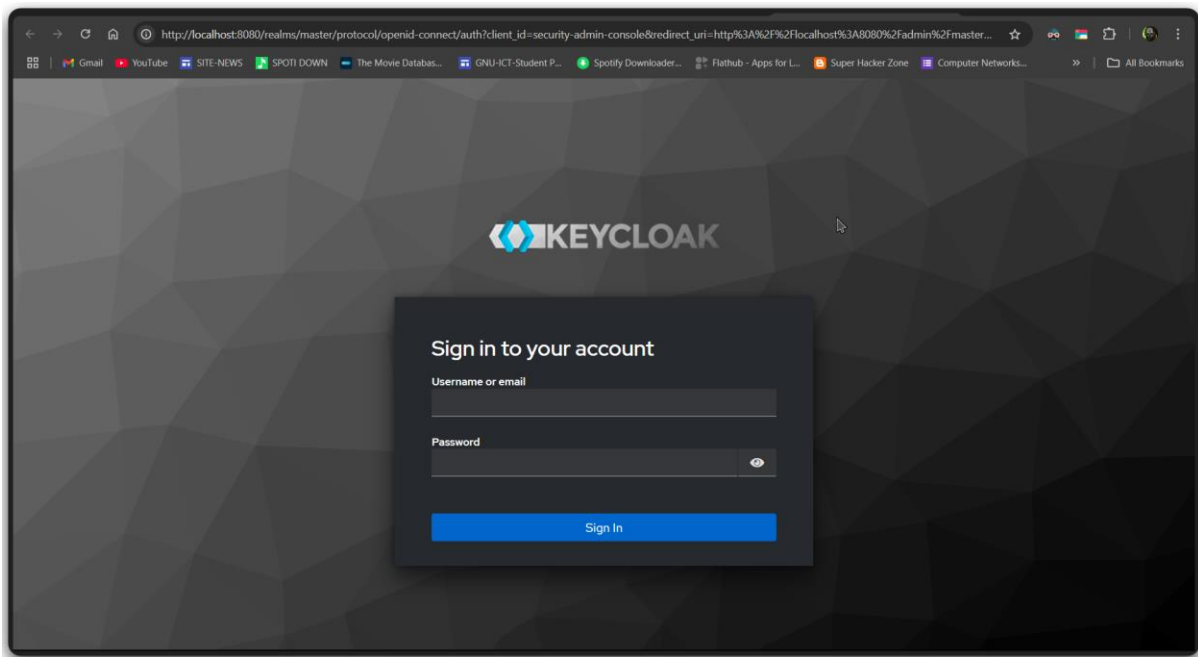
```
PowerShell
PS C:\PRACTICAL-14> docker run --name keycloak-tushar -p 8080:8080 -e KEYCLOAK_ADMIN=admin -e KEYCLOAK_ADMIN_PASSWORD=admin keycloak/keycloak start-dev
Updating the configuration and installing your custom providers, if any. Please wait.
2024-12-02 02:15:58,063 INFO [io.qua.dep.QuarkusAugmentor] (main) Quarkus augmentation completed in 11554ms
2024-12-02 02:16:03,844 INFO [org.keycloak.quarkus.runtime.storage.infinispan.CacheManagerFactory] (main) Starting Infinispan embedded cache manager
2024-12-02 02:16:04,101 INFO [org.keycloak.quarkus.runtime.storage.infinispan.CacheManagerFactory] (main) Persistent user sessions enabled and no memory li
mit found in configuration. Setting max entries for sessions to 10000 entries.
2024-12-02 02:16:04,101 INFO [org.keycloak.quarkus.runtime.storage.infinispan.CacheManagerFactory] (main) Persistent user sessions enabled and no memory li
mit found in configuration. Setting max entries for clientSessions to 10000 entries.
2024-12-02 02:16:04,101 INFO [org.keycloak.quarkus.runtime.storage.infinispan.CacheManagerFactory] (main) Persistent user sessions enabled and no memory li
mit found in configuration. Setting max entries for offlineSessions to 10000 entries.
2024-12-02 02:16:04,102 INFO [org.keycloak.quarkus.runtime.storage.infinispan.CacheManagerFactory] (main) Persistent user sessions enabled and no memory li
mit found in configuration. Setting max entries for offlineClientSessions to 10000 entries.
2024-12-02 02:16:04,662 INFO [org.infinispan.CONTAINER] (ForkJoinPool.commonPool-worker-1) ISPN000556: Starting user marshaller 'org.infinispan.commons.mar
shall.ImmutableProtoStreamMarshaller'
2024-12-02 02:16:05,883 INFO [org.keycloak.broker.provider.AbstractIdentityProviderMapper] (main) Registering class org.keycloak.broker.provider.mappersync
.ConfigSyncEventListener
2024-12-02 02:16:05,923 INFO [org.keycloak.connections.infinispan.DefaultInfinispanConnectionFactory] (main) Node name: node_446814, Site name: nul
l
2024-12-02 02:16:07,811 INFO [org.keycloak.quarkus.runtime.storage.database.liquibase.QuarkusJpaUpdaterProvider] (main) Initializing database schema. Using
changelog META-INF/jpa-changelog-master.xml

UPDATE SUMMARY
Run: 145
Previously run: 0
Filtered out: 0
-----
Total change sets: 145

2024-12-02 02:16:12,399 WARN [io.agroal.pool] (main) Datasource '<default>': JDBC resources leaked: 1 ResultSet(s) and 0 Statement(s)
2024-12-02 02:16:13,303 INFO [org.keycloak.services] (main) KC-SERVICES0050: Initializing master realm
2024-12-02 02:16:15,794 WARN [org.keycloak.services] (main) KC-SERVICES0110: Environment variable 'KEYCLOAK_ADMIN' is deprecated, use 'KC_BOOTSTRAP_ADMIN_U
SERNAME' instead
2024-12-02 02:16:15,794 WARN [org.keycloak.services] (main) KC-SERVICES0110: Environment variable 'KEYCLOAK_ADMIN_PASSWORD' is deprecated, use 'KC_BOOTSTRA
P_ADMIN_PASSWORD' instead
2024-12-02 02:16:16,064 INFO [org.keycloak.services] (main) KC-SERVICES0077: Created temporary admin user with username admin
2024-12-02 02:16:16,117 WARN [io.agroal.pool] (main) Datasource '<default>': JDBC resources leaked: 1 ResultSet(s) and 0 Statement(s)
2024-12-02 02:16:16,303 INFO [io.quarkus] (main) Keycloak 26.0.6 on JVM (powered by Quarkus 3.15.1) started in 18.091s. Listening on: http://0.0.0.0:8080
2024-12-02 02:16:16,304 INFO [io.quarkus] (main) Profile dev activated.
2024-12-02 02:16:16,304 INFO [io.quarkus] (main) Installed features: [agroal, cdi, hibernate-orm, jdbc-h2, keycloak, narayana-jta, opentelemetry, reactive-
routes, rest, rest-jackson, smallrye-context-propagation, vertx]
2024-12-02 02:16:16,313 WARN [org.keycloak.quarkus.runtime.KeycloakMain] (main) Running the server in development mode. DO NOT use this configuration in pr
oduction.
```

Now Open this url with that port

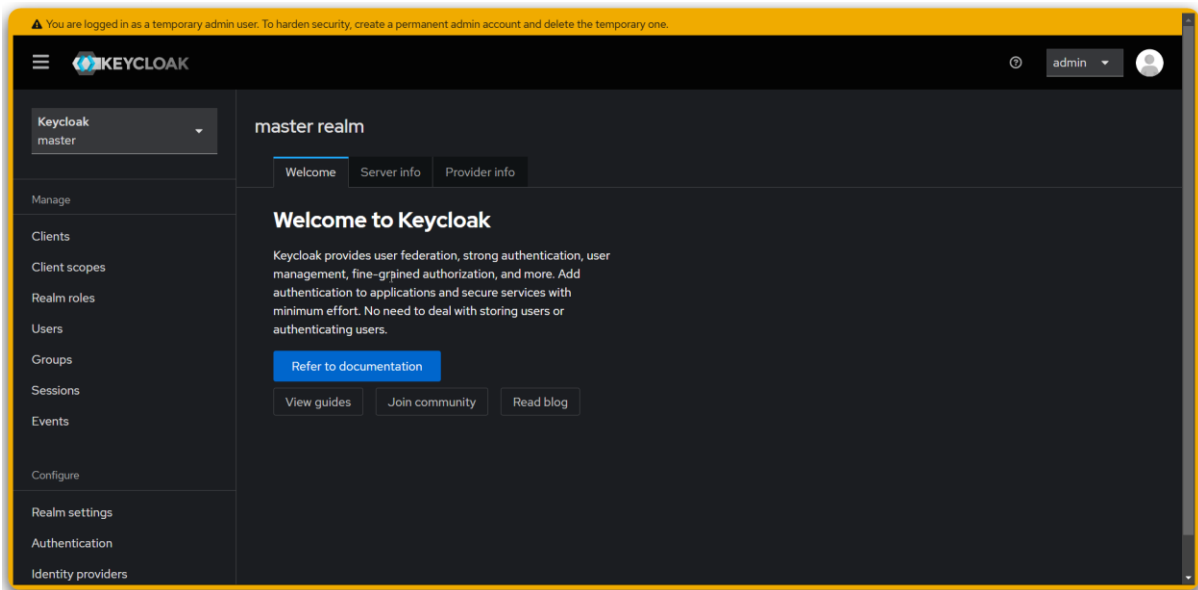




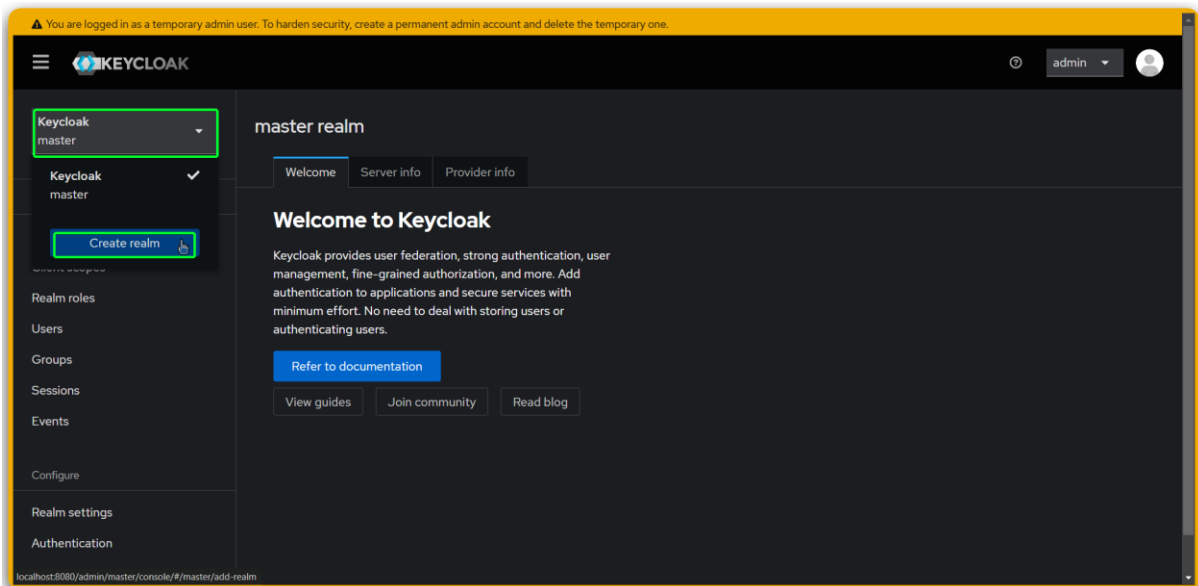
After that enter that username and password that typed in command

