DATABASE MANAGEMENT AND DATA VISUALIZATION

dmdvben/DM_DV: Code and files related to course in Database Management and Data Visualization

Droplet:

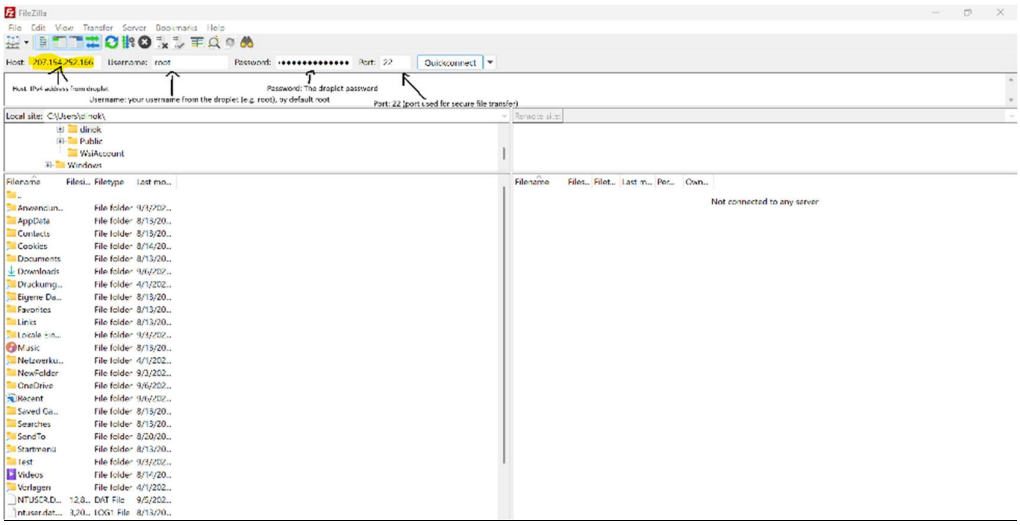
A Droplet is a virtual private server from DigitalOcean that lets you run applications, host websites, or store data in the cloud.

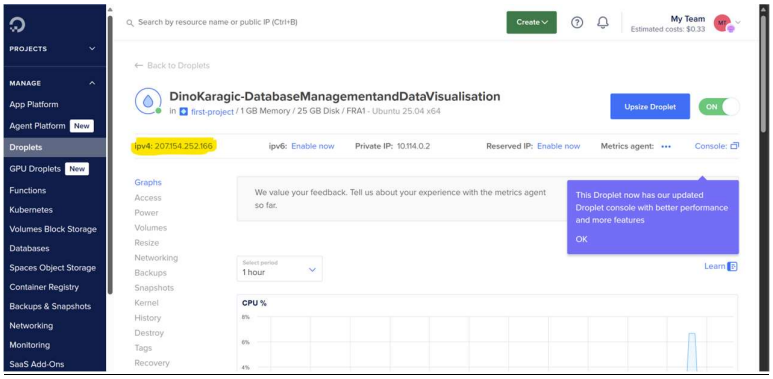
👉 Example: You can host a WordPress site on a Droplet and use FileZilla to easily upload your website files.

✅ Benefits: It's reliable (online 24/7), scalable (upgrade anytime), secure, and gives you full control compared to shared hosting or running on your own PC.

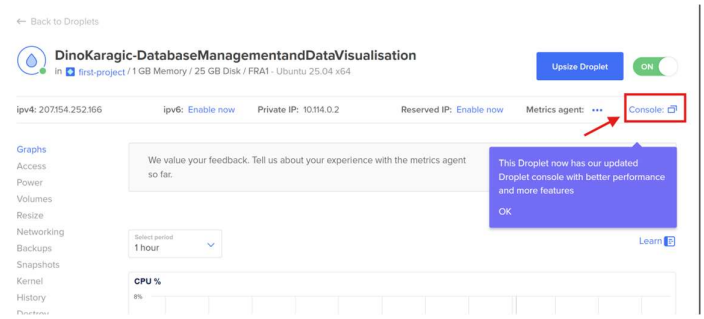
Conect Droplet with FileZilla:

FileZilla itself is just a client. It doesn't store or change files on your machine unless you download or upload files.
When you connect FileZilla to a server (like your Droplet), it shows you the files on that server, not your local computer.





Connect Command line Interface:




```
*** System restart required ***
root@ubuntu-s-1vcpu-1gb-fra1-01:~# pwd
/root
root@ubuntu-s-1vcpu-1gb-fra1-01:~#
```

pwd = current working directory.

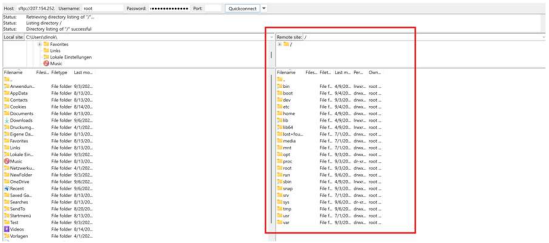
It shows you are currently in the /root folder, which is the home directory for the root user.

```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# ls -l
total 4
drwxr-xr-x 2 root root 4096 Sep  3 11:32 Dino
```

ls -l = information about files and directories in the current directory

You are in the root user's home directory (/root) and there is **one folder named Dino** inside it. This folder is owned by root and has standard read/write/execute permissions for the owner and read/execute permissions for everyone else.

