

Institute of Computer Technology
B. Tech Computer Science and Engineering

Sub: Identity and Access Management (2CSE507)

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Semester - 5

Class - A

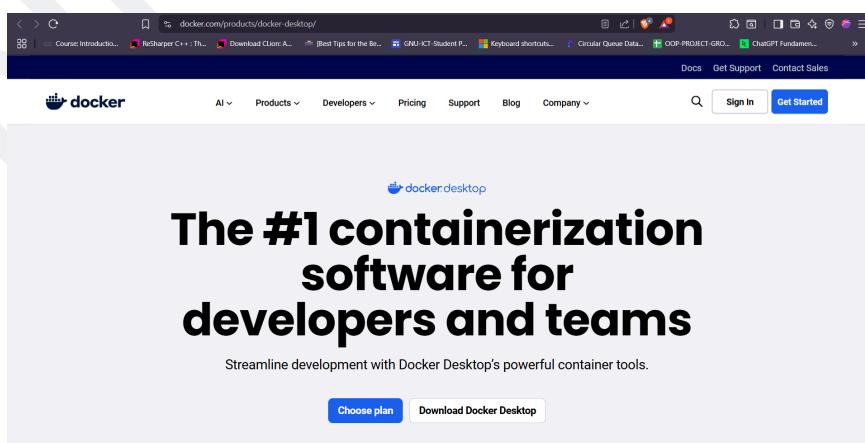
Batch – 52

PRACTICAL NO:- 1

Installing Docker:

1. Download Docker from below given URL:

<https://www.docker.com/products/docker-desktop/>



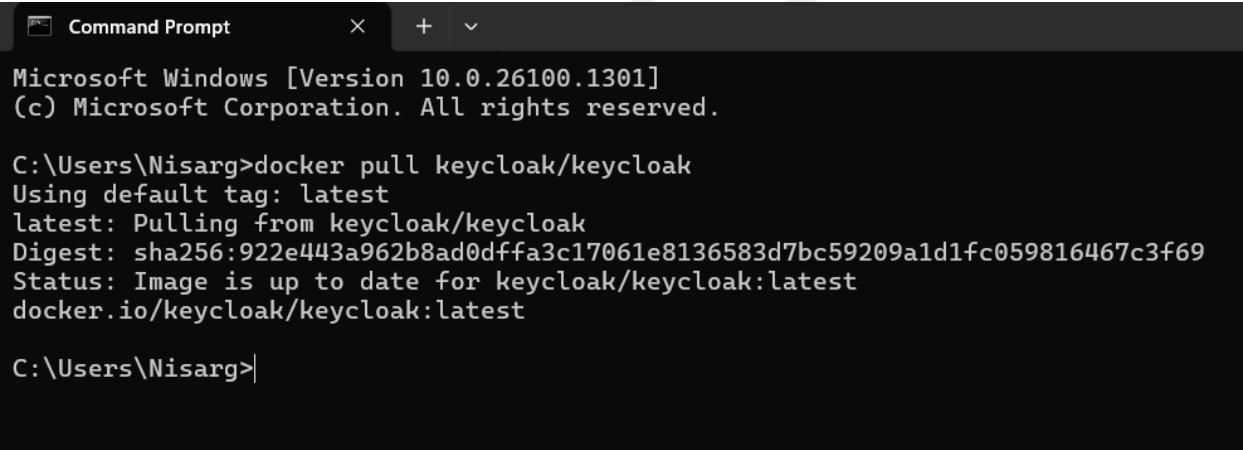
2. After the download completes, Run the installer to install Docker.
3. After installation completes, ‘sign-up’ for an account.

Pulling an image and Creating a Container:

1. Open command prompt (press ‘win+r’, then type ‘cmd’ and press ‘enter’).
2. Then type following command:

```
docker pull keycloak/keycloak
```