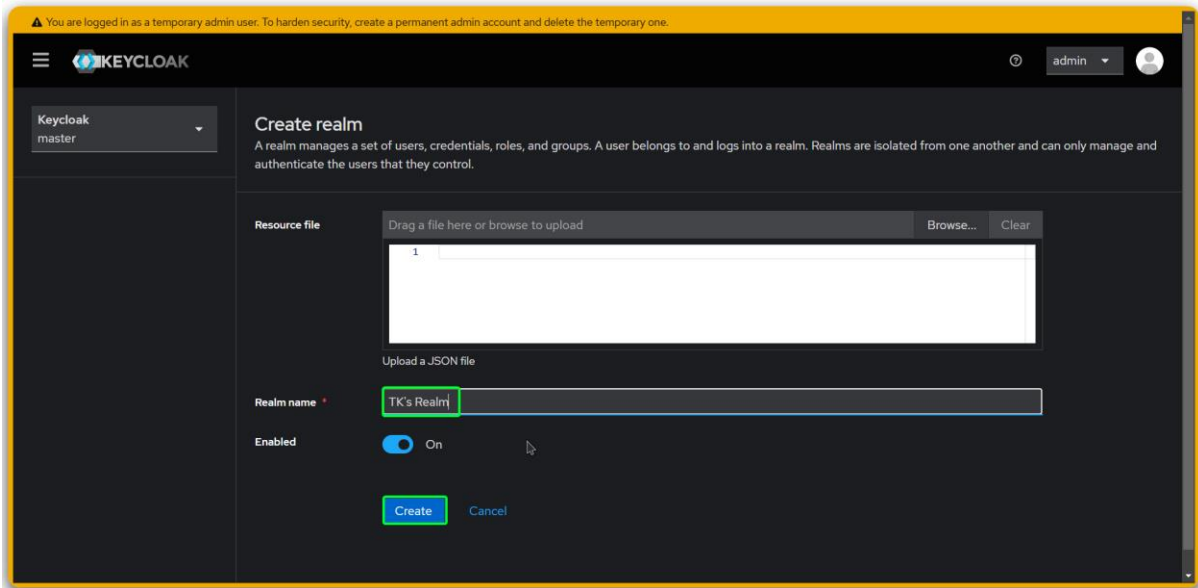


As you can see below I successfully signed in

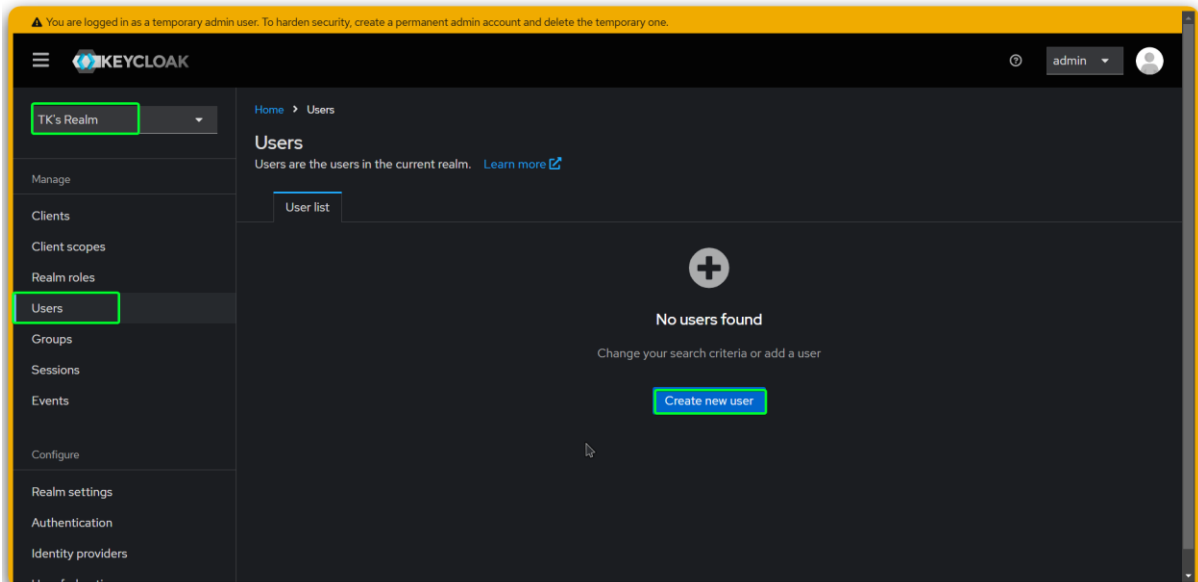


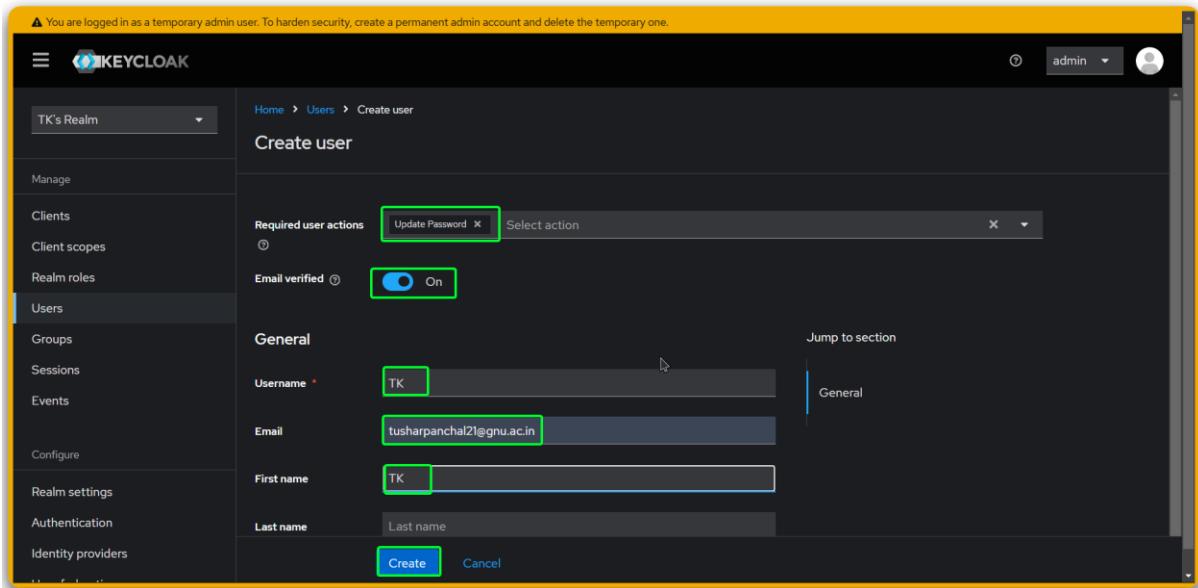
3. Create new realm and try adding a user