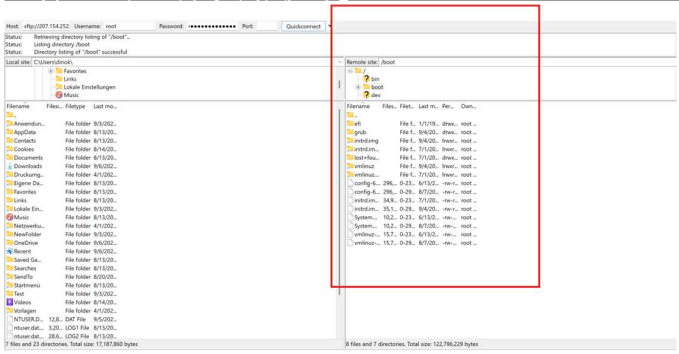
```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# pwd
/root
root@ubuntu-s-1vcpu-1gb-fra1-01:~# ls -l
total 4
drwxr-xr-x 2 root root 4096 Sep  3 11:32 Dino
root@ubuntu-s-1vcpu-1gb-fra1-01:~# cd ..
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls -l
total 60
lrwxrwxrwx   1 root root     7 Apr  9 12:06 bin -> usr/bin
drwxr-xr-x   5 root root  4096 Sep  4 06:49 boot
drwxr-xr-x  18 root root  3920 Sep  3 10:44 dev
drwxr-xr-x 117 root root  4096 Sep  4 06:51 etc
drwxr-xr-x   2 root root  4096 Apr  9 12:06 home
lrwxrwxrwx   1 root root     7 Apr  9 12:06 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Apr  9 12:06 lib64 -> usr/lib64
drwx------   2 root root 16384 Jul  1 19:57 lost+found
drwxr-xr-x   2 root root  4096 Jul  1 19:54 media
drwxr-xr-x   2 root root  4096 Jul  1 19:54 mnt
drwxr-xr-x   4 root root  4096 Sep  3 12:40 opt
dr-xr-xr-x 170 root root     0 Sep  3 10:44 proc
drwx------   5 root root  4096 Sep  3 11:32 root
drwxr-xr-x  33 root root  1040 Sep  6 06:42 run
lrwxrwxrwx   1 root root     8 Apr  9 12:06 sbin -> usr/sbin
drwxr-xr-x   2 root root  4096 Sep  3 10:44 snap
drwxr-xr-x   2 root root  4096 Jul  1 19:54 srv
dr-xr-xr-x  13 root root     0 Sep  3 10:44 sys
drwxrwxrwt  11 root root   220 Sep  6 06:41 tmp
drwxr-xr-x  12 root root  4096 Jul  1 19:54 usr
drwxr-xr-x  13 root root  4096 Sep  3 10:44 var
```



cd .. moves **one level up** → from /root to / (the **top of the filesystem**).

ls -l now lists **all top-level directories and symbolic links** in /

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/# cd boot
root@ubuntu-s-1vcpu-1gb-fra1-01:/boot# ls -l
total 119953
-rw------- 1 root root 10284289 Jun 13 18:24 System.map-6.14.0-23-generic
-rw------- 1 root root 10287886 Aug  7 14:44 System.map-6.14.0-29-generic
-rw-r--r-- 1 root root   296789 Jun 13 18:24 config-6.14.0-23-generic
-rw-r--r-- 1 root root   296778 Aug  7 14:44 config-6.14.0-29-generic
drwx------ 3 root root      512 Jan  1  1970 efi
drwxr-xr-x 6 root root     4096 Sep  4 06:49 grub
lrwxrwxrwx 1 root root       28 Sep  4 06:49 initrd.img -> initrd.img-6.14.0-29-generic
-rw-r--r-- 1 root root 34931204 Jul  1 19:56 initrd.img-6.14.0-23-generic
-rw-r--r-- 1 root root 35159299 Sep  4 06:49 initrd.img-6.14.0-29-generic
lrwxrwxrwx 1 root root       28 Jul  1 19:56 initrd.img.old -> initrd.img-6.14.0-23-generic
drwx------ 2 root root    16384 Jul  1 19:57 lost+found
lrwxrwxrwx 1 root root       25 Sep  4 06:49 vmlinuz -> vmlinuz-6.14.0-29-generic
-rw------- 1 root root 15767944 Jun 13 15:19 vmlinuz-6.14.0-23-generic
-rw------- 1 root root 15772040 Aug  7 15:34 vmlinuz-6.14.0-29-generic
lrwxrwxrwx 1 root root       25 Jul  1 19:56 vmlinuz.old -> vmlinuz-6.14.0-23-generic
```



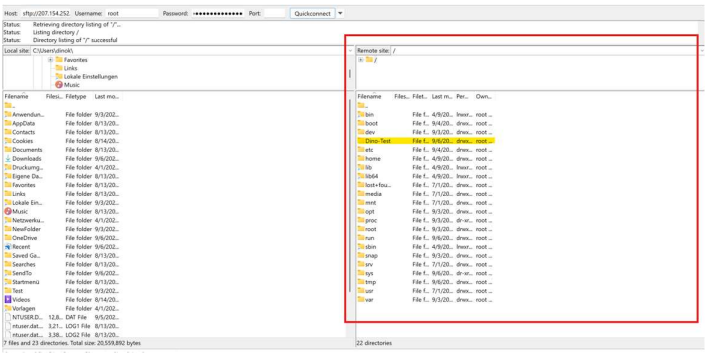
You successfully navigated to /boot and listed all information about files and directories in the boot directory.

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/boot# cd ..
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls l-
ls: cannot access 'l-': No such file or directory
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls -l
total 60
lrwxrwxrwx   1 root root     7 Apr  9 12:06 bin -> usr/bin
drwxr-xr-x   5 root root  4096 Sep  4 06:49 boot
drwxr-xr-x  18 root root  3920 Sep  3 10:44 dev
drwxr-xr-x 117 root root  4096 Sep  4 06:51 etc
drwxr-xr-x   2 root root  4096 Apr  9 12:06 home
lrwxrwxrwx   1 root root     7 Apr  9 12:06 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Apr  9 12:06 lib64 -> usr/lib64
drwx------   2 root root 16384 Jul  1 19:57 lost+found
drwxr-xr-x   2 root root  4096 Jul  1 19:54 media
drwxr-xr-x   2 root root  4096 Jul  1 19:54 mnt
drwxr-xr-x   4 root root  4096 Sep  3 12:40 opt
dr-xr-xr-x 167 root root     0 Sep  3 10:44 proc
drwx------   5 root root  4096 Sep  3 11:32 root
drwxr-xr-x  33 root root  1040 Sep  6 06:58 run
lrwxrwxrwx   1 root root     8 Apr  9 12:06 sbin -> usr/sbin
drwxr-xr-x   2 root root  4096 Sep  3 10:44 snap
drwxr-xr-x   2 root root  4096 Jul  1 19:54 srv
dr-xr-xr-x  13 root root     0 Sep  6 06:51 sys
drwxrwxrwt  11 root root   220 Sep  6 06:41 tmp
drwxr-xr-x  12 root root  4096 Jul  1 19:54 usr
drwxr-xr-x  13 root root  4096 Sep  3 10:44 var
```

