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Subject :Operating Systems Lab
Lab TASK 2

OS TASK 1

Task-1
Create four .cpp files as follows
- hello-1.cpp
- hello-2.cpp- hello-3.cpp- hello-4.cpp
Run the files separately using common (g++ hello-1.cpp -o hello1) and get the output of each file.
Now
write shell script to execute these files i.e hello1, hello2, hello3
and hello4. When you run this script, you should get the output of all 4
files.
Now add this script in your Dockerfile and build your image.
Command: docker build --name your_name .
Now run the container from the image you just build and you should get the output of all the .c code files.
Command: docker run mylab

Create files using terminal:

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ touch hello1.cpp
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ touch hello2.cpp
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ touch hello3.cpp
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ touch hello4.cpp
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ touch helloscript.sh
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ touch Dockerfile
```

---

now lets write code for all files:

Dockerfile | hello1.cpp | hello2.cpp

hello1.cpp

```cpp
#include <iostream>
using namespace std;
int main()
{
cout<<"First program"<<endl;
return 0;
}
```

Dockerfile | hello1.cpp | hello2.cpp

hello2.cpp

```cpp
#include <iostream>
using namespace std;
int main()
{
cout<<"second program"<<endl;
return 0;
}
```

Dockerfile | hello1.cpp | hello2.cpp

hello3.cpp

```cpp
#include <iostream>
using namespace std;
int main()
{
cout<<"third program"<<endl;
return 0;
}
```

Dockerfile | hello1.cpp | hello2.cpp

hello4.cpp

```cpp
#include <iostream>
using namespace std;
int main()
{
cout<<"Fourth program"<<endl;
return 0;
}
```

Dockerfile | hello1.cpp | hello2.cpp

helloscript.sh

```
#!/bin/bash

./hello1
./hello2
./hello3
./hello4
```

Dockerfile | hello1.cpp | hello2.cpp

Dockerfile

```
FROM gcc:latest

WORKDIR /app

ADD hello1.cpp .
ADD hello2.cpp .
ADD hello3.cpp .
ADD hello4.cpp .
ADD helloscript.sh .


RUN g++ hello1.cpp -o hello1
RUN g++ hello2.cpp -o hello2
RUN g++ hello3.cpp -o hello3
RUN g++ hello4.cpp -o hello4


RUN chmod +x helloscript.sh


CMD ["./helloscript.sh"]
```

Now run files :

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ g++ hello1.cpp -o hello1
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ g++ hello2.cpp -o hello2
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ g++ hello3.cpp -o hello3
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ g++ hello4.cpp -o hello4
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ ./hello1
./hello2
./hello3
./hello4
First program
second program
third program
Fourth program
```

Run helloscript file:

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ chmod +x helloscript.sh
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ ./helloscript.sh
First program
second program
third program
Fourth program
```

Now build image:
Problems facing:

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ docker build -t helloscript .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Post "http://%2Fvar%2Frun%2Fdocker.sock/
v1.24/build?buildargs=%7B%7D&cachefrom=%5B%5D&cgroupparent=&cpuperiod=0&cpuquota=0&cpusetcpus=&cpusetmems=&cpushares=0&dockerfile=Dockerfile&l
abels=%7B%7D&memory=0&memswap=0&networkmode=default&rm=1&shmsize=0&t=helloscript&target=&ulimits=null&version=1": dial unix /var/run/docker.so
ck: connect: permission denied
```

