Shynbolat Unaibayev, Practice 4 report

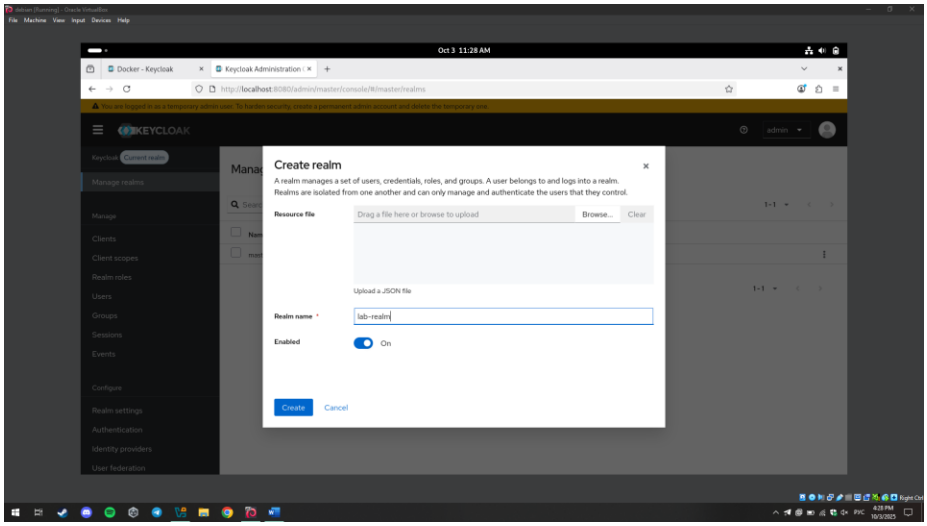
Keycloak Resource Server Integration Lab Report

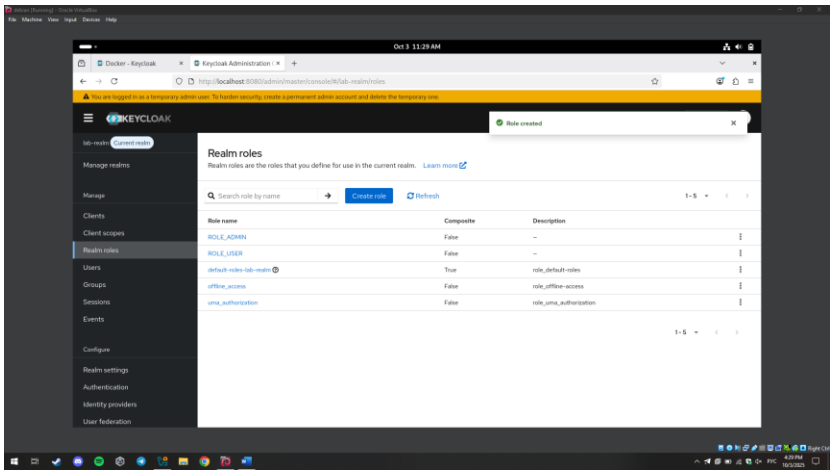
1. Introduction

The purpose of this lab is to integrate Keycloak as an Identity and Access Management (IAM) solution with a simple resource server. The lab demonstrates authentication and authorization using Keycloak-issued tokens, role-based access control, and token refresh functionality.

2. Environment Setup

Keycloak was installed locally and a new realm named 'lab-realm' was created. Two users were configured:
- user1 (assigned ROLE_USER)
- admin1 (assigned ROLE_ADMIN)

