```
hemanth@sh01:~$ docker run -d -ti --rm -p 8889:8888 \
> -v ~/ds:/home/jovyan/projects/ds \
> -v /a:/a \
> -v /data:/data \
> --user root \
> -e GRANT_SUDO=yes \
> --name hemanth-jupyter_datascience-notebook-latest jupyter/datascience-notebook
6d15d4ac54f3d5d4b91238cbf3ddca61e2192f0a313e7e90cb2c19b65bf445b6
```

name: hemanth-jupyter_datascience-notebook-latest

Show all:

```
hemanth@sh01:~$ docker container ls
CONTAINER ID   IMAGE                         COMMAND              CREATED         STATUS               PORTS
NAMES
6d15d4ac54f3   jupyter/datascience-notebook  "tini -g -- start-no…"  39 seconds ago  Up 38 seconds (healthy)   0.0.0.0:8889->8888/tcp, :::8889->8888/tcp
hemanth-jupyter_datascience-notebook-latest
6d65a329363f   jupyter/datascience-notebook  "tini -g -- start.sh…"  5 hours ago     Up 5 hours (healthy)     0.0.0.0:8083->8888/tcp, :::8083->8888/tcp
prem-jupyter_datascience-notebook-latest
0f04b357bbb6   jupyter/datascience-notebook  "tini -g -- start.sh…"  20 hours ago    Up 20 hours (healthy)    0.0.0.0:8088->8888/tcp, :::8088->8888/tcp
akshata-jupyter_datascience-notebook-latest
c08bc9e8b4ca   5216e5ebe698                  "tini -g -- start.sh…"  22 hours ago    Up 22 hours (healthy)    0.0.0.0:8082->8888/tcp, :::8082->8888/tcp
kush-jupyter_datascience-notebook-latest
4ac3d02417b2   5216e5ebe698                  "tini -g -- start.sh…"  7 days ago      Up 7 days (healthy)      0.0.0.0:8081->8888/tcp, :::8081->8888/tcp
venkata-jupyter_datascience-notebook-latest
d84fe4601a2e   5216e5ebe698                  "tini -g -- start.sh…"  10 days ago     Up 10 days (healthy)     0.0.0.0:8080->8888/tcp, :::8080->8888/tcp
jupyter-yhuang_19289
47f96ff51e83   d0e83f25b127                  "cat"                10 days ago     Up 10 days
condescending_edison
```

Start:

```
hemanth@sh01:~$ docker exec hemanth-jupyter_datascience-notebook-latest jupyter lab list
[JupyterServerListApp] Currently running servers:
[JupyterServerListApp] http://6d15d4ac54f3:8888/?token=c98a0fefb1ae125a1623519f77db3dd485bf79f238443c6d :: /home/jovyan
```

Created Image hemanth-jupyter datascience-notebook-latest using the hemanth-jupyter_datascience-notebook-latest container

```
hemanth@sh01:~$ docker commit -p -a "hemanth" -m "docker first image" 6d15d4ac54f3 hemanth-jupyter_datascience-notebook-latest
sha256:4607b3b7a7b59ebbc87070f30e9f7cc37e95b4c0de51e123216fb9cbb8d7ba78
hemanth@sh01:~$ docker images
REPOSITORY                                                      TAG       IMAGE ID       CREATED            SIZE
hemanth-jupyter_datascience-notebook-latest                     latest    4607b3b7a7b5   15 seconds ago     5.16GB
pramod-jupyter_datascience-notebook                             v0.1      600f87169a17   14 minutes ago     5.16GB
roja-jupyter_datascience-notebook-latest                        latest    e015acc76595   About an hour ago  5.24GB
varsha-jupyter_datascience-notebook-latest                      latest    3fd3e2a58605   2 hours ago        5.16GB
dhruv-jupyter_database-notebook-1                                latest    dc112b282a75   2 hours ago        5.48GB
<none>                                                          <none>    1b78d4ae84b3   3 hours ago        5.16GB
jagtap-jupyter_datascience-notebook-latest                      latest    fc09bde55b69   4 hours ago        5.16GB
class-shared-instance/mayur-jupyter_datascience-notebook-latest latest    1751fbfeb09e   5 hours ago        5.16GB
mayur-jupyter_datascience-notebook-latest                       latest    1751fbfeb09e   5 hours ago        5.16GB