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker build -t ostask2 .
[sudo] password for ubuntu:
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon  77.31kB
Step 1/14 : FROM ubuntu:latest
 ---> c6b84b685f35
Step 2/14 : WORKDIR /app
 ---> Using cache
 ---> 400b5094dfdf
Step 3/14 : COPY hello-1.cpp .
COPY failed: file not found in build context or excluded by .dockerignore: stat hello-1.cpp: file does not exist
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker build -t ostask2 .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon  77.31kB
Step 1/14 : FROM ubuntu:latest
 ---> c6b84b685f35
Step 2/14 : WORKDIR /app
 ---> Using cache
 ---> 400b5094dfdf
Step 3/14 : COPY hello-1.cpp .
```

So after taking many attempts:

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker build -t helloscript .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon   89.6kB
Step 1/13 : FROM gcc:latest
latest: Pulling from library/gcc
167b8a53ca45: Pull complete
b47a222d28fa: Pull complete
debce5f9f3a9: Pull complete
1d7ca7cd2e06: Pull complete
0e12a76e4e31: Pull complete
debb91263655: Pull complete
4aacf9dbaa31: Pull complete
cc324c4a8030: Pull complete
Digest: sha256:ad7f580ef21b6dcc1a70b33686c514edf5d624bb8c7b160460c6198e7f18cfc7
Status: Downloaded newer image for gcc:latest
 ---> 9b2c8fba84b5
Step 2/13 : WORKDIR /app
 ---> Running in 46b9f9db1639
Removing intermediate container 46b9f9db1639
 ---> 5b07f2461a21
Step 3/13 : ADD hello1.cpp .
 ---> 2de99cd9679c
Step 4/13 : ADD hello2.cpp .
 ---> 6dcc1ed674bb
Step 5/13 : ADD hello3.cpp .
 ---> d6c3d7ee52b9
Step 6/13 : ADD hello4.cpp .
 ---> be215dbe464a
Step 7/13 : ADD helloscript.sh .
 ---> 740f0d819ca7
Step 8/13 : RUN g++ hello1.cpp -o hello1
```

```
 ---> Running in c070ae438441
Removing intermediate container c070ae438441
 ---> 409251288712
Step 9/13 : RUN g++ hello2.cpp -o hello2
 ---> Running in 06b1999fec10
Removing intermediate container 06b1999fec10
 ---> bafd5ee14325
Step 10/13 : RUN g++ hello3.cpp -o hello3
 ---> Running in c018206c9e65
Removing intermediate container c018206c9e65
 ---> 906e46216b4e
Step 11/13 : RUN g++ hello4.cpp -o hello4
 ---> Running in d9c2523b6781
Removing intermediate container d9c2523b6781
 ---> 263bff37639d
Step 12/13 : RUN chmod +x helloscript.sh
 ---> Running in fe48d2b062cb
Removing intermediate container fe48d2b062cb
 ---> 439346d6ff84
Step 13/13 : CMD ["./helloscript.sh"]
 ---> Running in 1e1b2cc16ca9
Removing intermediate container 1e1b2cc16ca9
 ---> 22110786a360
Successfully built 22110786a360
Successfully tagged helloscript:latest
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker images
REPOSITORY    TAG       IMAGE ID       CREATED          SIZE
helloscript   latest    22110786a360   15 seconds ago   1.38GB
shellscript   latest    aeab3466cb7b   3 hours ago      77.8MB
ostask2       latest    633b664f5d8f   4 hours ago      353MB
task2         latest    0399c988664a   5 hours ago      353MB
<none>        <none>    afbc11383365   5 hours ago      353MB
<none>        <none>    3a0700375370   6 hours ago      77.8MB
oslab         latest    744b483f84a0   2 days ago       77.9MB
```

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker images
REPOSITORY    TAG       IMAGE ID       CREATED          SIZE
helloscript   latest    22110786a360   15 seconds ago   1.38GB
shellscript   latest    aeab3466cb7b   3 hours ago      77.8MB
ostask2       latest    633b664f5d8f   4 hours ago      353MB
task2         latest    0399c988664a   5 hours ago      353MB
<none>        <none>    afbc11383365   5 hours ago      353MB
<none>        <none>    3a0700375370   6 hours ago      77.8MB
oslab         latest    744b483f84a0   2 days ago       77.9MB
mysql         latest    b2013ac99101   12 days ago      577MB
gcc           latest    9b2c8fba84b5   13 days ago      1.38GB
ubuntu        latest    c6b84b685f35   7 weeks ago      77.8MB
```

Hence final result is:

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ docker run helloscript
docker: permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Post "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/containers/create": dial unix /var/run/docker.sock: connect: permission denied.
See 'docker run --help'.
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker run helloscript
First program
second program
third program
Fourth program
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$
```

OS TASK 2

TASK 2:

task is you have to print the Even numbers from range 1 to 20 using docker containers. Like when I run container it should print the table as follows. And even numbers should be calculated using Shell Script only.
Hint: write shell script to print even numbers once done create your Dockerfile and run you .sh script inside the conatiner.