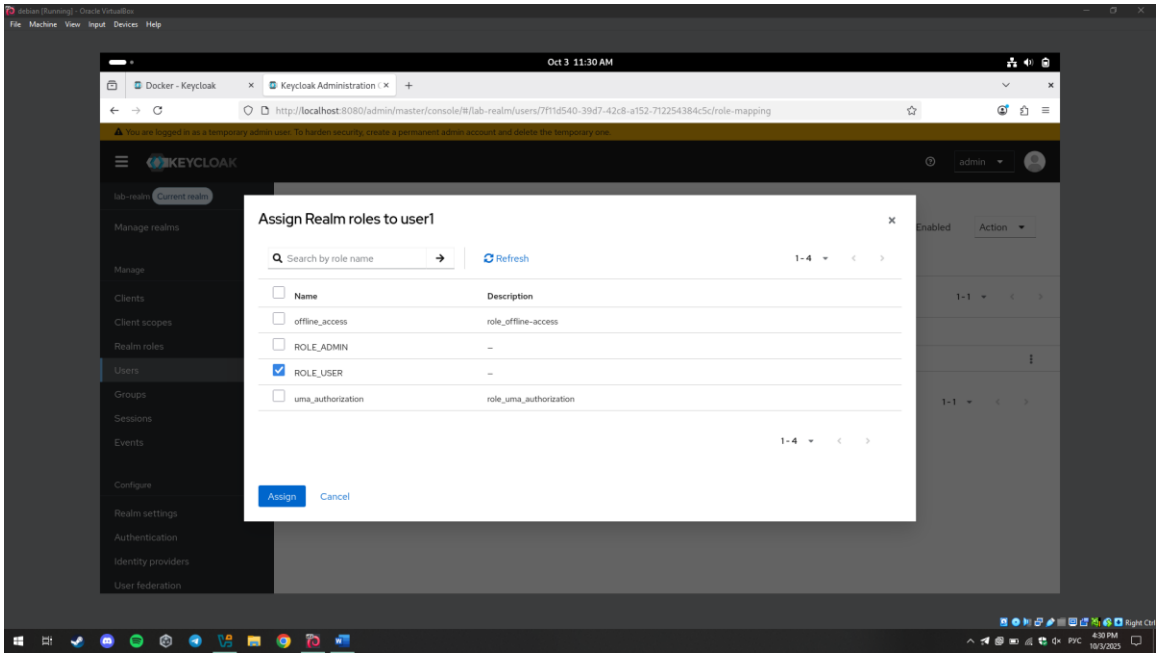




A demo client ('demo-client') was created with the following settings:

- Standard flow enabled
- Direct access grants enabled
- Client authentication disabled

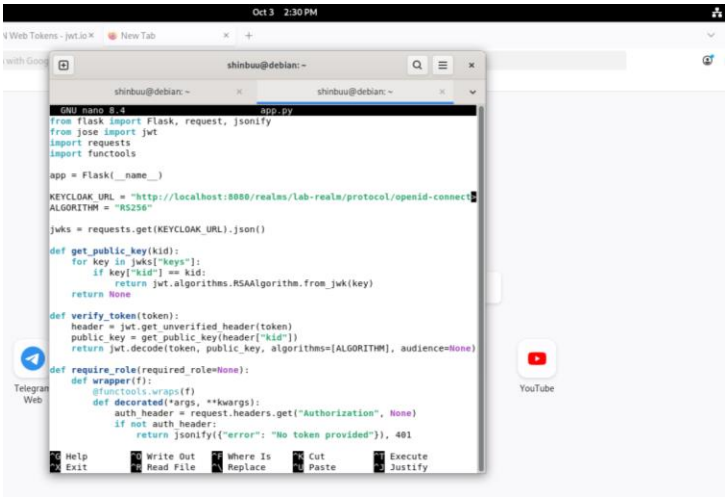
Screenshot:

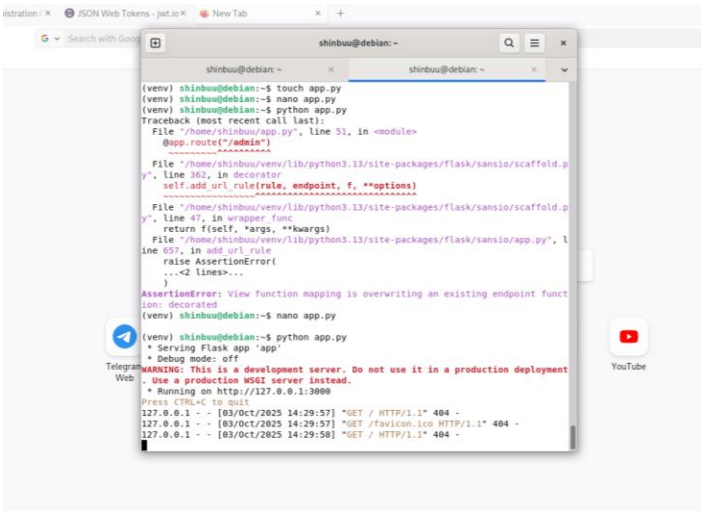


3. Resource Server Implementation

A simple Python Flask application was developed with two endpoints:
- /user → accessible to ROLE_USER and ROLE_ADMIN
- /admin → accessible only to ROLE_ADMIN

JWT validation was implemented using the Keycloak public key. Role checks were added to enforce access restrictions.