nandikonda-jupyter_datascience-notebook-01                      latest    377a6a387218   8 hours ago        5.21GB
<none>                                                          <none>    5951f1cc6921   8 hours ago        5.21GB
<none>                                                          <none>    3482894506cd   8 hours ago        5.21GB
<none>                                                          <none>    eb238952bb51   8 hours ago        5.21GB
sahithi-jupyter_datascience-notebook-latest                     latest    b9b68ef82565   33 hours ago       5.16GB
prem-jupyter_datascience-notebook-latest                        latest    e7247acd3ec3   2 days ago         5.24GB
docker                                                          latest    9e089f49ffe8   3 days ago         311MB
jupyter/datascience-notebook                                    latest    b467222b435d   4 days ago         5.16GB
rajat-jupyter_datascience-notebook-01                           latest    b467222b435d   4 days ago         5.16GB
hi_entrypoint                                                   v1.0      491c3a5e4827   12 days ago        122MB
<none>                                                          <none>    d0e83f25b127   12 days ago        122MB
jupyter/datascience-notebook                                    <none>    5216e5ebe698   13 days ago        4.58GB
ubuntu                                                          18.04     b89fba62bc15   2 weeks ago        63.1MB
hello-world                                                     latest    feb5d9fea6a5   17 months ago      13.3kB
mjbright/jupyter_datascience-notebook                           latest    c6261c80420a   7 years ago        5.48GB
```

Remove the container hemanth-jupyter_datascience-notebook-latest and create a new one

```
[hemanth@sh01:~$ docker stop 6d15d4ac54f3
6d15d4ac54f3
```

```
[hemanth@sh01:~$ docker run -d -ti --rm -p 8889:8888 \
> -v ~/ds:/home/jovyan/projects/ds \
> -v /a:/a \
> -v /data:/data \
> --user root \
> -e GRANT_SUDO=yes \
> --name hemanth-jupyter_datascience-notebook-latest jupyter/datascience-notebook
9af13c2582acea765ab223982905352472ac5d09b8b1ce4067d0cbf1232852bf
```

```
[hemanth@sh01:~$ docker ps
CONTAINER ID   IMAGE                                    COMMAND                CREATED          STATUS                  PORTS
9af13c2582ac   jupyter/datascience-notebook             "tini -g -- start-no…"  46 seconds ago   Up 45 seconds (healthy)  0.0.0.0:8889->8888/tcp,
  :::8889->8888/tcp           hemanth-jupyter_datascience-notebook-latest
5a171128b931   jupyter/datascience-notebook             "tini -g -- start.sh…"  48 minutes ago   Up 48 minutes (healthy)  0.0.0.0:8086->8888/tcp,
  :::8086->8888/tcp           pramod-jupyter_datascience-notebook-latest
12c8b841297c   jupyter/datascience-notebook             "tini -g -- start.sh…"  About an hour ago  Up About an hour (healthy)  0.0.0.0:49154->8888/tcp
, :::49154->8888/tcp         roja-jupyter_datascience-notebook-latest
1090d079516c   jupyter/datascience-notebook             "tini -g -- start.sh…"  2 hours ago      Up 2 hours (healthy)  0.0.0.0:8886->8888/tcp,
  :::8886->8888/tcp           jagtap-1-jupyter_datascience-notebook-01
```

Run the image ,install lmod and checking whether everything is working or not

A container is a runtime instance of an image. When we run an image, we create a container, which is a lightweight and isolated environment that runs the application. The container includes the application and its dependencies, as well as an isolated file system and network interface.