Cd moves back to parent folder

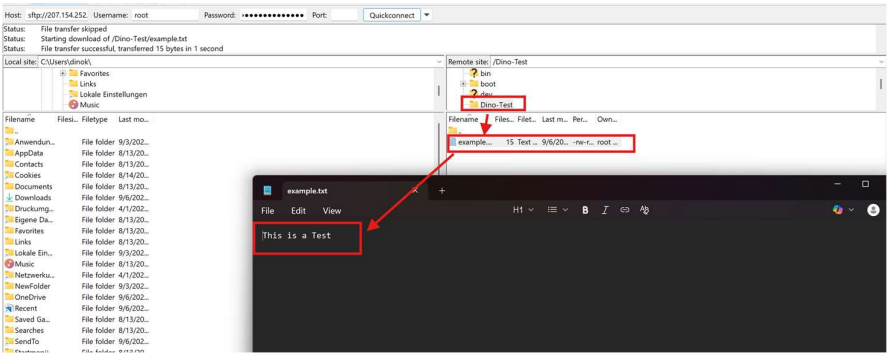
Ls -l list all information about files and directories in the / directory.

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/# mkdir Dino-Test
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls -l
total 64
drwxr-xr-x   2 root root  4096 Sep  6 07:03 Dino-Test
lrwxrwxrwx   1 root root     7 Apr  9 12:06 bin -> usr/bin
drwxr-xr-x   5 root root  4096 Sep  4 06:49 boot
drwxr-xr-x  18 root root  3920 Sep  3 10:44 dev
drwxr-xr-x 117 root root  4096 Sep  4 06:51 etc
drwxr-xr-x   2 root root  4096 Apr  9 12:06 home
lrwxrwxrwx   1 root root     7 Apr  9 12:06 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Apr  9 12:06 lib64 -> usr/lib64
drwx------   2 root root 16384 Jul  1 19:57 lost+found
drwxr-xr-x   2 root root  4096 Jul  1 19:54 media
drwxr-xr-x   2 root root  4096 Jul  1 19:54 mnt
drwxr-xr-x   4 root root  4096 Sep  3 12:40 opt
dr-xr-xr-x 167 root root     0 Sep  3 10:44 proc
drwx------   5 root root  4096 Sep  3 11:32 root
drwxr-xr-x  33 root root  1040 Sep  6 06:58 run
lrwxrwxrwx   1 root root     8 Apr  9 12:06 sbin -> usr/sbin
drwxr-xr-x   2 root root  4096 Sep  3 10:44 snap
drwxr-xr-x   2 root root  4096 Jul  1 19:54 srv
dr-xr-xr-x  13 root root     0 Sep  6 06:51 sys
drwxrwxrwt  11 root root   220 Sep  6 06:41 tmp
drwxr-xr-x  12 root root  4096 Jul  1 19:54 usr
drwxr-xr-x  13 root root  4096 Sep  3 10:44 var
root@ubuntu-s-1vcpu-1gb-fra1-01:/#
```



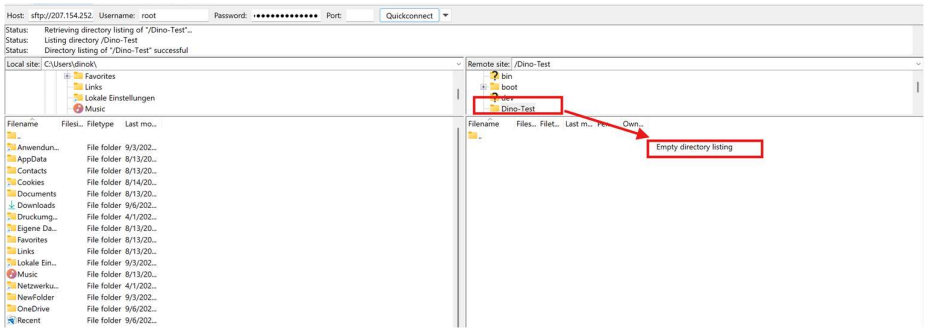
Mkdir – Creates new folder (here created Dino-Test)

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/# cd Dino-Test
root@ubuntu-s-1vcpu-1gb-fra1-01:/Dino-Test# ls -l
total 4
-rw-r--r-- 1 root root 12 Sep  6 07:16 example.txt
root@ubuntu-s-1vcpu-1gb-fra1-01:/Dino-Test# echo "This is a Test" > example.txt
root@ubuntu-s-1vcpu-1gb-fra1-01:/Dino-Test# cat example.txt
This is a Test
root@ubuntu-s-1vcpu-1gb-fra1-01:/Dino-Test#
```