4. Testing Access with Tokens

Access tokens were obtained via Direct Access Grants using cURL commands. The following tests were performed:

- Accessing /user with user1 → SUCCESS

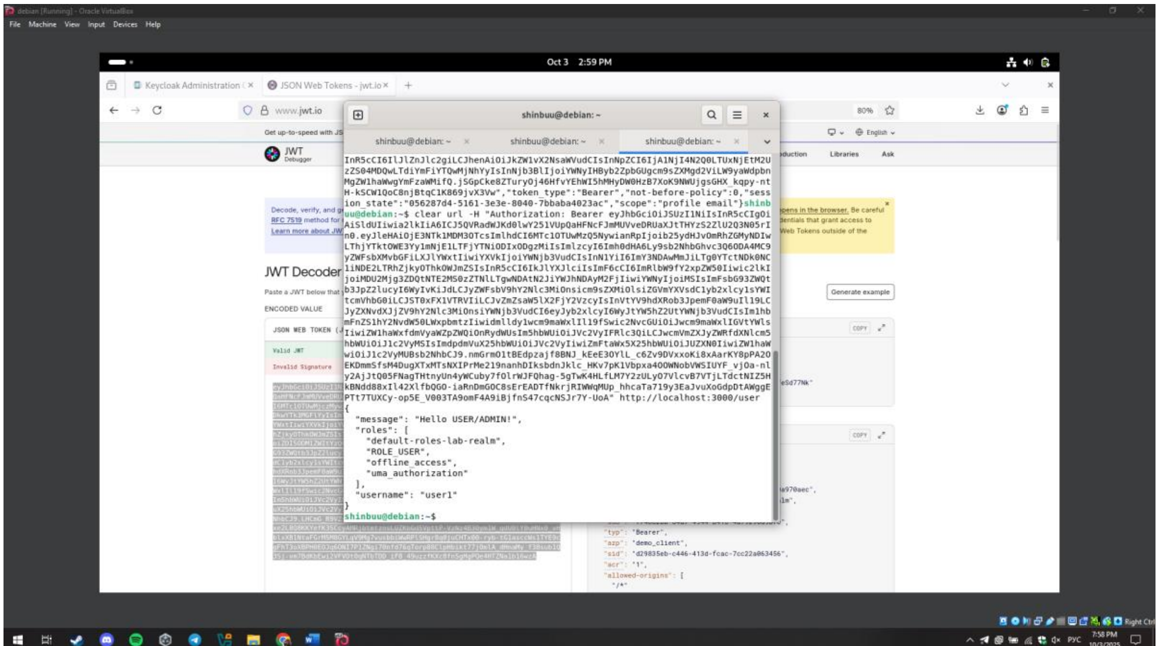
- Accessing /admin with user1 → FORBIDDEN