```
[hemanth@sh01:~$ docker exec -it 9af13c2582ac /bin/bash
(base) root@9af13c2582ac:~# apt update
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [23.2 kB]
Get:4 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [900 kB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [829 kB]
Get:6 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [868 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [107 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy/restricted amd64 Packages [164 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy/main amd64 Packages [1,792 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [885 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1,138 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [28.6 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1,198 kB]
Get:17 http://archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [49.0 kB]
Get:18 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [22.4 kB]
Fetched 26.2 MB in 5s (5,350 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
1 package can be upgraded. Run 'apt list --upgradable' to see it.
```

```
(base) root@9af13c2582ac:~# apt install -y lua5.3 luarocks liblua5.3-0:amd64 liblua5.3-dev liblua5.3-dev:amd64 libtcl8.6:amd64 libtolua-dev lua-bit32 lua-bit3
2-dev lua-bit32:amd64 lua-bitop lua-json lua-lpeg lua-posix lua-posix-dev lua-posix:amd64 lua-term tcl tcl-dev tcl8.6 tcl8.6-dev:amd64
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  autoconf automake autotools-dev file libltdl-dev libltdl7 liblua5.2-0 liblua5.2-dev libmagic-mgc libmagic1 libncurses-dev libreadline-dev libsigsegv2
  libtool libtool-bin lua-any lua-sec lua-socket m4 pkg-config zip zlib1g-dev
Suggested packages:
  autoconf-archive gnu-standards autoconf-doc gettext libtool-doc ncurses-doc readline-doc gcj-jdk m4-doc tcl-doc tcl-tclreadline tcl8.6-doc
The following NEW packages will be installed:
  autoconf automake autotools-dev file libltdl-dev libltdl7 liblua5.2-0 liblua5.2-dev liblua5.3-0 liblua5.3-dev libmagic-mgc libmagic1 libncurses-dev
  libreadline-dev libsigsegv2 libtcl8.6 libtolua-dev libtool libtool-bin lua-any lua-bit32 lua-bit32-dev lua-bitop lua-json lua-lpeg lua-posix lua-posix-dev
  lua-sec lua-socket lua-term lua5.3 luarocks m4 pkg-config tcl tcl-dev tcl8.6 tcl8.6-dev zip zlib1g-dev
0 upgraded, 40 newly installed, 0 to remove and 1 not upgraded.
Need to get 6,212 kB of archives.
After this operation, 36.5 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64 libmagic-mgc amd64 1:5.41-3 [257 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64 libmagic1 amd64 1:5.41-3 [87.2 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/main amd64 file amd64 1:5.41-3 [21.5 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/main amd64 libsigsegv2 amd64 2.13-1ubuntu3 [14.6 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 m4 amd64 1.4.18-5ubuntu2 [199 kB]