Moved to director Dino – Test, listed all the folders, example.txt was there, created in the example.txt a text “This is a Test” (“This is a Text” > example.txt) showed the text in the example test (cat example.txt)

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/Dino-Test# rm example.txt
root@ubuntu-s-1vcpu-1gb-fra1-01:/Dino-Test# ls -l
total 0
```



Rm – removes the example.txt

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/# rm -r Dino-Test
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls -l
total 60
lrwxrwxrwx   1 root root     7 Apr  9 12:06 bin -> usr/bin
drwxr-xr-x   5 root root  4096 Sep  4 06:49 boot
drwxr-xr-x  18 root root  3920 Sep  3 10:44 dev
drwxr-xr-x 117 root root  4096 Sep  4 06:51 etc
drwxr-xr-x   2 root root  4096 Apr  9 12:06 home
lrwxrwxrwx   1 root root     7 Apr  9 12:06 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Apr  9 12:06 lib64 -> usr/lib64
drwx------   2 root root 16384 Jul  1 19:57 lost+found
drwxr-xr-x   2 root root  4096 Jul  1 19:54 media
drwxr-xr-x   2 root root  4096 Jul  1 19:54 mnt
drwxr-xr-x   4 root root  4096 Sep  3 12:40 opt
dr-xr-xr-x 166 root root     0 Sep  3 10:44 proc
drwx------   5 root root  4096 Sep  3 11:32 root
drwxr-xr-x  33 root root  1040 Sep  6 07:32 run
lrwxrwxrwx   1 root root     8 Apr  9 12:06 sbin -> usr/sbin
drwxr-xr-x   2 root root  4096 Sep  3 10:44 snap
drwxr-xr-x   2 root root  4096 Jul  1 19:54 srv
dr-xr-xr-x  13 root root     0 Sep  6 06:51 sys
drwxrwxrwt  11 root root   220 Sep  6 07:18 tmp
drwxr-xr-x  12 root root  4096 Sep  6 07:35 usr
drwxr-xr-x  13 root root  4096 Sep  3 10:44 var
root@ubuntu-s-1vcpu-1gb-fra1-01:/#
```

rm -r MyAssignments, deletes the directory and everything inside it.

Docker:

Docker is a tool that lets you run apps in containers — like little boxes that have everything the app needs to work.

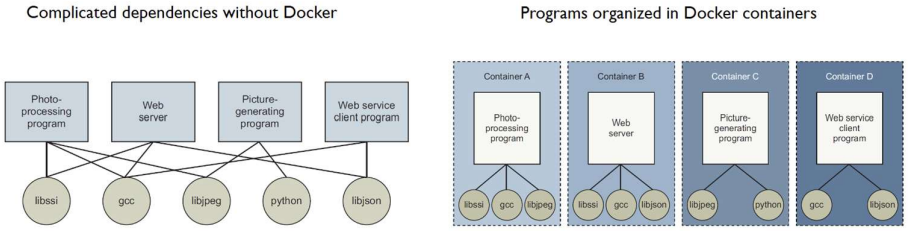
What is a container?

- A container is like a mini-computer inside your computer.
- It has its own software, settings, and files, separate from your main system.

Example:

Imagine you want to run a website:

- Normally, you'd install a web server, database, and code on your PC.
- With Docker, you just get a **container** with all of that already inside.
- You can start it with one command, and it works instantly.



- ***docker ps***: See containers in running state

```
root@test:~$ docker ps
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS     NAMES
root@test:~$
```

No containers running

- ***docker ps –a***: See all containers (both in running and created state)

Two containers in the created state

```
root@test:~$ docker ps -a
CONTAINER ID   IMAGE         COMMAND    CREATED              STATUS                          PORTS     NAMES
1a0accaf4eee   hello-world   "/hello"   About a minute ago   Exited (0) About a minute ago             romantic_jepsen
1dcace59b419   hello-world   "/hello"   58 minutes ago       Exited (0) 58 minutes ago                 confident_banzai
```

- ***Docker remove [name of container]***: Remove a container in created state

```
root@test:~$ docker rm romantic_jepsen
romantic_jepsen
root@test:~$ docker ps -a
CONTAINER ID   IMAGE         COMMAND    CREATED          STATUS                      PORTS     NAMES
1dcace59b419   hello-world   "/hello"   59 minutes ago   Exited (0) 59 minutes ago             confident_banzai
```

After removing one container, only one container is in created state

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Docker Volume:

A volume is a special folder that lives outside the container but can be used by one or more containers.