Explanation: The command docker pull ‘keycloak/keycloak’ downloads the Keycloak container image from Docker Hub to your local system. This image contains everything needed to run the Keycloak identity and access management server inside a Docker container.



```
Command Prompt
Microsoft Windows [Version 10.0.26100.1301]
(c) Microsoft Corporation. All rights reserved.

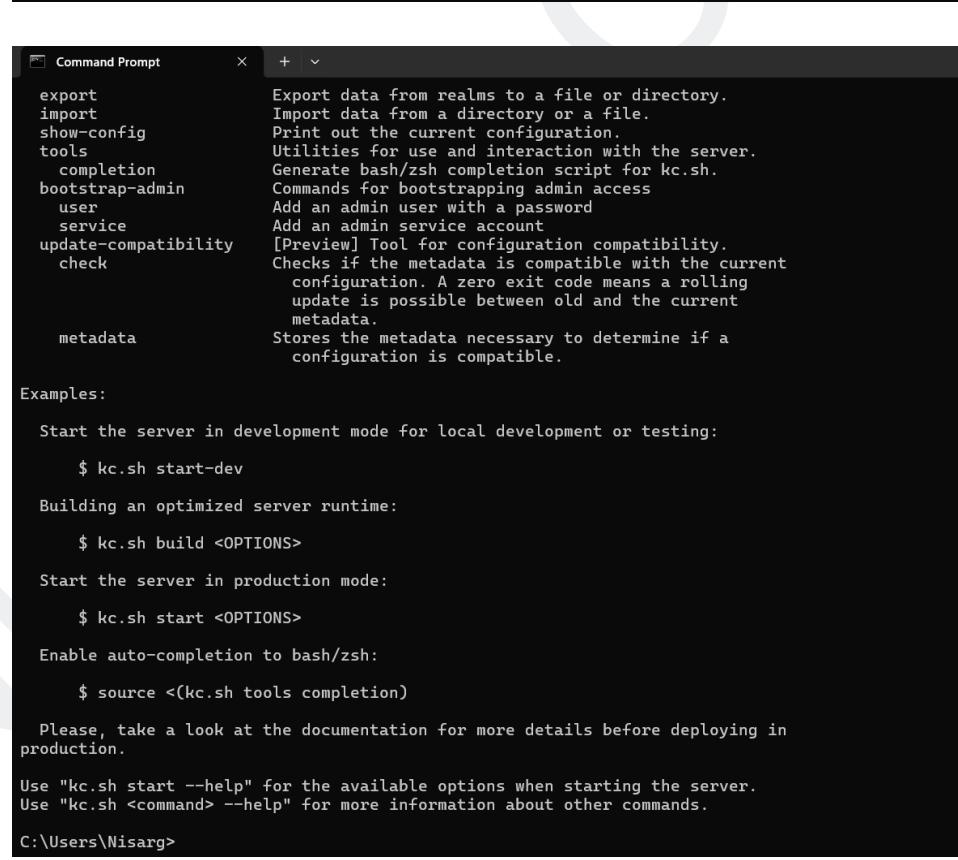
C:\Users\Nisarg>docker pull keycloak/keycloak
Using default tag: latest
latest: Pulling from keycloak/keycloak
Digest: sha256:922e443a962b8ad0dfffa3c17061e8136583d7bc59209a1d1fc059816467c3f69
Status: Image is up to date for keycloak/keycloak:latest
docker.io/keycloak/keycloak:latest

C:\Users\Nisarg>
```

3. Then in order to create a new container, use following command:

```
docker run -p 8080:8080 -e KEYCLOAK_ADMIN=admin -e
KEYCLOAK_ADMIN_PASSWORD=admin keycloak/keycloak
```