```

```
(base) root@9af13c2582ac:~# luarocks list


Rocks installed for Lua 5.3
---------------------------


(base) root@9af13c2582ac:~# luarocks search posix

posix - Search results for Lua 5.3:
===================================


Rockspecs and source rocks:
---------------------------


lposix
   20031107-1 (rockspec) - https://luarocks.org
   20031107-1 (src) - https://luarocks.org

lrexlib-posix
   2.9.1-1 (rockspec) - https://luarocks.org
   2.9.1-1 (src) - https://luarocks.org
   2.9.0-1 (rockspec) - https://luarocks.org
   2.9.0-1 (src) - https://luarocks.org
   2.8.0-1 (rockspec) - https://luarocks.org
   2.8.0-1 (src) - https://luarocks.org
   2.7.2-1 (rockspec) - https://luarocks.org
   2.7.2-1 (src) - https://luarocks.org
   2.7.1-1 (rockspec) - https://luarocks.org
   2.7.1-1 (src) - https://luarocks.org
   2.7.0-1 (rockspec) - https://luarocks.org
   2.7.0-1 (src) - https://luarocks.org
   2.4.0-1 (rockspec) - https://luarocks.org
   2.4.0-1 (src) - https://luarocks.org
   2.3.0-1 (rockspec) - https://luarocks.org
   2.3.0-1 (src) - https://luarocks.org
   2.2.2-2 (rockspec) - https://luarocks.org
   2.2.2-2 (src) - https://luarocks.org
   2.2.2-1 (rockspec) - https://luarocks.org
```

```
(base) root@9af13c2582ac:~# sudo luarocks install luaposix 34.0.4-1
Installing https://luarocks.org/luaposix-34.0.4-1.src.rock
Missing dependencies for luaposix 34.0.4-1:
   bit32 (not installed)
   std.normalize (not installed)

luaposix 34.0.4-1 depends on bit32 (not installed)
Installing https://luarocks.org/bit32-5.3.5.1-1.src.rock

bit32 5.3.5.1-1 depends on lua >= 5.1, < 5.5 (5.3-1 provided by VM)
gcc -O2 -fPIC -I/usr/include/lua5.3 -c lbitlib.c -o lbitlib.o -DLUA_COMPAT_BITLIB -Ic-api
gcc -shared -o bit32.so lbitlib.o
No existing manifest. Attempting to rebuild...
bit32 5.3.5.1-1 is now installed in /usr/local (license: MIT)

luaposix 34.0.4-1 depends on lua >= 5.1, < 5.4 (5.3-1 provided by VM)
luaposix 34.0.4-1 depends on std.normalize (not installed)
Installing https://luarocks.org/std.normalize-2.0.3-1.src.rock
Missing dependencies for std.normalize 2.0.3-1:
   std._debug (not installed)

std.normalize 2.0.3-1 depends on lua >= 5.1, < 5.5 (5.3-1 provided by VM)
std.normalize 2.0.3-1 depends on std._debug (not installed)
Installing https://luarocks.org/std._debug-1.0.1-1.src.rock

std._debug 1.0.1-1 depends on lua >= 5.1, < 5.5 (5.3-1 provided by VM)
std._debug 1.0.1-1 is now installed in /usr/local (license: MIT/X11)

std.normalize 2.0.3-1 is now installed in /usr/local (license: MIT/X11)
```

List the applications:

```
gcc -O2 -fPIC -shared  -DVERSION='"34.0.4"' -D_XOPEN_SOURCE=700 -DPACKAGE='"luaposix"' -D_FORTIFY_SOURCE=2 -D_POSIX_C_SOURCE=200809L -DNDEBUG  -Iext/include
I/usr/include/lua5.3 ext/posix/utime.c -o linux/posix/utime.so
true -c build-aux/config.ld .