It's used to store data persistently.

- Normally, if a container is deleted, all its data disappears.
- With a volume, the data stays safe even if the container is removed.

What is a Shared Volume?

- A shared volume is a volume that multiple containers can access at the same time.
- This allows containers to read and write the same data, making it useful for collaboration between containers.

Example

Imagine you have two containers:

1. A web server container
2. A backup container

You can create a shared volume /data:

Volume: /data

```
Volume: /data
 ├─ Container 1: Web server writes logs
 └─ Container 2: Backup container reads logs to save them
```

- Both containers can access /data, so logs are shared safely

Create Volumes:

```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker volume create rstudio_data
rstudio_data
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker volume ls
DRIVER    VOLUME NAME
local     postgres_data
local     rstudio_data
local     shiny_app_data
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker volume inspect --format '{{ .Mountpoint }}' $(docker volume ls -q)
/var/lib/docker/volumes/postgres_data/_data
/var/lib/docker/volumes/rstudio_data/_data
/var/lib/docker/volumes/shiny_app_data/_data
root@ubuntu-s-1vcpu-1gb-fra1-01:~# chmod o+rw /var/lib/docker/volumes/postgres_data/_data
root@ubuntu-s-1vcpu-1gb-fra1-01:~# chmod o+rw /var/lib/docker/volumes/rstudio_data/_data
root@ubuntu-s-1vcpu-1gb-fra1-01:~# chmod o+rw /var/lib/docker/volumes/shiny_app_data/_data
root@ubuntu-s-1vcpu-1gb-fra1-01:~#
```

docker volume create rstudio_data

Creates a volume on the host machine which can be accessed from the container

docker volume ls

Returns a list of shared volume

docker volume inspect --format '{{ .Mountpoint }}' $(docker volume ls -q)

Returns a list of shared volumes and their location on the host machi

chmod o+rw /var/lib/docker/volumes/postgres_data/_data

chmod o+rw /var/lib/docker/volumes/rstudio_data/_data

chmod o+rw /var/lib/docker/volumes/shiny_app_data/_data

Create read and write permission for other users than the root user in host path associated with the shared volume.

The path /var/lib/docker/volumes/rstudio_data/_data should be changed if the location of the shared volume is different

Rstudio Docker:

GET RSTUDIO CONTAINER RUNNING

- ***docker run -d -p 8787:8787 -e PASSWORD=ThisIs4ThePassword --name rstudio -v rstudio_data:/home/rstudio rocker/rstudio***
  - ***docker run***: *start a container*
  - ***-d*** *: run in detach mode (the container runs in the background and do not tie up your terminal)*
  - ***-p 8787:8787***: The first 8787 is the host machine port, and the next 8787 is the port for the container. We map from the host machine port to the container port. Hence, when you access the host and specify that you connect to port 8787 (E.g., "droplet_IP:8787") Docker will redirect traffic to the container.
  - ***-e PASSWORD = [your_password]***: *Set the password for logging in to Rstudio*
  - ***--name rstudio***: *The name of the container*
  - ***-v rstudio_data:/home/rstudio***: *Mount the volume "rstudio_data" to the container path "/home/rstudio"*
  - ***rocker/rstudio***: *The name of the image that you use to install and run the docker container*
  - *See more information about rocker images: https://rocker-project.org/images/versioned/rstudio.html*
- Find the ipv4 address of your digital ocean droplet, and access your Rstudio server in the browser using port 8787 (e.g., 165.22.92.178:8787)
- The username is "*rstudio*" and the password is as you gave in the docker run command

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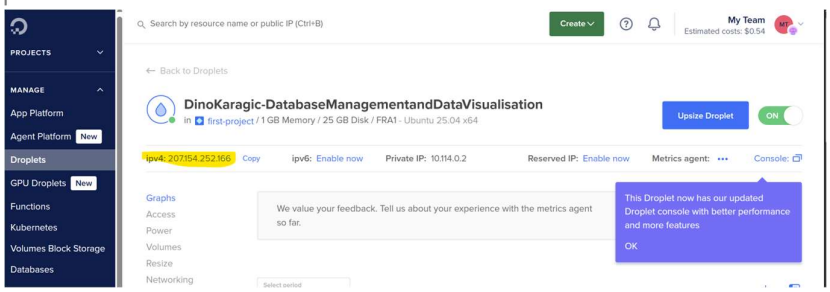