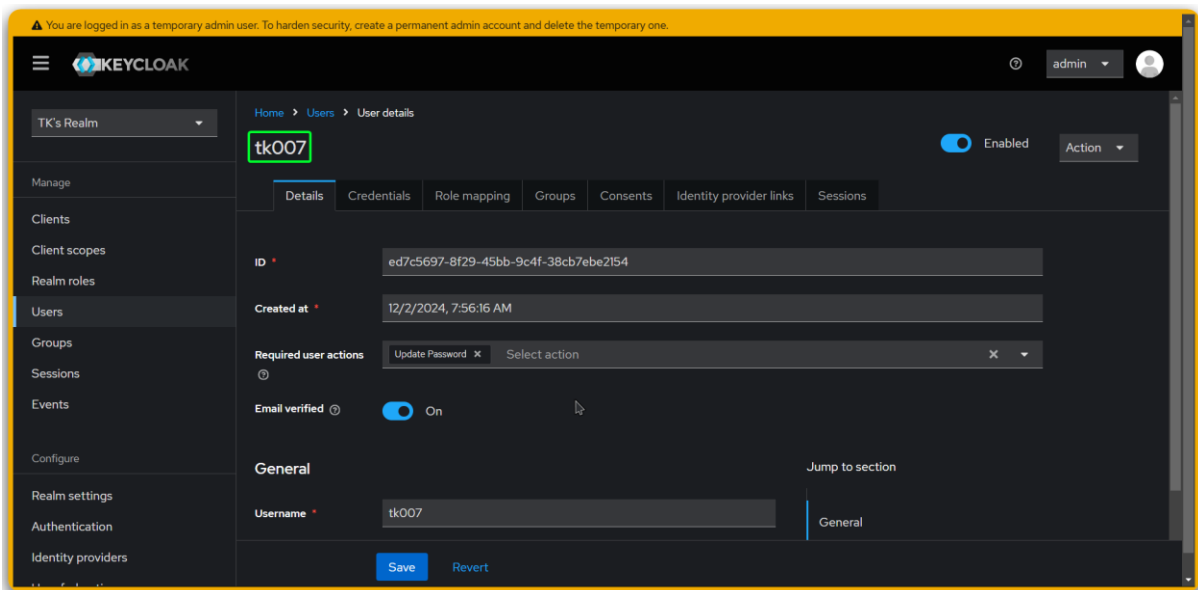


Realm has been created successfully now we will create an user

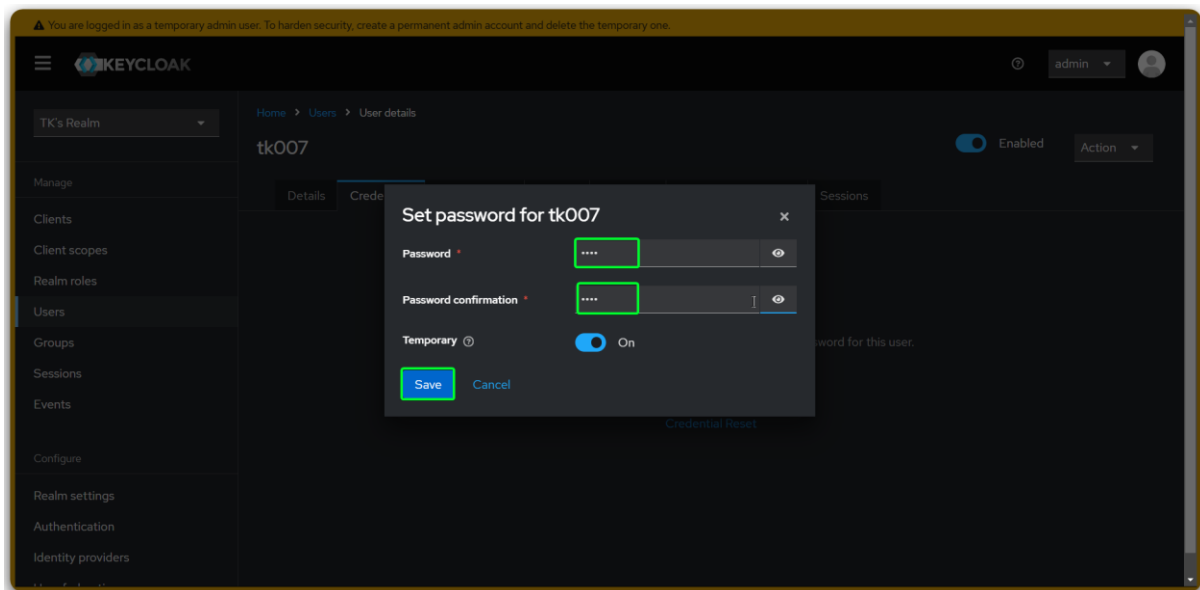
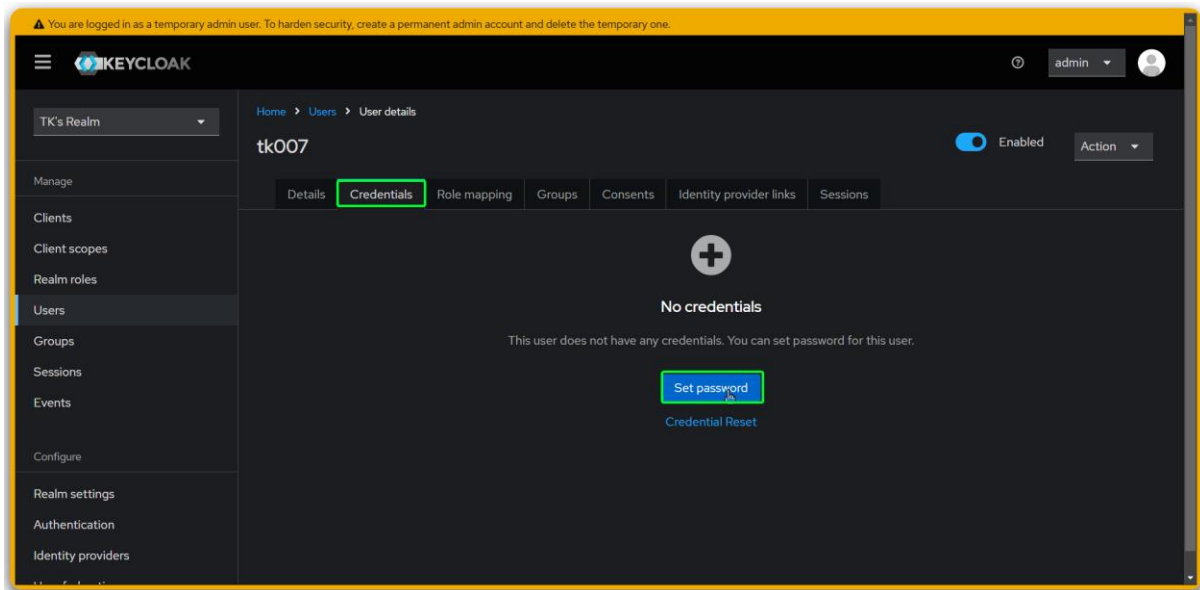


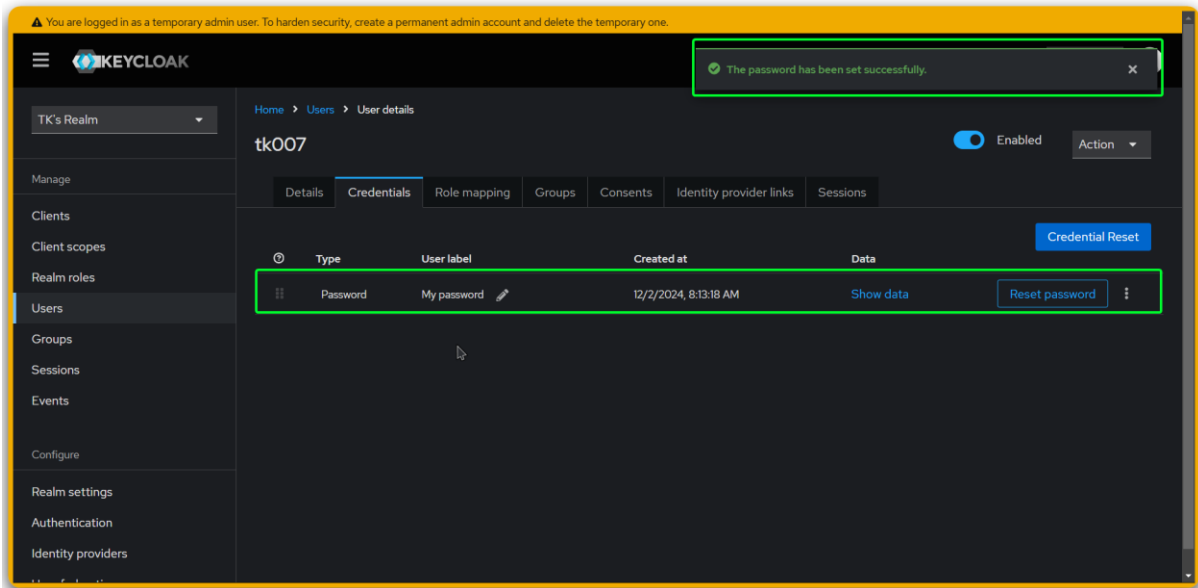


As you can below user name tk007 has been created successfully

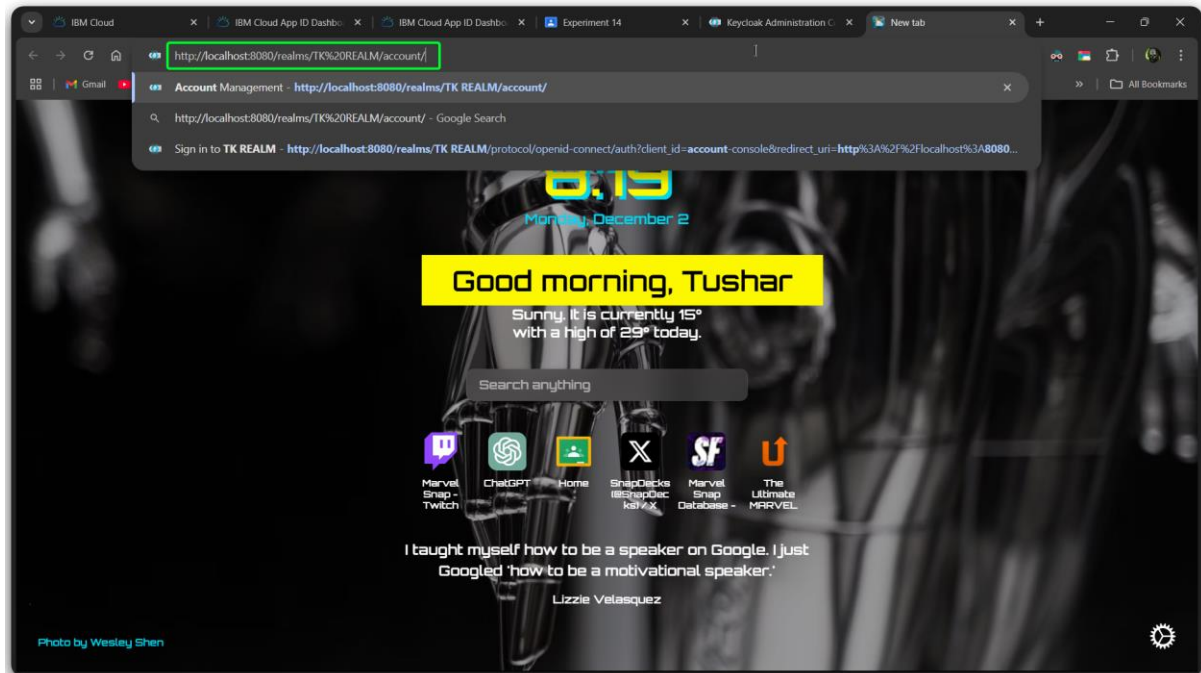


4. Password must have to be created for new user if not set policy and permissions





5. With newly created realm and user, test if they work



TK REALM

Sign in to your account


Username or email
james

Password

Sign In

TK REALM

Update password

 You need to change your password to activate your account.