Explanation: It runs the Keycloak container and maps host port 8080 to container port 8080. It also sets the environment variables KEYCLOAK_ADMIN and KEYCLOAK_ADMIN_PASSWORD to create the initial admin user (admin/admin). This lets you access the Keycloak admin console via ‘<http://localhost:8080>’.



```
C:\Users\Nisarg>docker run -p 8080:8080 -e KEYCLOAK_ADMIN=admin -e KEYCLOAK_ADMIN_PASSWORD=admin keycloak/keycloak
Keycloak - Open Source Identity and Access Management
Find more information at: https://www.keycloak.org/docs/latest

Usage:
kc.sh [OPTIONS] [COMMAND]

Use this command-line tool to manage your Keycloak cluster.

Options:
--cf, --config-file <file>
      Set the path to a configuration file. By default, configuration properties are
      read from the "keycloak.conf" file in the "conf" directory.
-h, --help
      This help message.
-v, --verbose
      Print out error details when running this command.
-V, --version
      Show version information

Commands:
build          Creates a new and optimized server image.
start          Start the server.
start-dev       Start the server in development mode.
export         Export data from realms to a file or directory.
import         Import data from a directory or a file.
show-config    Print out the current configuration.
tools          Utilities for use and interaction with the server.
completion     Generate bash/zsh completion script for kc.sh.
bootstrap-admin Commands for bootstrapping admin access
user           Add an admin user with a password
service         Add an admin service account
update-compatibility [Preview] Tool for configuration compatibility.
check          Checks if the metadata is compatible with the current
               configuration. A zero exit code means a rolling
               update is possible between old and the current
               metadata.
metadata       Stores the metadata necessary to determine if a
               configuration is compatible.
```

```
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               update is possible between old and the current
               metadata.
metadata       Stores the metadata necessary to determine if a
               configuration is compatible.

Examples:
Start the server in development mode for local development or testing:
$ kc.sh start-dev

Building an optimized server runtime:
$ kc.sh build <OPTIONS>

Start the server in production mode:
$ kc.sh start <OPTIONS>

Enable auto-completion to bash/zsh:
$ source <(kc.sh tools completion)

Please, take a look at the documentation for more details before deploying in
production.

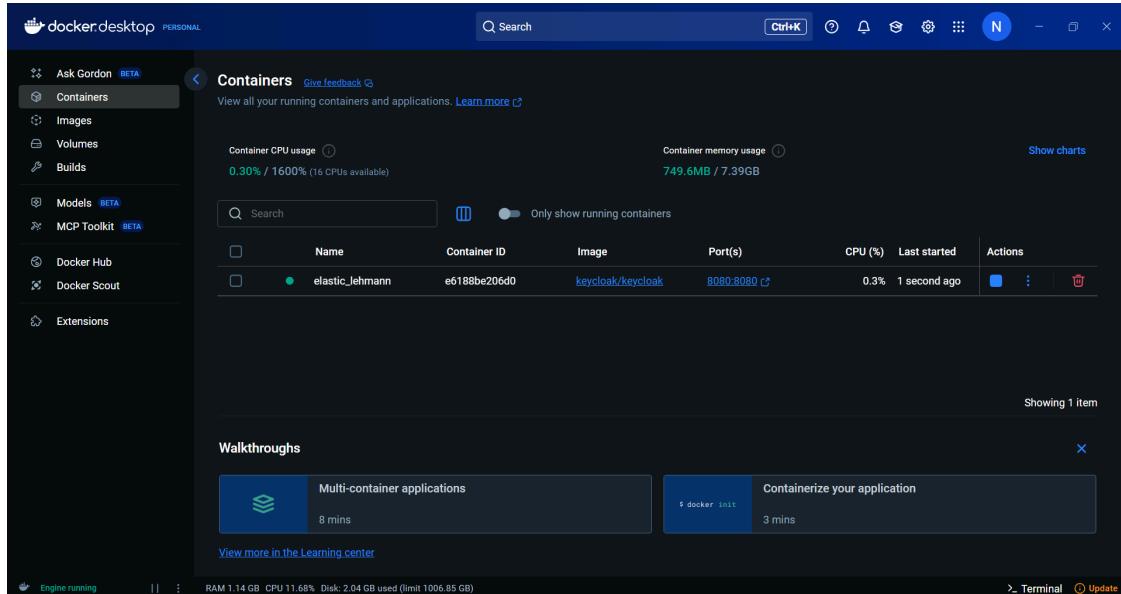
Use "kc.sh start --help" for the available options when starting the server.
Use "kc.sh <command> --help" for more information about other commands.

C:\Users\Nisarg>
```

4. Now you will be able to access the container through your Docker Desktop

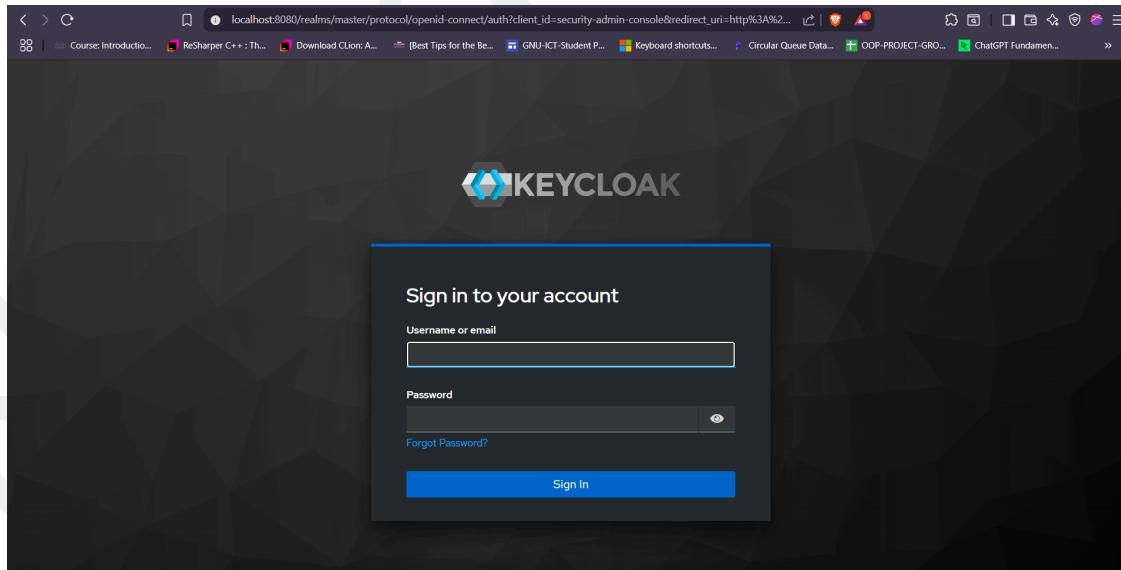
Running a Container:

1. Open your Docker Desktop and go to the container tab.
2. Now, click on the start button of the container you just created.

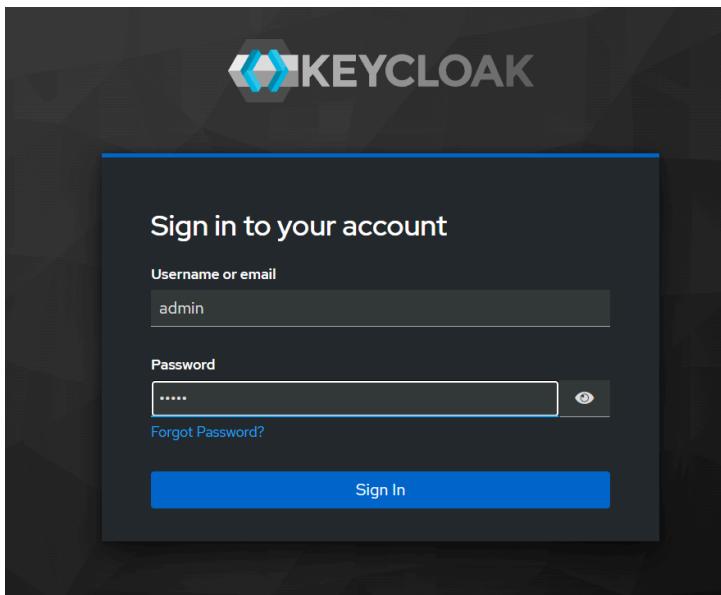


3. Open your browser and type following url:

'localhost:8080'



4. Use the admin login credentials, that you declared during creating the container. (In this case, username: admin and password: admin).



5. Now, you will be able to access admin control of the system.

A screenshot of the Keycloak admin console. The URL in the browser is "localhost:8080/admin/master/console/". The top navigation bar shows various links like "Course: Introduction...", "ReSharper C++ : Th...", "Download Clickn A...", "[Best Tips for the Be...", "GNU-ICT-Student P...", "Keyboard shortcuts...", "Circular Queue Data...", "OOP-PROJECT-GRO...", and "ChatGPT Fundamen...". A yellow notification bar says "⚠ You are logged in as a temporary admin user. To harden security, create a permanent admin account and delete the temporary one." The main dashboard is titled "master realm". It features a sidebar with "Manage realms", "Clients", "Client scopes", "Realm roles", "Users", "Groups", "Sessions", "Events", "Configure", "Realm settings", and "Authentication". The main content area is titled "Welcome to Keycloak" and contains a brief introduction about its features: "Keycloak provides user federation, strong authentication, user management, fine-grained authorization, and more. Add authentication to applications and secure services with minimum effort. No need to deal with storing users or authenticating users." It includes a "Refer to documentation" button and links to "View guides", "Join community", and "Read blog".

What is the difference between docker and Virtualization? Why do we use docker?

| Features | Docker | Hypervisor |
|---------------------|------------------------------------------------|--------------------------------------------------|
| Type | Container-based virtualization | Hardware-based (VM) virtualization |
| Function | Runs applications in isolated containers | Runs entire OS instances (VMs) |
| Abstraction Level | OS-level virtualization | Hardware-level virtualization |
| What It Virtualizes | Only the application and its dependencies | Entire operating system and hardware |
| Host OS Shared? | Yes (containers share the same host OS kernel) | No (each VM runs its own OS instance) |
| Guest OS Required | No | Yes |
| Resource Usage | Lightweight (no guest OS overhead) | Heavy (each VM needs its own OS) |
| Performance | Near-native | Slightly lower due to VM overhead |
| Isolation Level | Process-level (less isolated) | Full OS-level (more isolated) |
| Security | Shared kernel (risk if compromised) | Better security due to full isolation |
| Portability | Very portable (container images) | Less portable (VM images are larger) |
| Typical Use Case | Microservices, DevOps, CI/CD, lightweight apps | Full OS testing, legacy app support, multiple OS |