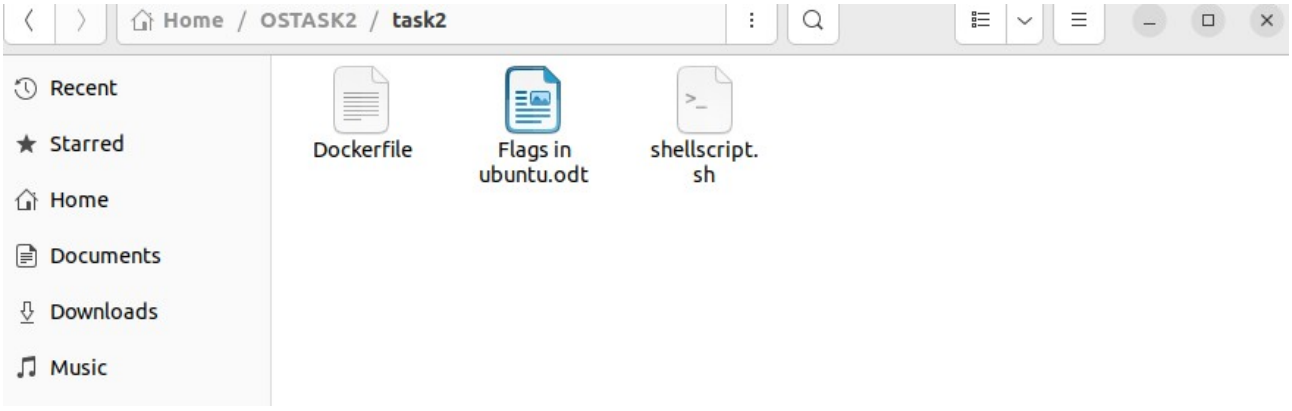
Even Numbers are:

2
4
6
8
10
12
14
16
18
20

Create files and folder using terminal.

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ mkdir task2
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ cd task2
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2/task2$ touch shellscript.sh
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2/task2$ touch Dockerfile
```

Here our folder looks like:



Now write code content in files:

Code for shellscript.sh

hello3.cpp | hello4.cpp | Dockerfile | helloscript.sh | shellscript.sh | Dockerfile

```
#!/bin/bash

echo "Even Numbers are:"

for ((i = 2; i <= 20; i += 2)); do
  echo $i
done

```

Code for docker file:

hello3.cpp | hello4.cpp | Dockerfile | helloscript.sh | shellscript.sh | Dockerfile

```
FROM ubuntu:latest

WORKDIR /app

ADD shellscript.sh .

RUN chmod +x shellscript.sh

CMD ["./shellscript.sh"]

```

Now write some commands on terminal.

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2/task2$ sudo docker build -t shellscript .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
            Install the buildx component to build images with BuildKit:
            https://docs.docker.com/go/buildx/

Sending build context to Docker daemon  3.072kB
Step 1/5 : FROM ubuntu:latest
 ---> c6b84b685f35
Step 2/5 : WORKDIR /app
 ---> Using cache
 ---> 400b5094dfdf
Step 3/5 : COPY shellscript.sh .
 ---> 25469eb7f50d
Step 4/5 : RUN chmod +x shellscript.sh
 ---> Running in fb08928fd903
Removing intermediate container fb08928fd903
 ---> 4e9d22959cd2
Step 5/5 : CMD ["./shellscript.sh"]
 ---> Running in 28dd080963bf
Removing intermediate container 28dd080963bf
 ---> aeab3466cb7b
Successfully built aeab3466cb7b
Successfully tagged shellscript:latest
```

Now let see our docker images:

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2/task2$ sudo docker images
REPOSITORY    TAG       IMAGE ID       CREATED             SIZE
shellscript   latest    aeab3466cb7b   35 seconds ago      77.8MB
ostask2       latest    633b664f5d8f   About an hour ago   353MB
task2         latest    0399c988664a   2 hours ago         353MB
<none>        <none>    afbc11383365   2 hours ago         353MB
<none>        <none>    3a0700375370   2 hours ago         77.8MB
oslab         latest    744b483f84a0   2 days ago          77.9MB
mysql         latest    b2013ac99101   12 days ago         577MB
ubuntu        latest    c6b84b685f35   7 weeks ago         77.8MB
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2/task2$ sudo docker run shellscript
Even Numbers are:
2
4
6
8
10
12
14
16
18
20
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2/task2$ pwd
```

After running this commands we get our result.

ERRORS Facing :