New Password

Confirm password

☒ Sign out from other devices

Submit

KEYCLOAK

Tushar Panchal

Personal info

Account security

Applications

Personal info

Manage your basic information

General

Username * james

Email * tusharpanchal21@gnu.ac.in

First name * Tushar

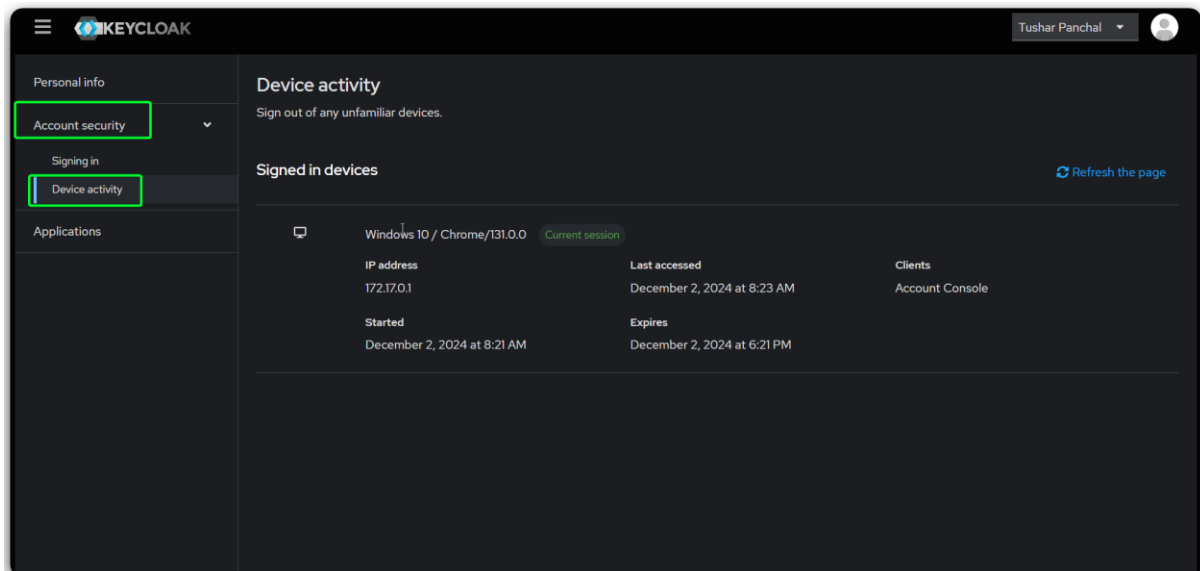
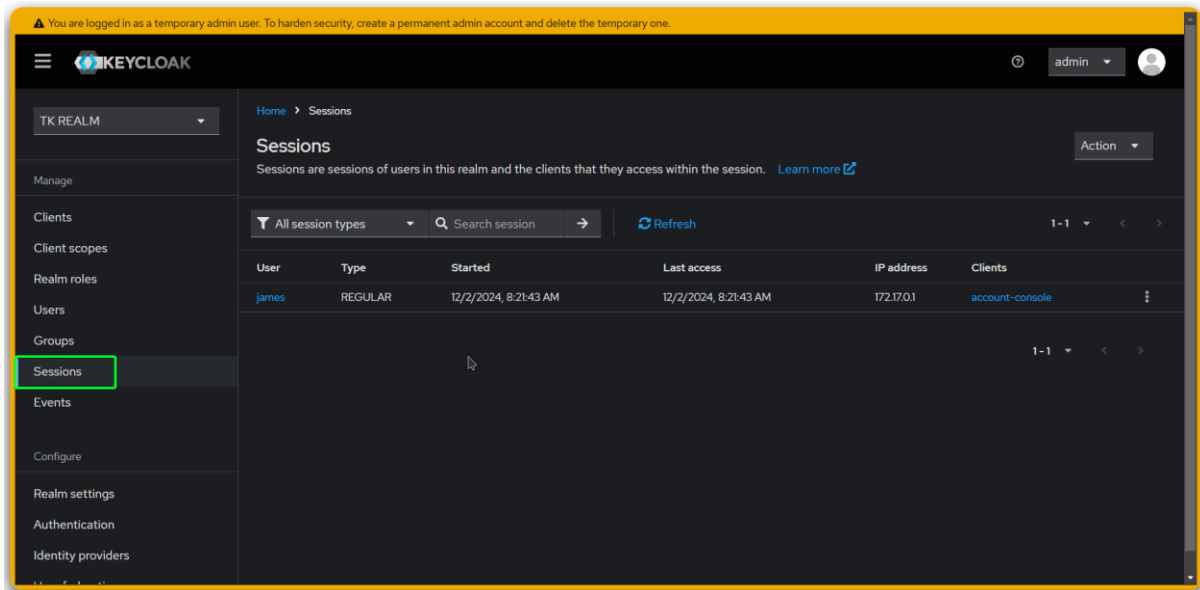
Last name * Panchal

Save Cancel

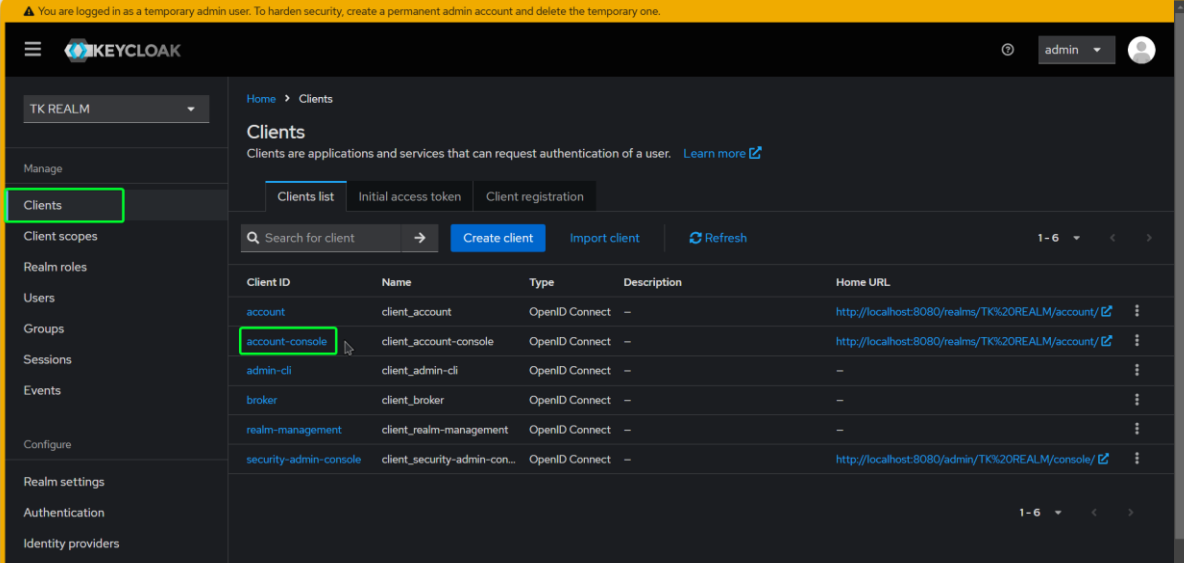
Jump to section

General

6. Explore other options like session are visible

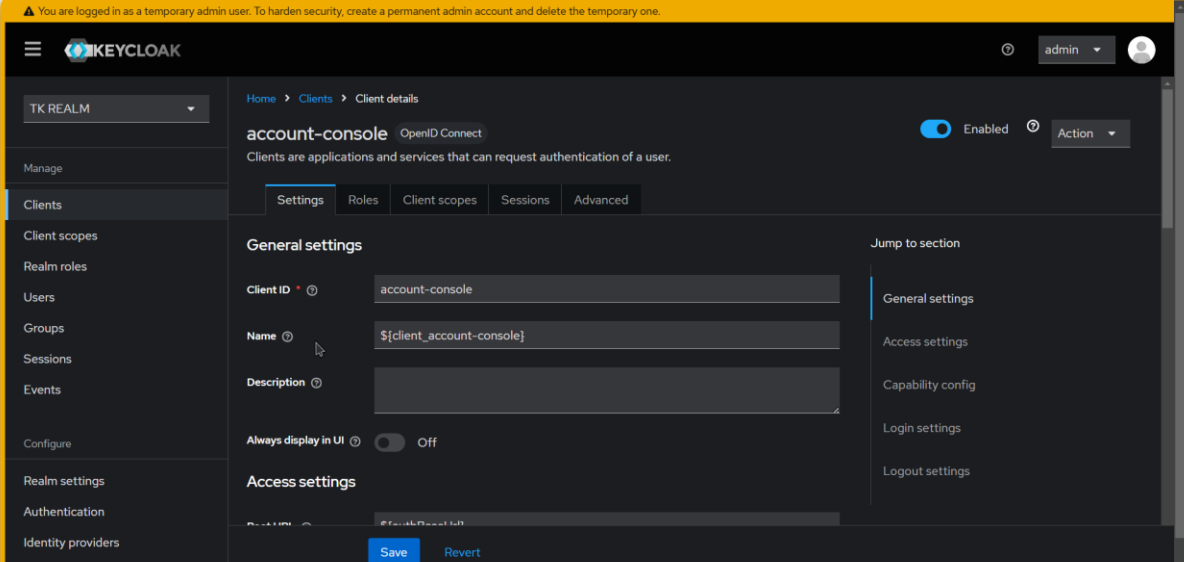


7. With admin user, explore client settings



This screenshot shows the Keycloak Admin Console interface. The left sidebar contains a navigation menu with options like Manage, Clients, Client scopes, Realm roles, Users, Groups, Sessions, Events, Configure, Realm settings, Authentication, and Identity providers. The 'Clients' option is highlighted with a green box. The main content area displays the 'Clients' page, which includes a search bar, a 'Create client' button, and a table of existing clients. The table has columns for Client ID, Name, Type, Description, and Home URL. The 'account-console' client is highlighted with a green box.

Client ID	Name	Type	Description	Home URL
account	client_account	OpenID Connect	-	http://localhost:8080/realms/TK%20REALM/account/
account-console	client_account-console	OpenID Connect	-	http://localhost:8080/realms/TK%20REALM/account/
admin-cli	client_admin-cli	OpenID Connect	-	-
broker	client_broker	OpenID Connect	-	-
realm-management	client_realm-management	OpenID Connect	-	-
security-admin-console	client_security-admin-con...	OpenID Connect	-	http://localhost:8080/admin/TK%20REALM/console/



This screenshot shows the 'account-console' client details page in the Keycloak Admin Console. The left sidebar is the same as the previous screenshot. The main content area displays the 'Settings' tab for the 'account-console' client. The 'General settings' section includes fields for Client ID (account-console), Name (\$[client_account-console]), and Description. There is also a toggle for 'Always display in UI' which is currently turned off. The 'Access settings' section is partially visible at the bottom. On the right side, there is a 'Jump to section' menu with options like General settings, Access settings, Capability config, Login settings, and Logout settings.

General settings

Client ID: account-console

Name: \$[client_account-console]