- Accessing /user with admin1 → SUCCESS

- Accessing /admin with admin1 → SUCCESS

- Accessing without token → UNAUTHORIZED

- Accessing with expired token → INVALID TOKEN


Oct 3 2:59 PM
Keycloak Administration
JSON Web Tokens - jwt.io
shinbuu@debian: ~
JWT Decoder
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"ROLE_USER",
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"uma_authorization"
],
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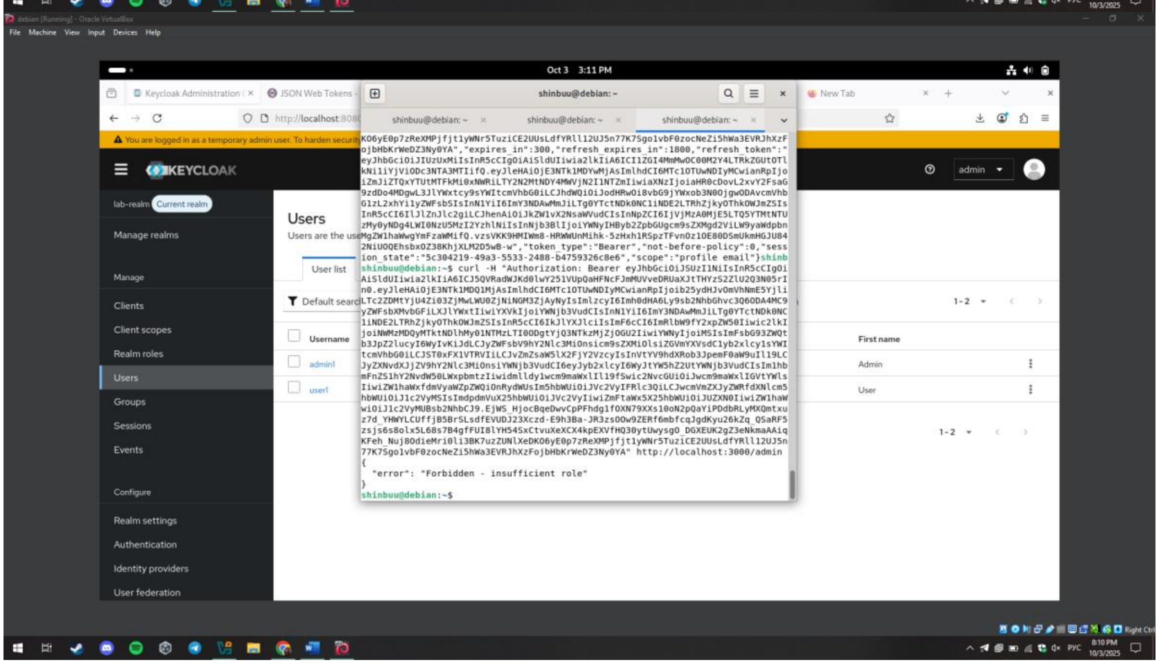
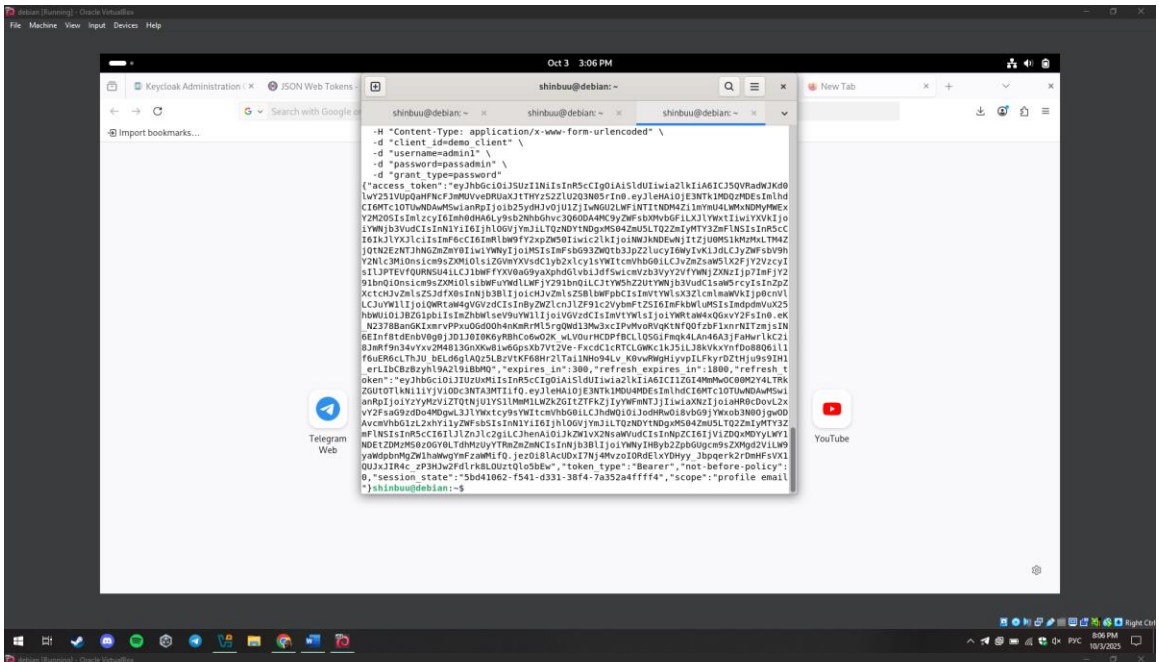
}
shinbuu@debian:~$