```
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker run ostask2
docker: Error response from daemon: failed to create task for container: failed to create shim task: OCI runtime create failed: runc create fa
iled: unable to start container process: exec: "./hellosscript.sh": stat ./hellosscript.sh: no such file or directory: unknown.
ERRO[0000] error waiting for container:
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker run ostask2
docker: Error response from daemon: failed to create task for container: failed to create shim task: OCI runtime create failed: runc create fa
iled: unable to start container process: exec: "./hellosscript.sh": stat ./hellosscript.sh: no such file or directory: unknown.
ERRO[0000] error waiting for container:
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker run ostask2
[sudo] password for ubuntu:
docker: Error response from daemon: failed to create task for container: failed to create shim task: OCI runtime create failed: runc create fa
iled: unable to start container process: exec: "./hellosscript.sh": stat ./hellosscript.sh: no such file or directory: unknown.
ERRO[0000] error waiting for container:
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker run ostask2
docker: Error response from daemon: failed to create task for container: failed to create shim task: OCI runtime create failed: runc create fa
iled: unable to start container process: exec: "./hellosscript.sh": stat ./hellosscript.sh: no such file or directory: unknown.
ERRO[0000] error waiting for container:
ubuntu@ubuntu-Latitude-E5470:~/OSTASK2$ sudo docker run ostask2
docker: Error response from daemon: failed to create task for container: failed to create shim task: OCI runtime create failed: runc create fa
iled: unable to start container process: exec: "./hellosscript.sh": stat ./hellosscript.sh: no such file or directory: unknown.
ERRO[0000] error waiting for container:
```

```
  libnss-nis libnss-nisplus
The following NEW packages will be installed:
  binutils binutils-common binutils-x86-64-linux-gnu cpp cpp-11
  fontconfig-config fonts-dejavu-core g++ g++-11 gcc gcc-11 gcc-11-base
  libasan6 libatomic1 libbinutils libbrotli1 libbsd0 libc-dev-bin
  libc-devtools libc6-dev libcc1-0 libcrypt-dev libctf-nobfd0 libctf0
  libdeflate0 libexpat1 libfontconfig1 libfreetype6 libgcc-11-dev libgd3
  libgomp1 libisl23 libitm1 libjbig0 libjpeg-turbo8 libjpeg8 liblsan0 libmd0
  libmpc3 libmpfr6 libnsl-dev libpng16-16 libquadmath0 libstdc++-11-dev
  libtiff5 libtirpc-dev libtsan0 libubsan1 libwebp7 libx11-6 libx11-data
  libxau6 libxcb1 libxdmcp6 libxpm4 linux-libc-dev manpages manpages-dev
  rpcsvc-proto ucf
The following packages will be upgraded:
  libc6
1 upgraded, 60 newly installed, 0 to remove and 3 not upgraded.
Need to get 73.6 MB of archives.
After this operation, 227 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libc6 amd64 2.35-0ubuntu3.4 [3234 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64 libmd0 amd64 1.0.4-1build1 [23.0 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/main amd64 libbsd0 amd64 0.11.5-1 [44.8 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libexpat1 amd64 2.4.7-1ubuntu0.2 [91.0 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 ucf all 3.0043 [56.1 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy/main amd64 libpng16-16 amd64 1.6.37-3build5 [191 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy/main amd64 libxau6 amd64 1:1.0.9-1build5 [7634 B]
Get:8 http://archive.ubuntu.com/ubuntu jammy/main amd64 libxdmcp6 amd64 1:1.1.3-0ubuntu5 [10.9 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy/main amd64 libxcb1 amd64 1.14-3ubuntu3 [49.0 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libx11-data all 2:1.7.5-1ubuntu0.3 [120 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libx11-6 amd64 2:1.7.5-1ubuntu0.3 [667 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/main amd64 manpages all 5.10-1ubuntu1 [1375 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 binutils-common amd64 2.38-4ubuntu2.3 [222 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libbinutils amd64 2.38-4ubuntu2.3 [662 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libctf-nobfd0 amd64 2.38-4ubuntu2.3 [107 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libctf0 amd64 2.38-4ubuntu2.3 [103 kB]
Get:17 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 binutils-x86-64-linux-gnu amd64 2.38-4ubuntu2.3 [2327 k
```