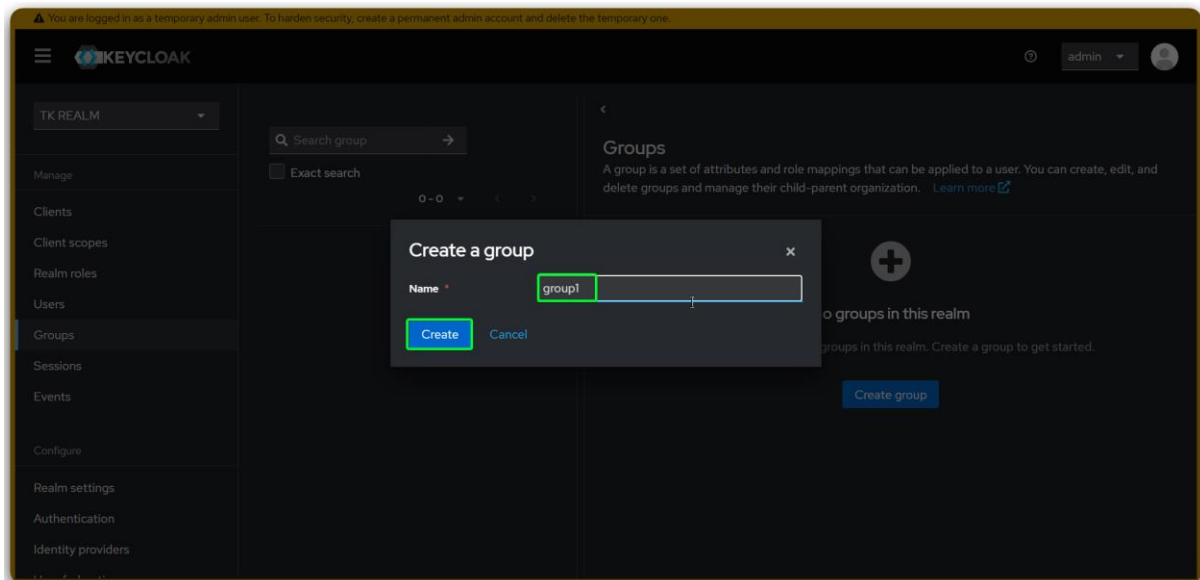
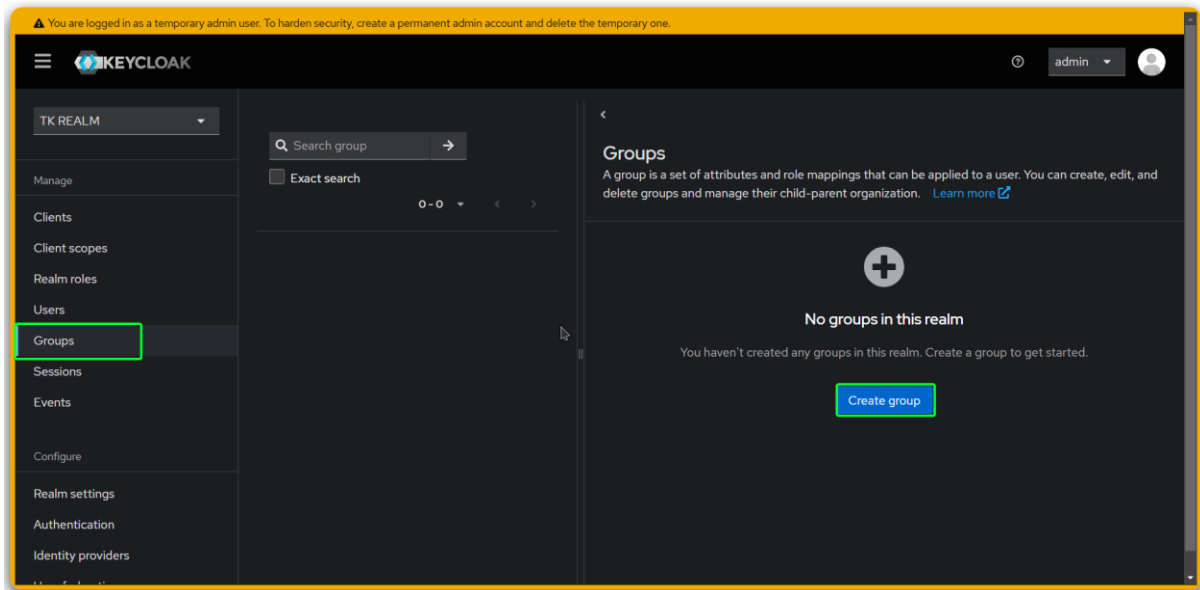
Description:

Always display in UI: Off

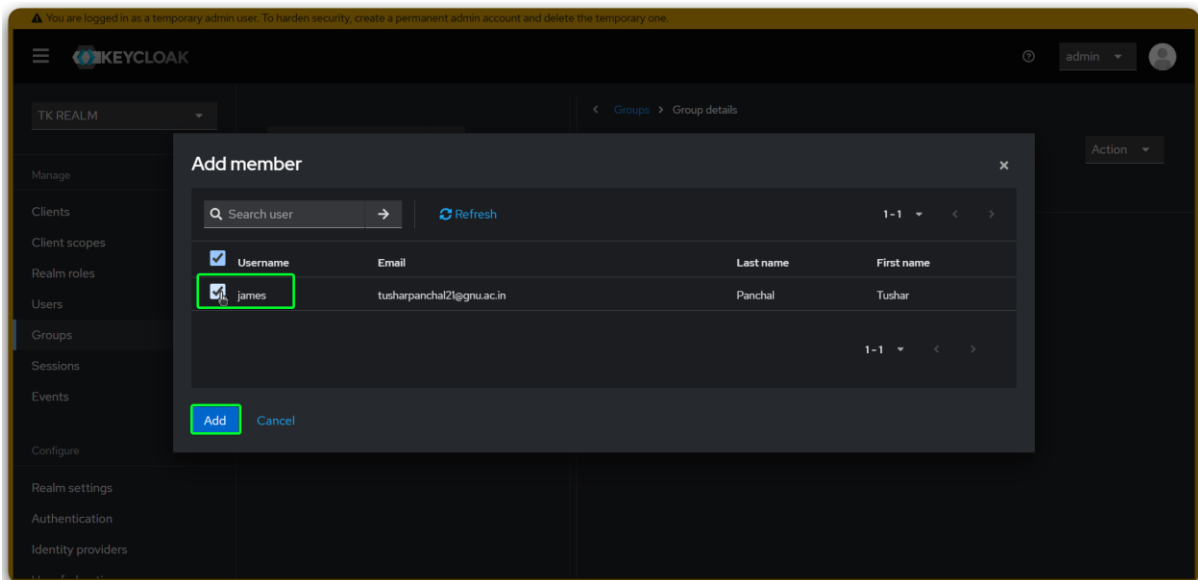
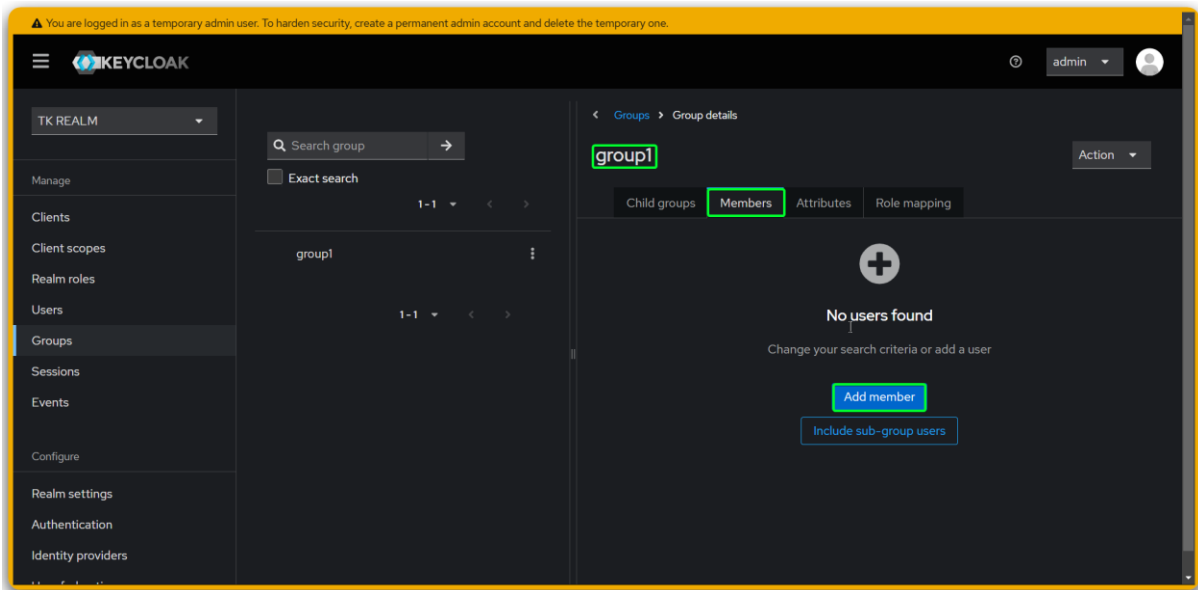
Access settings