/usr/bin/lua5.3 build-aux/luke install --quiet INST_LIBDIR="/usr/local/lib/luarocks/rocks-5.3/luaposix/34.0.4-1/lib" INST_LUADIR="/usr/local/lib/luarocks/rock
s-5.3/luaposix/34.0.4-1/lua"
luaposix 34.0.4-1 is now installed in /usr/local (license: MIT/X11)

(base) root@9af13c2582ac:~# sudo ln -s /a/apps/gb/lmod/lmod/init/profile       /etc/profile.d/z00_lmod.sh
(base) root@9af13c2582ac:~# grep -qxF 'source /etc/profile.d/z00_lmod.sh' /etc/bash.bashrc || echo 'source /etc/profile.d/z00_lmod.sh' >> /etc/bash.bashrc
(base) root@9af13c2582ac:~# source /etc/profile.d/z00_lmod.sh
(base) root@9af13c2582ac:~# echo $LMOD_CMD
/a/apps/gb/lmod/lmod/libexec/lmod
(base) root@9af13c2582ac:~# echo $MODULEPATH
/a/modulefiles/eb/all:/a/modulefiles/gb:/a/modulefiles/Linux:/a/modulefiles/Core:/a/apps/gb/lmod/lmod/modulefiles/Core
(base) root@9af13c2582ac:~# cd ~/projects/ds/
(base) root@9af13c2582ac:~/projects/ds# ml av


---------------------------------------------------------------- /a/modulefiles/eb/all ----------------------------------------------------------------
   Anaconda2/5.3.0                           Perl/5.32.1-GCCcore-10.3.0-minimal        help2man/1.47.7-GCCcore-8.2.0
   Anaconda3/5.1.0                           Perl/5.32.1-GCCcore-10.3.0                help2man/1.47.16-GCCcore-10.2.0
   Anaconda3/2022.05              (D)        Perl/5.34.0-GCCcore-11.2.0                help2man/1.48.3-GCCcore-10.3.0
   Autoconf/2.69-GCCcore-8.2.0               Perl/5.34.1-GCCcore-11.3.0      (D)       help2man/1.48.3-GCCcore-11.2.0
   Autoconf/2.71-GCCcore-10.3.0              PostgreSQL/13.3-GCCcore-10.3.0            help2man/1.49.2-GCCcore-11.3.0      (D)
   Autoconf/2.71-GCCcore-11.2.0              Python/2.7.15-GCCcore-8.2.0               hwloc/1.11.11-GCCcore-8.2.0
   Autoconf/2.71-GCCcore-11.3.0   (D)        Python/3.9.5-GCCcore-10.3.0-bare          hwloc/2.5.0-GCCcore-11.2.0
   Automake/1.16.1-GCCcore-8.2.0             Python/3.9.5-GCCcore-10.3.0               hwloc/2.7.1-GCCcore-11.3.0          (D)
   Automake/1.16.3-GCCcore-10.3.0            Python/3.9.6-GCCcore-11.2.0-bare          intltool/0.51.0-GCCcore-10.3.0
   Automake/1.16.4-GCCcore-11.2.0            Python/3.9.6-GCCcore-11.2.0     (D)       intltool/0.51.0-GCCcore-11.2.0      (D)
   Automake/1.16.5-GCCcore-11.3.0 (D)        Rust/1.52.1-GCCcore-10.3.0                jbigkit/2.1-GCCcore-11.2.0
   Autotools/20180311-GCCcore-8.2.0          Rust/1.54.0-GCCcore-11.2.0      (D)       libGLU/9.0.2-GCCcore-11.2.0
   Autotools/20210128-GCCcore-10.3.0         SOCI/4.0.2-GCC-10.3.0                     libarchive/3.4.0-GCCcore-8.2.0
   Autotools/20210726-GCCcore-11.2.0         SQLite/3.27.2-GCCcore-8.2.0               libarchive/3.5.1-GCCcore-10.3.0
   Autotools/20220317-GCCcore-11.3.0 (D)     SQLite/3.35.4-GCCcore-10.3.0              libarchive/3.5.1-GCCcore-11.2.0    (D)
   Bison/3.0.4                               SQLite/3.36-GCCcore-11.2.0      (D)       libdeflate/1.8-GCCcore-10.3.0
   Bison/3.0.5-GCCcore-8.2.0                 Szip/2.1.1-GCCcore-11.2.0                 libdrm/2.4.107-GCCcore-11.2.0
   Bison/3.0.5                               Tcl/8.6.9-GCCcore-8.2.0                   libevent/2.1.12-GCCcore-10.3.0
   Bison/3.3.2                               Tcl/8.6.11-GCCcore-10.3.0                 libevent/2.1.12-GCCcore-11.2.0
   Bison/3.7.1-GCCcore-10.2.0                Tcl/8.6.11-GCCcore-11.2.0       (D)       libevent/2.1.12-GCCcore-11.3.0     (D)
```