Oct 3 3:11 PM
Keycloak Administration
shinbuu@debian: ~
KEYCLOAK
lab-realm
Current realm
Manage realms
Manage
Clients
Client scopes
Realm roles
Users
Groups
Sessions
Events
Configure
Realm settings
Authentication
Identity providers
User federation
Users
User list
Username
First name
admin1
Admin
user1
User
{
"error": "Forbidden - insufficient role"
}
shinbuu@debian:~$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File Machine View Input Devices Help
Oct 3 3:06 PM
shinbuu@debian: ~
shinbuu@debian: ~
shinbuu@debian: ~
shinbuu@debian: ~
-H "Content-Type: application/x-www-form-urlencoded" \
-d "client_id=demo_client" \
-d "username=admin1" \
-d "password=passadmin" \
-d "grant_type=password"
{"access_token":"eyJhbGciOiJSUzI1NiIsInR5cCIgOiAiSldUIiwia2lkIiA6ICJ5QVRadWJKd0
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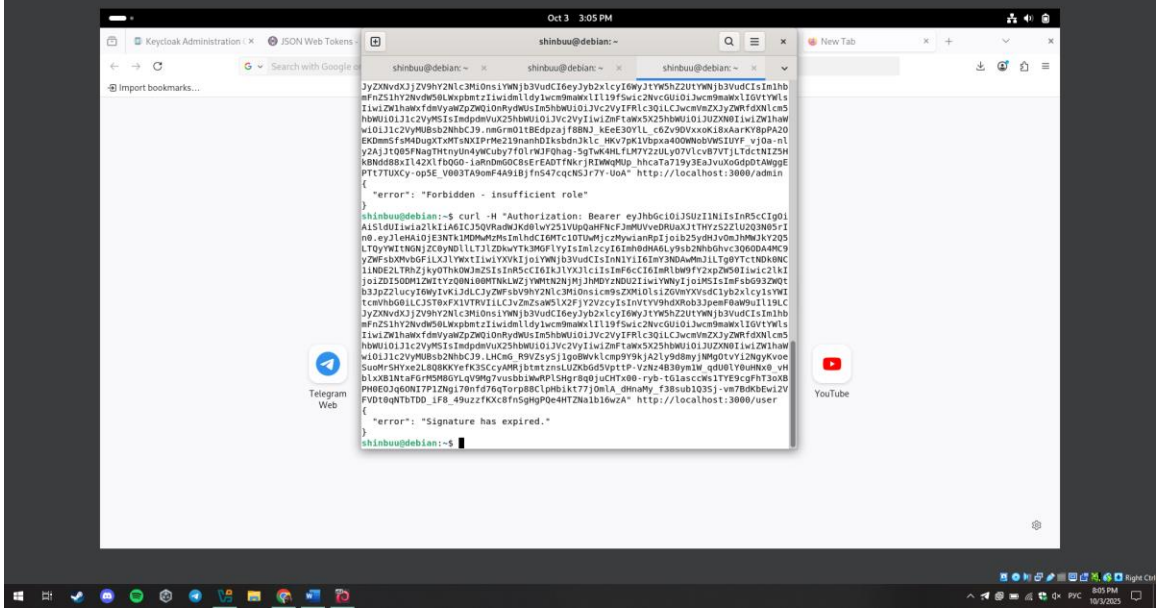
Telegram Web
YouTube
Right Ctrl
PYC
8:06 PM
10/3/2025