Save Revert

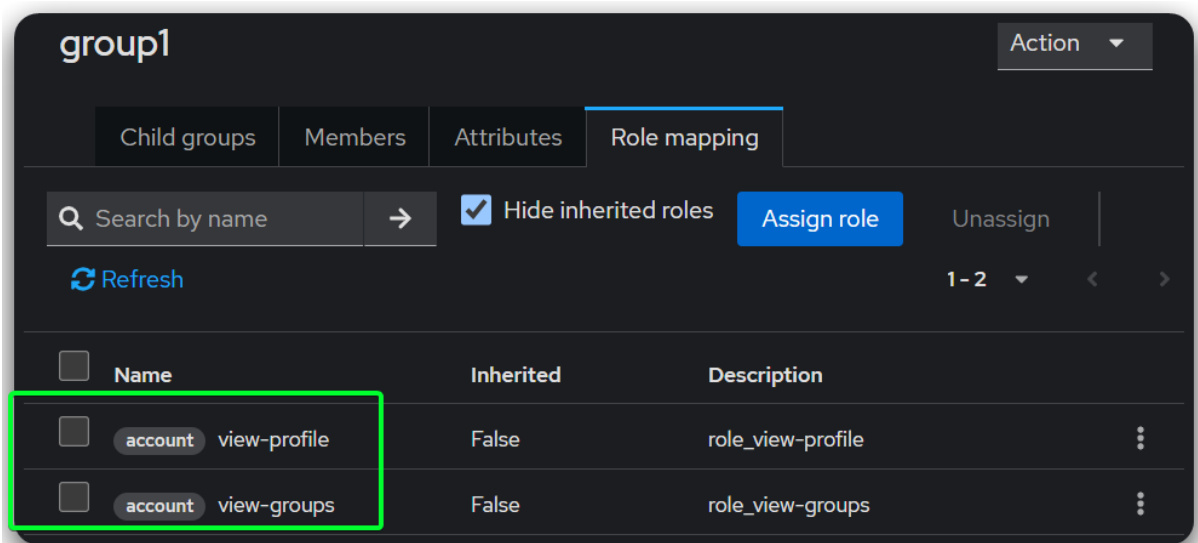
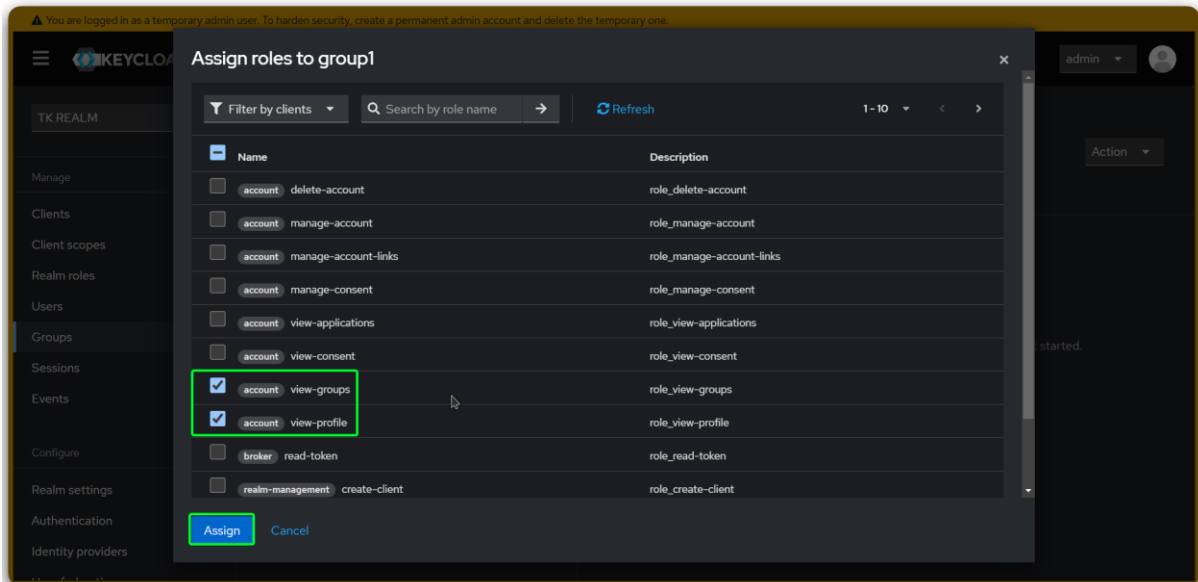
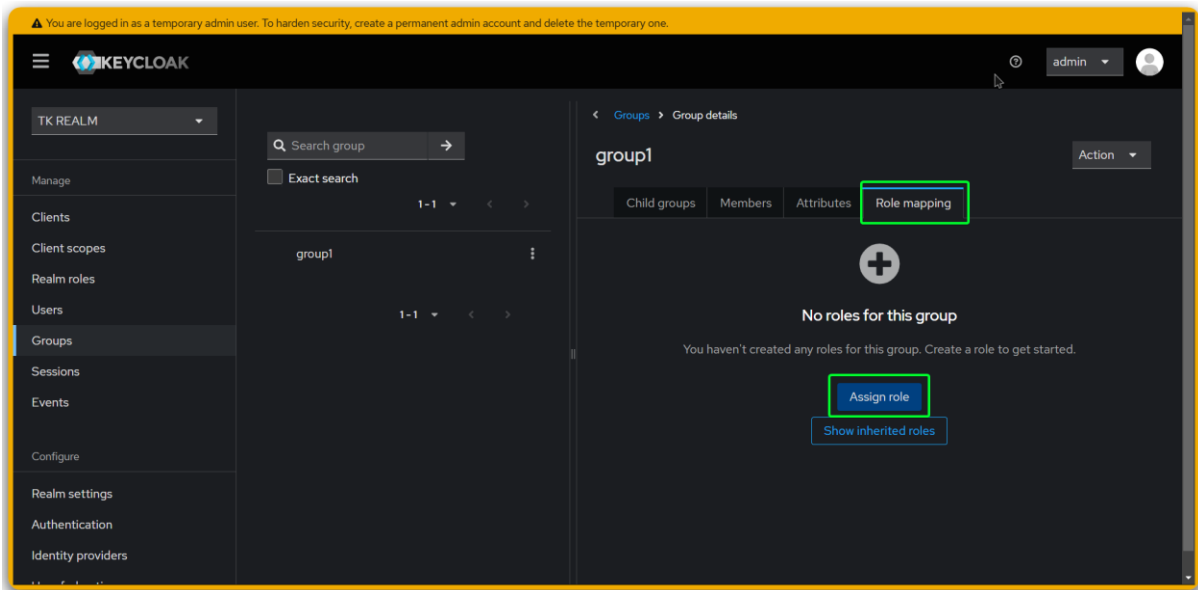
8. Create group and add user to it, assign roles and explore

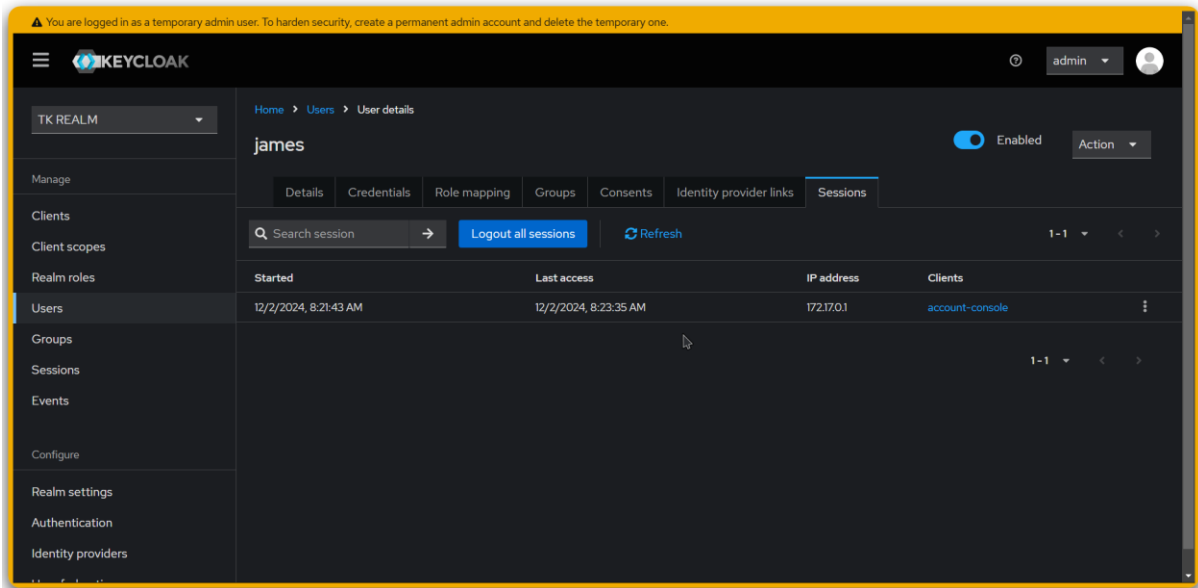


Then add members in that created group

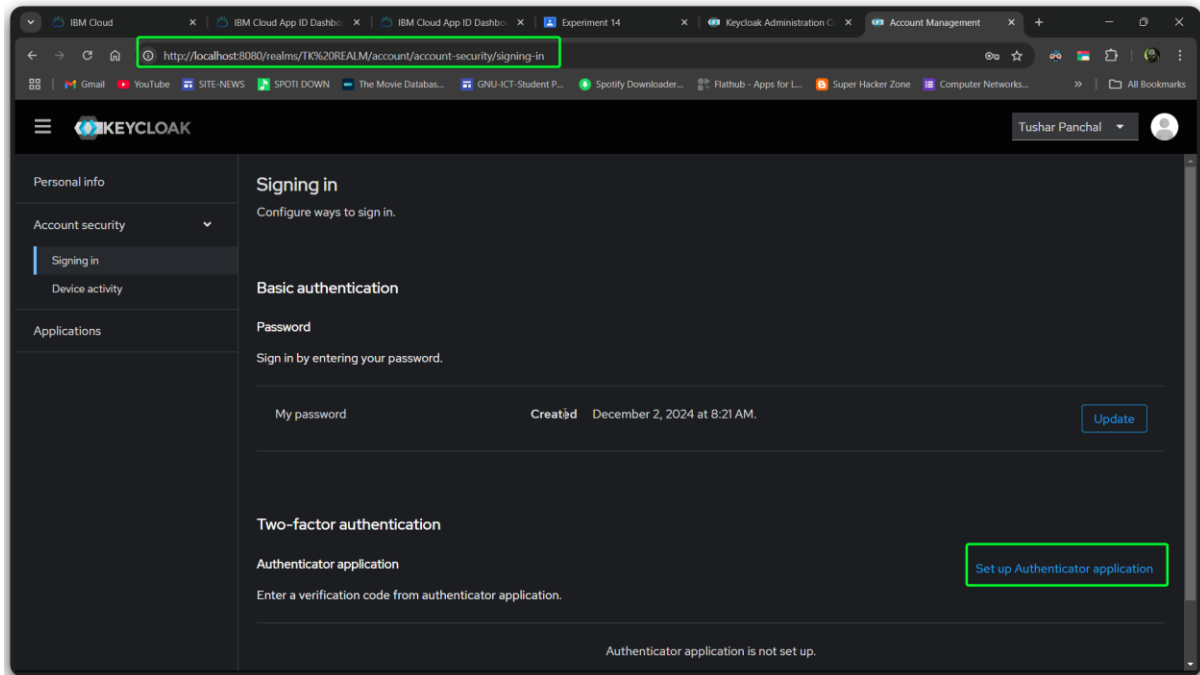


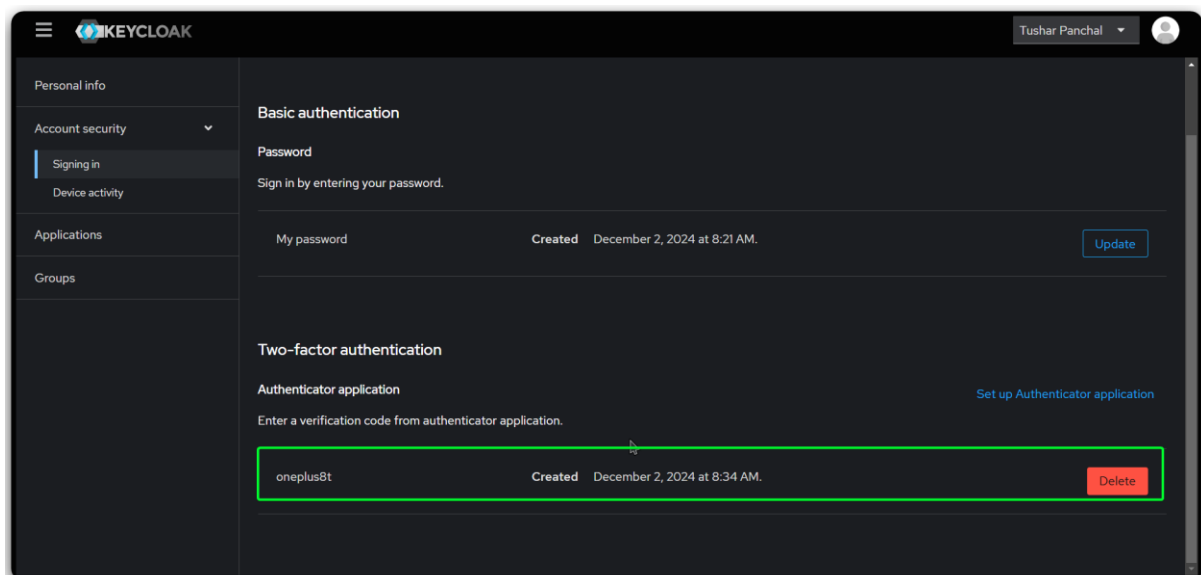
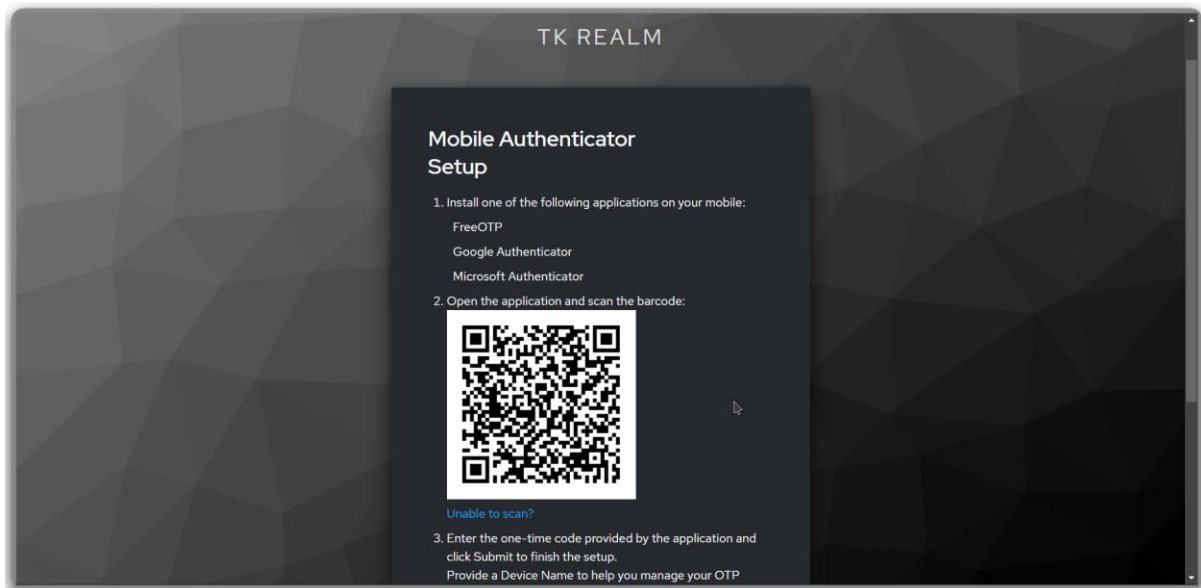
Now assign roles to that group