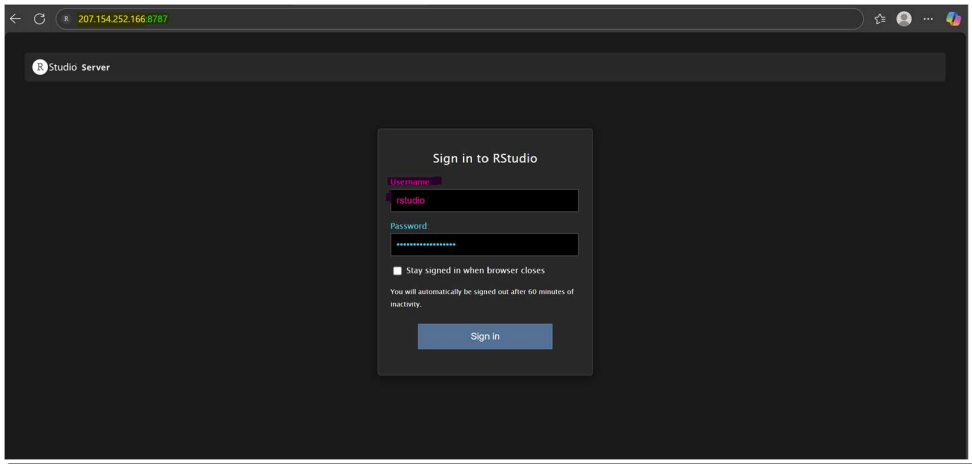

VERIFY PERSISTENT STORAGE IN SHARED VOLUME

- Login to rstudio from your browser
- In R: Install the R package "pryr" with ***install.packages("pryr")***
- Create a new R script where you load the R package: ***library(pryr)***
  - Verify that **library(pryr)** works
- Then stop and remove the rstudio container (from the Linux CLI)
  - ***docker stop rstudio***
  - ***docker rm rstudio***
- Use filezilla to connect to the server and go to the host folder where the shared volume for *rstudio_data* is located and verify that the R script is in that folder (despite the rstudio container has been removed)
  - Remember: when you created the shared volume you specified the host path for the shared volume
- Spin up the rstudio container again and verify that the rscript is still there
  - ***docker run -d -p 8787:8787 -e PASSWORD=ThisIs4ThePassword --name rstudio -v rstudio_data:/home/rstudio rocker/rstudio***
- Open the R script and try to run library(pryr)
  - You should get an error, as the library is not installed
  - The reason is that the rstudio container is not built with this package! It is only the data in the shared volume which is persisted
  - This is an advantage when different users use the same image. We can create our own images with the packages we wish to have installed → next lecture.

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INSPECTING AND ENTERING A CONTAINER

- ***docker exec -it rstudio /bin/bash***
  - ***docker exec***: execute a command in a container
  - ***-it***: the i stands for *interactive*, and t for *terminal.*
  - ***/bin/bash***: Is the command executed and we are starting an interactive shell within the container
- ***id rstudio***: In the shell of the rstudio container, we inspect the user id and group id of the user called rstudio. Rstudio is the default user when using the rocker/rstudio image.
- **exit**: leave the interactive terminal in the container and return to host

```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker exec -it rstudio /bin/bash
root@5a2be9cd8a04:/# id rstudio
uid=1000(rstudio) gid=1000(rstudio) groups=1000(rstudio),50(staff)
root@5a2be9cd8a04:/# exit
exit
root@ubuntu-s-1vcpu-1gb-fra1-01:~#
```

docker exec -it rstudio /bin/bash = This command lets you **enter the RStudio container** and manipulate its filesystem, install packages, or inspect files just like you would on a normal server.

Id rstudio = inspects user id and group id of the user called rstudio

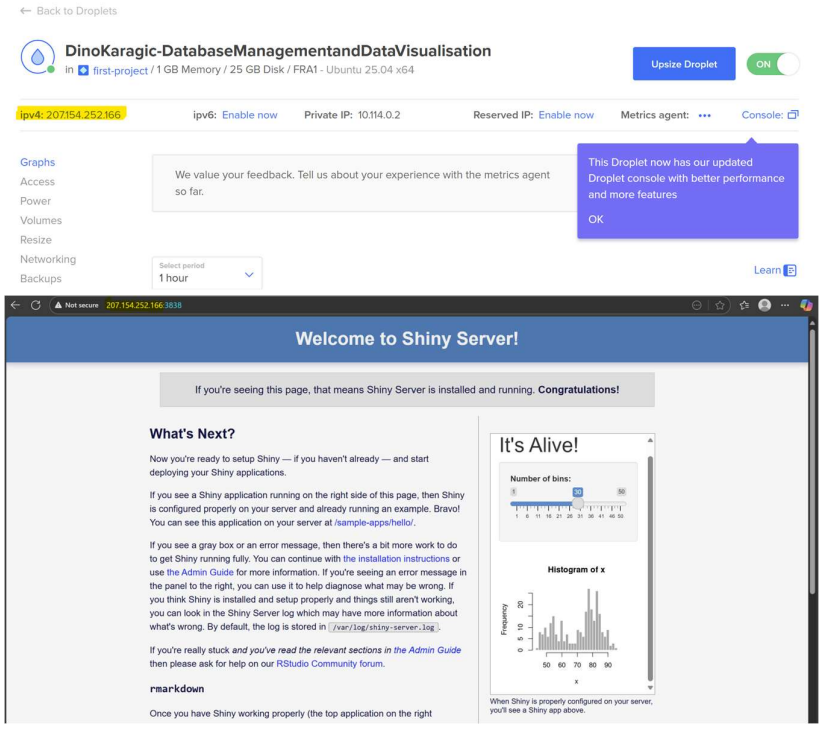
Exit = Leaves the container

Shiny Docker:

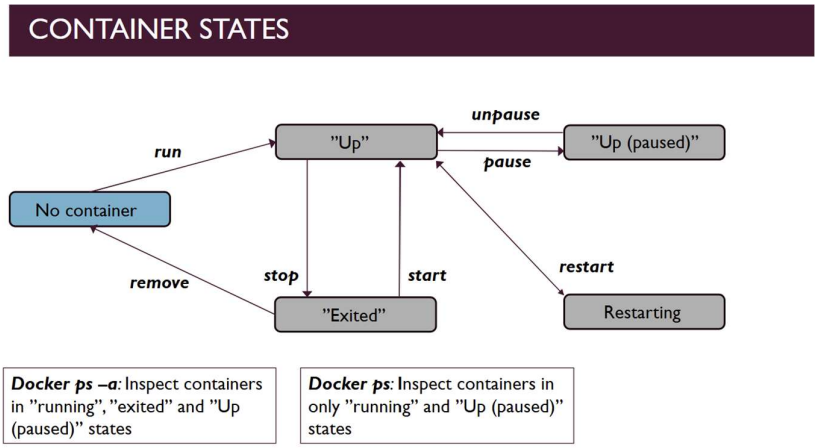
docker run -d -p 3838:3838 --name rshiny -v shiny_app_data:/srv/shiny-server rocker/shiny

```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker run -d -p 3838:3838 --name rshiny -v shiny_app_data:/srv/shiny-server rocker/shiny
Unable to find image 'rocker/shiny:latest' locally
latest: Pulling from rocker/shiny
49d352c11bbd: Already exists
a725794c0e5a: Already exists
a172b5443207: Already exists
6a53944a7dae: Already exists
aa8e97b03ca8: Already exists
00411d571e02: Already exists
17191a55fd34: Pull complete
9fc0b49fbfbc: Pull complete
e3f87c7e5545: Pull complete
95e854d1d447: Pull complete
715752b21b06: Pull complete
0062c1982440: Pull complete
Digest: sha256:74367d163cef2d5ed35efd74f11fd43edb1f4dd92c26936f323b31d435658a2a
Status: Downloaded newer image for rocker/shiny:latest
7e30e982ce93861d4b13a80a2da30b8282eb3d64c0bf694152ac6984a1322b7f
root@ubuntu-s-1vcpu-1gb-fra1-01:~#
```

- ***docker pull rocker/shiny:*** Download the image without creating the container
  - If we were to use the *docker run* command below, then the image would automatically be downloaded
  - Hence, I only show this command so you know we can download images without running them immediately
- ***docker run -d -p 3838:3838 --name rshiny -v shiny_app_data:/srv/shiny-server rocker/shiny***
- Find the ipv4 address of your digital ocean droplet, and access Shiny server in the browser using port 3838 (e.g., 165.22.92.178:3838)



Docker Container States:




```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker ps
CONTAINER ID   IMAGE             COMMAND   CREATED          STATUS          PORTS                                                 NAMES
7e30e982ce93   rocker/shiny      "/init"   4 minutes ago    Up 4 minutes    0.0.0.0:3838->3838/tcp, [::]:3838->3838/tcp           rshiny
5a2be9cd8a04   rocker/rstudio    "/init"   14 minutes ago   Up 14 minutes   0.0.0.0:8787->8787/tcp, [::]:8787->8787/tcp           rstudio
```

```
oot@ubuntu-s-1vcpu-1gb-fra1-01:~# docker ps -a
ONTAINER ID   IMAGE             COMMAND    CREATED          STATUS                      PORTS                                                 NAMES
7e30e982ce93   rocker/shiny      "/init"    5 minutes ago    Up 5 minutes                0.0.0.0:3838->3838/tcp, [::]:3838->3838/tcp           rshiny
a2be9cd8a04   rocker/rstudio    "/init"    15 minutes ago   Up 15 minutes               0.0.0.0:8787->8787/tcp, [::]:8787->8787/tcp           rstudio
e9ac4f42f08   hello-world       "/hello"   2 hours ago      Exited (0) 2 hours ago                                                            wonderful_fermi
8dcf498a8ff   hello-world       "/hello"   2 days ago       Exited (0) 2 days ago                                                             intelligent_curran
```

Remove a container:

First stop container with:

Docker stop container_name

Then remove container:

Docker rm container_name

Networks:

Protocol

- A protocol is like a language computers use to talk to each other.
- Example:
  - HTTP → the language for web pages
  - If both sides "speak" HTTP, they can exchange web data correctly.

Interface

- An interface is like a door to a computer.
- Each interface has an IP address, which is like the house address of the computer.
- Example:
  - 192.168.0.1 → a specific computer on your network

Port

- A port is like a room inside the house (computer) for a specific service.
- Example:
  - RStudio Server → port 8787
  - RShiny → port 3838
  - PostgreSQL → port 5432
- A program listens on its port so clients know where to send data.

Putting it together

Example:

- You want to access a website on Wendy's computer:

  IP address (door) : 192.168.0.1
  Port (room) : 80 (web server)
  Protocol (language): HTTP
- Your web browser "knocks" on the door (IP) and asks for data in the correct room (port) using HTTP.

Two Networks:

Host network

- This is the network your computer or server is connected to.
- Example:
  - Your laptop connected to Wi-Fi at home → that's your host network.
  - A server connected to the internet → that's its host network.
- It defines how the machine communicates with other computers.