debian [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Oct 3 3:05 PM
shinbuu@debian: ~
shinbuu@debian: ~
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shinbuu@debian: ~
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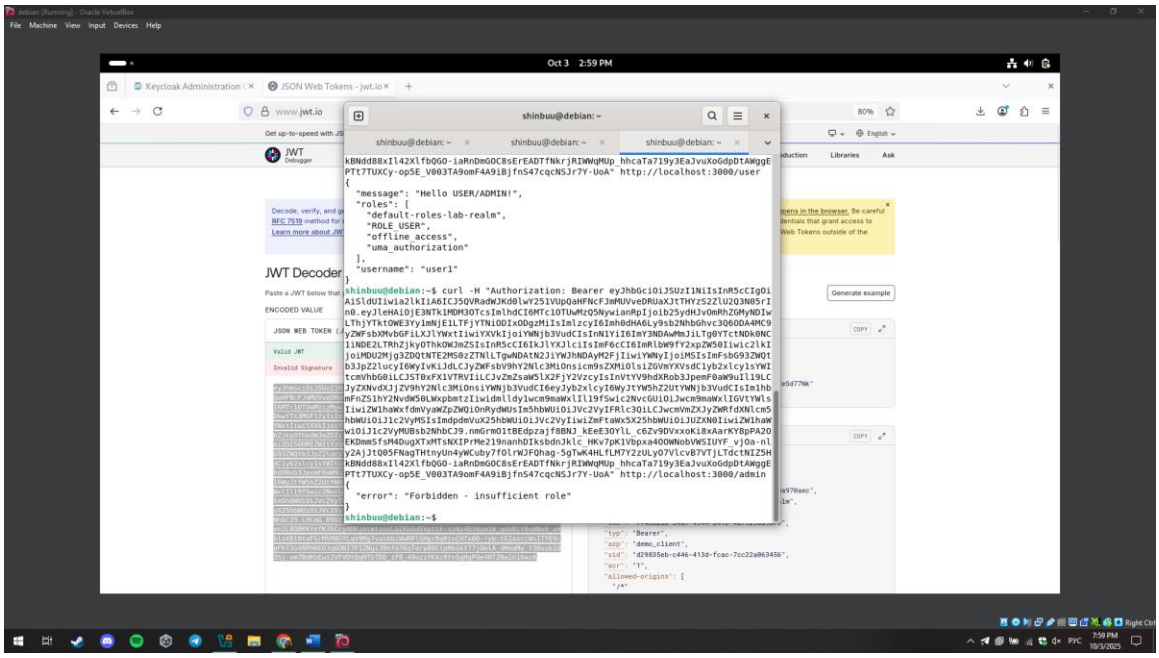
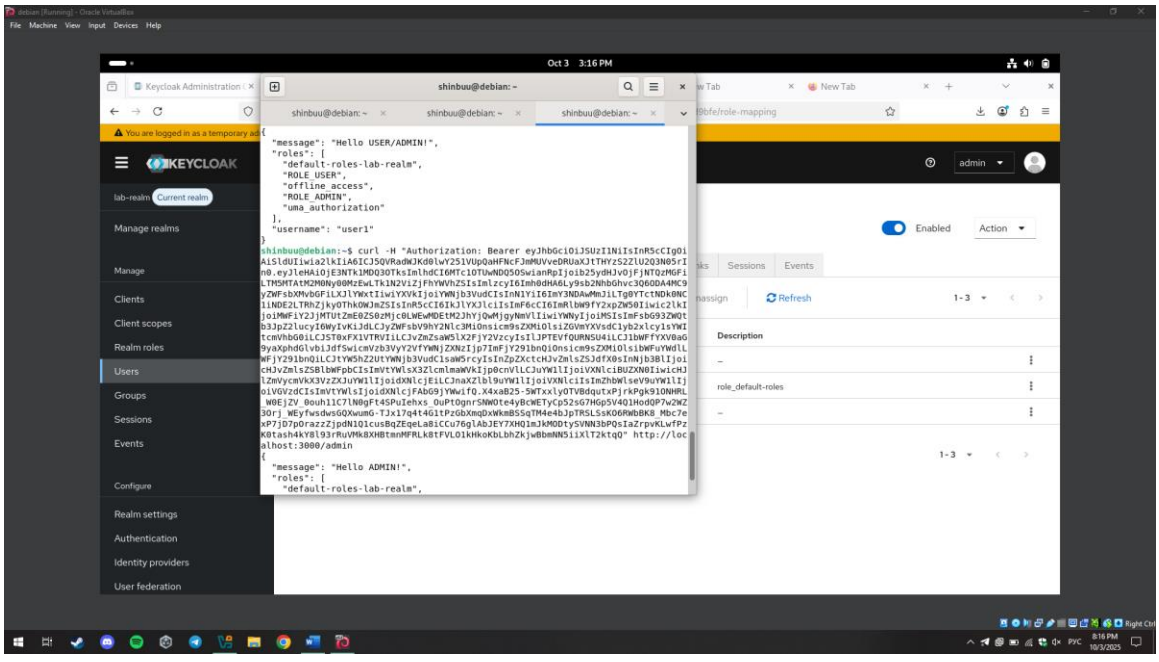
}
shinbuu@debian:~$
Telegram Web
YouTube
Right Ctrl
PYC
8:05 PM
10/3/2025



5. Role Modification

User roles were modified in Keycloak. For example, ROLE_ADMIN was removed from admin1. After obtaining a new token, the user could no longer access the /admin endpoint. This confirmed that Keycloak role assignments directly affect authorization.

Screenshot:



7. Comparison of Flows

Two authentication flows were compared:
- Password Grant (Direct Access Grants): Simple to test with cURL, but less secure because it requires the client to handle user credentials directly.
- Authorization Code Flow (Standard Flow): More secure, since credentials are only entered at Keycloak's login page and the client receives only tokens.

The lab primarily used Direct Access Grants, but Standard Flow is recommended for production.

8. Conclusion

The lab successfully demonstrated Keycloak integration with a resource server, role-based access control, and token management. Key results include:
- Verified access control based on roles
- Demonstrated role modification impact
- Tested refresh token usage
- Compared Direct Access vs Standard Flow