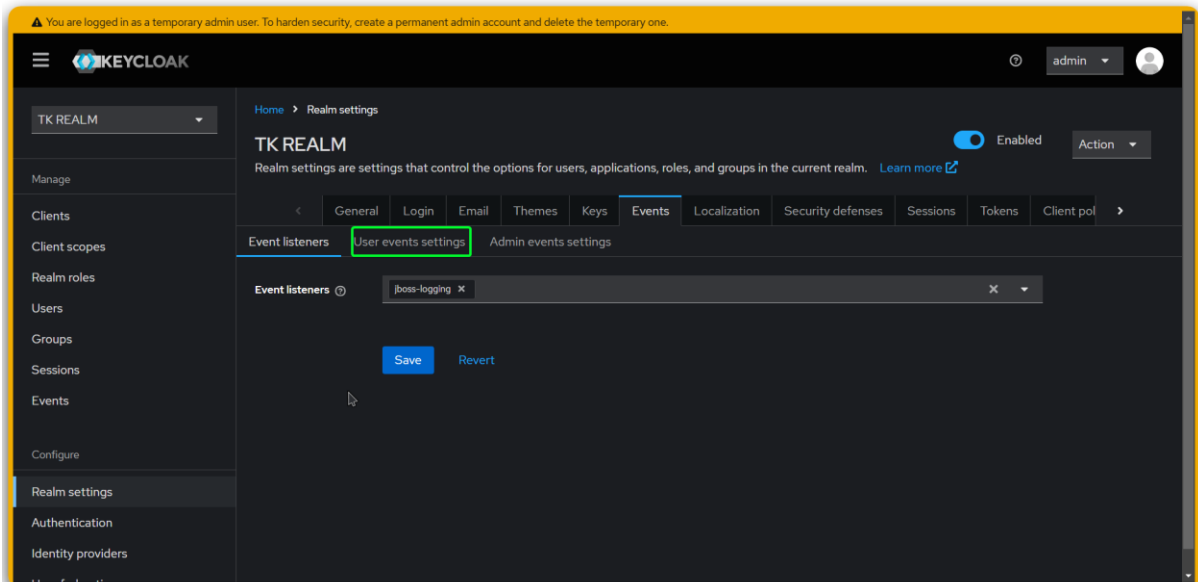
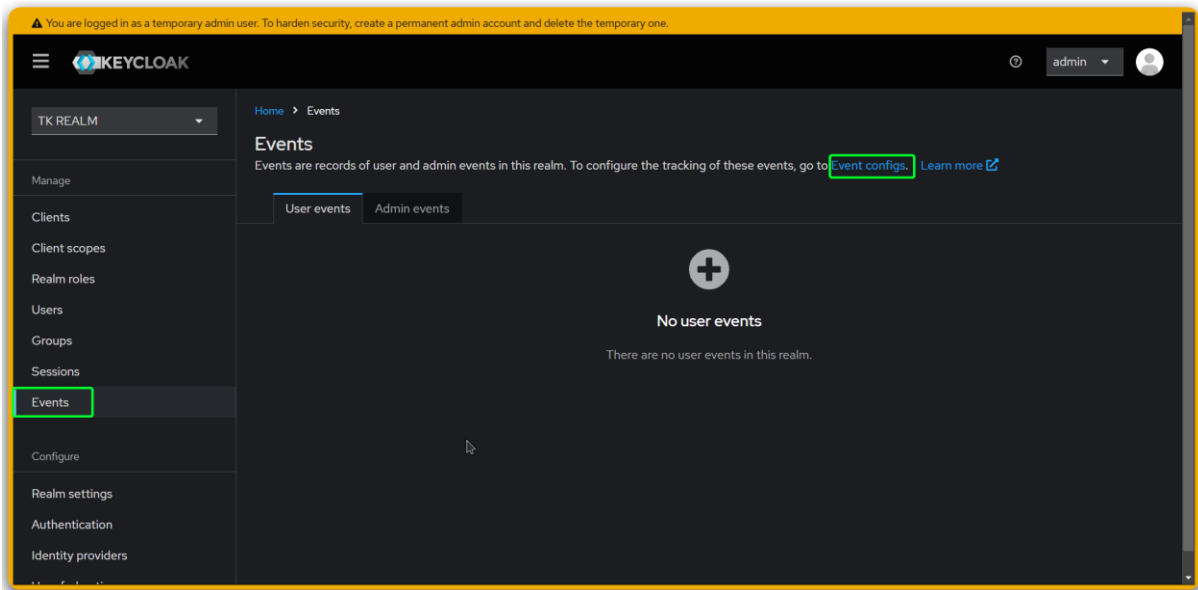


9. Setup authenticator application





10. Try event configuration settings and add logging



You are logged in as a temporary admin user. To harden security, create a permanent admin account and delete the temporary one.

KEYCLOAK

TK REALM

Home > Realm settings

TK REALM Enabled Action

Realm settings are settings that control the options for users, applications, roles, and groups in the current realm. [Learn more](#)

General Login Email Themes Keys **Events** Localization Security defenses Sessions Tokens Client

Event listeners **User events settings** Admin events settings

Save events On

Expiration 2 Minutes

Save Revert

Clear user events Clear user events

You are logged in as a temporary admin user. To harden security, create a permanent admin account and delete the temporary one.

KEYCLOAK

TK REALM

Home > Realm settings

TK REALM Enabled Action

Realm settings are settings that control the options for users, applications, roles, and groups in the current realm. [Learn more](#)

General Login Email Themes Keys **Events** Localization Security defenses Sessions Tokens Client

Event listeners **User events settings** **Admin events settings**

Save events On

Include representation Off

Expiration 2 Minutes

Save Revert

Clear admin events Clear admin events

You are logged in as a temporary admin user. To harden security, create a permanent admin account and delete the temporary one.

KEYCLOAK

TK REALM

Home > Events

Events

Events are records of user and admin events in this realm. To configure the tracking of these events, go to [Event configs](#). [Learn more](#)

User events Admin events

Search user event Refresh 1-3

Time	User	Event saved type	IP address	Client
> December 2, 2024 at 8:38 AM	1b097a31-83ef-4908-8cc5-20590f86a7a0	UPDATE_PROFILE	172.17.0.1	account
> December 2, 2024 at 8:37 AM	1b097a31-83ef-4908-8cc5-20590f86a7a0	CODE_TO_TOKEN	172.17.0.1	account-console
> December 2, 2024 at 8:37 AM	1b097a31-83ef-4908-8cc5-20590f86a7a0	LOGIN	172.17.0.1	account-console

1-3

11. Create new user with some permissions and check logs

⚠ You are logged in as a temporary admin user. To harden security, create a permanent admin account and delete the temporary one.

KEYCLOAK

admin

TK REALM

Manage

Clients

Client scopes

Realm roles

Users

Groups

Sessions

Events

Configure

Realm settings

Authentication

Identity providers

Required user actions

Update Password x Update Profile x Select action x

Email verified ☒ On

General

Username

Email

First name

Last name

Groups

Jump to section

General

⚠ You are logged in as a temporary admin user. To harden security, create a permanent admin user and delete the temporary one.

KEYCLOAK

admin

TK REALM

Manage

Clients

Client scopes

Realm roles

Users

Groups

Sessions

Events

Configure

Realm settings

Authentication

Identity providers

Home > Events

Events

Events are records of user and admin events in this realm. To configure the tracking of these events, go to [Event configs](#). [Learn more](#)

User events Admin events

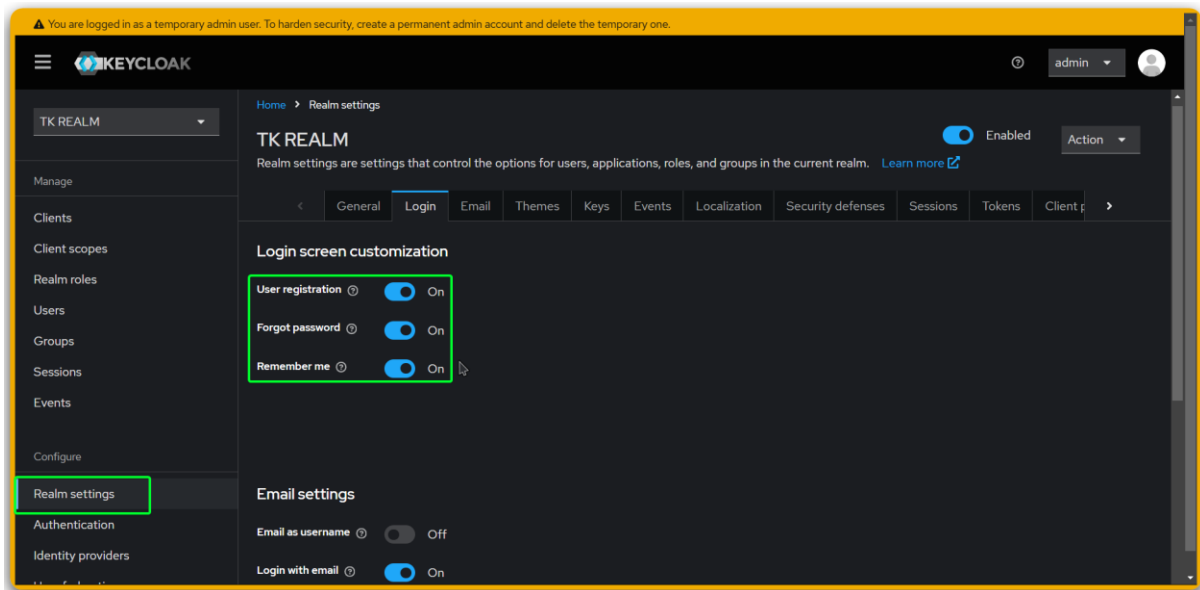
Search admin event

1-2 < >

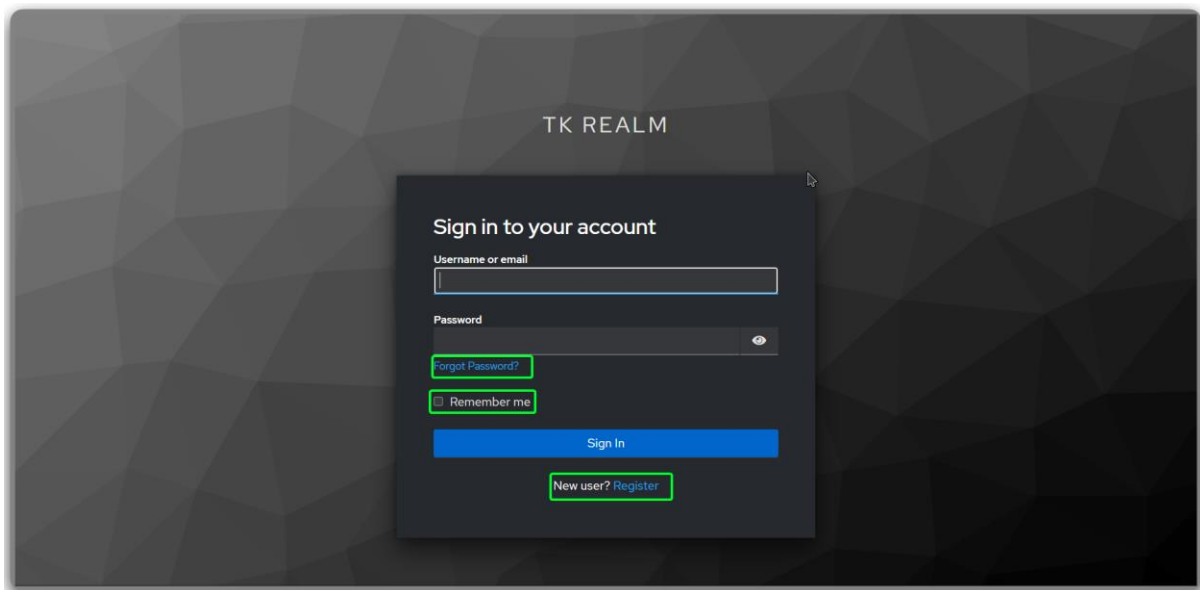
Time	Resource path	Resourc...	Operation type	User
> December 2, 2024 at 8:40 AM	users/58d584a2-b6b0-4f5c-9caa-1916f0c7...	USER	CREATE	21090502-4ee7-484f-b875-942a702811ae
> December 2, 2024 at 8:37 AM	events/config	REALM	UPDATE	21090502-4ee7-484f-b875-942a702811ae

1-2 < >

12. Explore other realm settings like adding option of forgot password, registration, etc.



After you sign you can see changes



⚠ You are logged in as a temporary admin user. To harden security, create a permanent admin account and delete the temporary one.

KEYCLOAK

TK REALM

Manage

Clients

Client scopes

Realm roles

Users

Groups

Sessions

Events

Configure

Realm settings

Authentication

Identity providers

Email settings

Email as username ☐ Off

Login with email ☒ On

Duplicate emails ☐ Off

Verify email ☐ Off

User info settings

Edit username ☒ On

Edit username changed successfully

⚠ You are logged in as a temporary admin user. To harden security, create a permanent admin account and delete the temporary one.

KEYCLOAK

TK REALM

Home > Realm settings

Realms are settings that control the options for users, applications, roles, and groups in the current realm. [Learn more](#)

General Login Email Themes **Keys** Events Localization Security defenses Sessions Tokens Client policies User profile

Keys list Add providers

Active keys Search key Refresh

Algorithm	Type	Kid	Use	Provider	Valid to	Public keys
HS512	OCT	d927ea42-e0d9-4a43-b1ab-06ab22572bbc	SIG	hmac-generated-hs512	-	
RS256	RSA	U0eMelfVokqVDaOMshNTdHohrbKeqo6s6SmUvglcT8A	SIG	rsa-generated	12/2/2034, 8:18:31 AM	Public key Certificate
RSA-OAEP	RSA	ST_KitnLPFwhLJRFUthXzjwGAs_FrMThMeFh-ojR5CA	ENC	rsa-enc-generated	12/2/2034, 8:18:31 AM	Public key Certificate
AES	OCT	f85875b9-3446-46a9-a7ac-7e6629840930	ENC	aes-generated	-	

1-4

⚠ You are logged in as a temporary admin user. To harden security, create a permanent admin account and delete the temporary one.

KEYCLOAK

TK REALM

Home > Realm settings > Keys

Realms are settings that control the options for users, applications, roles, and groups in the current realm. [Learn more](#)

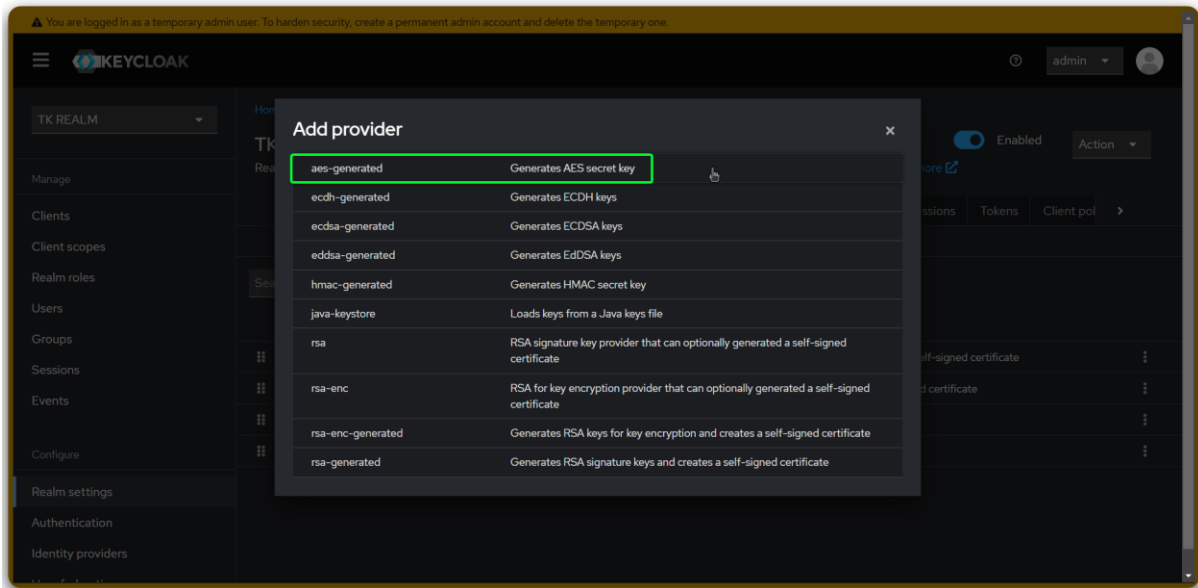
General Login Email Themes **Keys** Events Localization Security defenses Sessions Tokens Client pol

Keys list Add providers

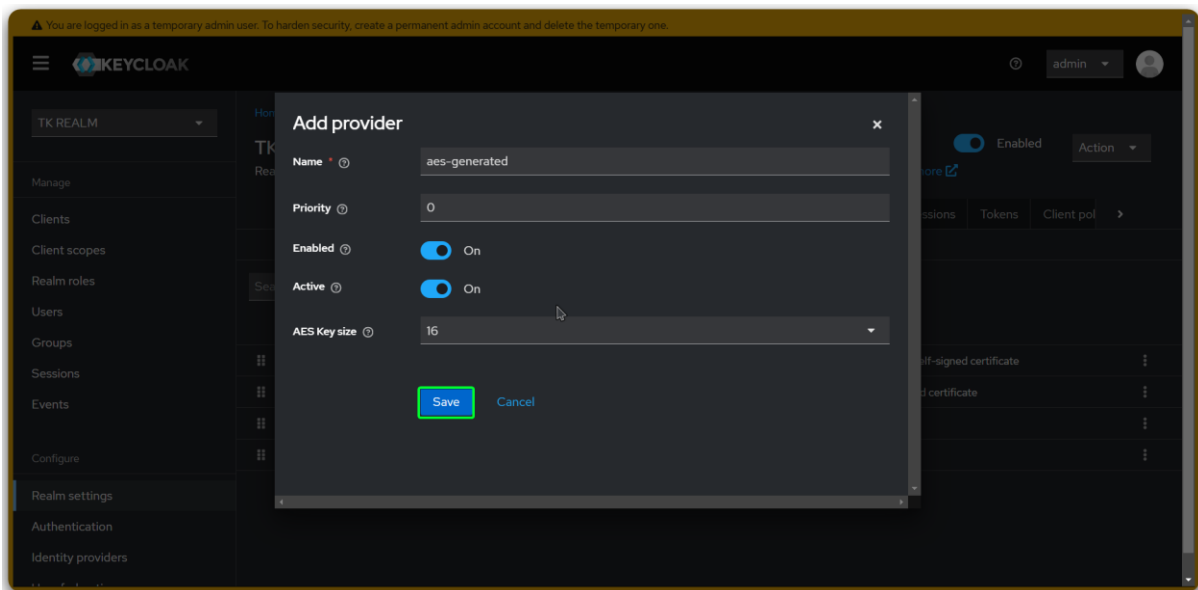
Search Add provider

Name	Provider	Provider description
rsa-enc-generated	rsa-enc-generated	Generates RSA keys for key encryption and creates a self-signed certificate
rsa-generated	rsa-generated	Generates RSA signature keys and creates a self-signed certificate
hmac-generated-hs512	hmac-generated	Generates HMAC secret key
aes-generated	aes-generated	Generates AES secret key

localhost:8080/admin/master/console/#/TK_REALM/realms-settings/email



These above options available for key creation and management



Change this below options as I does