Docker virtual network (Bridge)

- Docker creates its own virtual network to let containers talk to each other and the host.
- The bridge network is like a virtual LAN inside your host machine.
- Containers connected to the bridge can:
  - Communicate with each other using container names
  - Connect to the outside world via the ho

Inspecting Docker Network: (docker network ls)

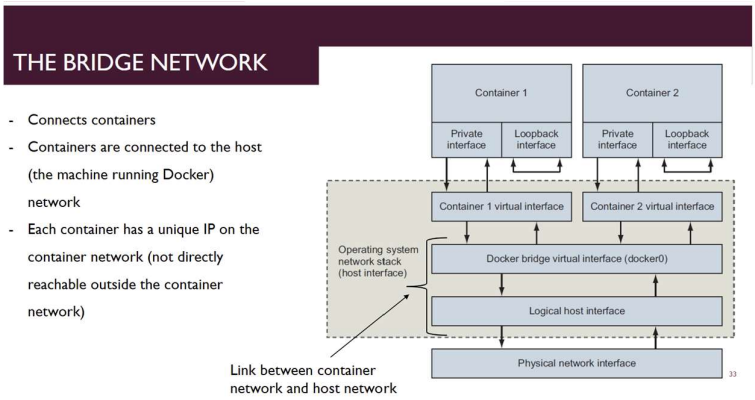
```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker network ls
NETWORK ID     NAME      DRIVER    SCOPE
3aa02e02c60a   bridge    bridge    local
b8cf7fbcf2f2   host      host      local
63b3015476f2   none      null      local
root@ubuntu-s-1vcpu-1gb-fra1-01:~#
```

Bridge: Provides intercontainer connectivity on the same machine

Host: Containers connected to host interact with the host network

None: Containers connected to this does not have network connectivity outside themselves

Local scope: The network is constrained to the host running Dock



Build a New Network

Creating a network is helpful so we can have different containers in the network.

```
docker network create \
  --driver bridge \
  --attachable \
  --scope local \
  --subnet 10.0.42.0/24 \
  --ip-range 10.0.42.128/25 \
  db_r_shiny
```

```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker network create \
  --driver bridge \
  --attachable \
  --scope local \
  --subnet 10.0.42.0/24 \
  --ip-range 10.0.42.128/25 \
  db_r_shiny
72bf3977433b7dad563e545a13ec866902d910799a362fdc3b68c12ba8192140
root@ubuntu-s-1vcpu-1gb-fra1-01:~#
```

Docker network create:	Command to build a new network
driver bridge:	Using the bridge driver to create a bridge network
attachable:	Allows us to attach and detach containers at any time
scope local:	A network only available on the host
subnet 10.0.42.0/24:	Considers all IP-addresses from 10.0.42.0 to 10.0.42.255 as local
ip-range 10.0.42.128/25:	Only allocate IP-addresses to new containers in the range from 10.0.42.128 to 10.0.42.255
	Hence we reserve the first IP-addresses for other purposes like manual assignment of IP adres

Attach a Container to the Network: (docker network connect db_r_shiny rstudio)

```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker network connect db_r_shiny rstudio
```

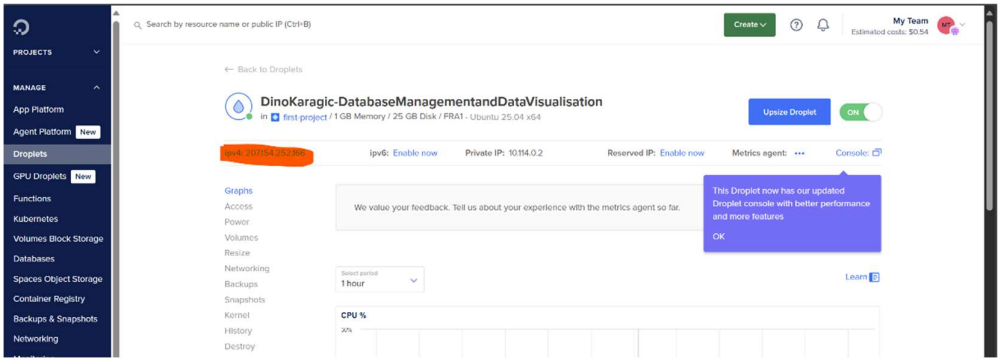
Docker network connect:	Command to connect a container to network
db_r_shiny:	The network name
rstudio:	The container nam

Postgress SQL Container and Connect to Network

Install Docker

docker run -p 5432:5432 --name postgres -e POSTGRES_PASSWORD=ThisIs4ThePassword -e POSTGRES_USER=postgres -d -v postgres_data:/var/lib/postgresql/data postgres

```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker run -p 5432:5432 --name postgres -e POSTGRES_PASSWORD=ThisIs4ThePassword -e POSTGRES_USER=postgres -d -v postgres_data:/var/lib/postgresql/data postgres
Unable to find image 'postgres:latest' locally
latest: Pulling from library/postgres
396b1da7636e: Pull complete
b72d8ac87e9d: Pull complete
94e1cd2b7c29: Pull complete
33d8bc47040c: Pull complete
5f1c287d8d1d: Pull complete
073d4679511b: Pull complete
e6907b3b0646: Pull complete
270b526d29aa: Pull complete
2ad4158055c0: Pull complete
fe225b67449f: Pull complete
b9d5e0463683: Pull complete
41da6c673ba5: Pull complete
04777d59042a: Pull complete
756eee103c01: Pull complete
Digest: sha256:d17be73073d6e73a005c239c67b8c9f0331925d05bd874964f445a9f698fbf72
Status: Downloaded newer image for postgres:latest
1b8cb674df93dd5fc24a5c42ef58cbb0dea3ad673bca3cdc0da9dcb98da2b6d8
```



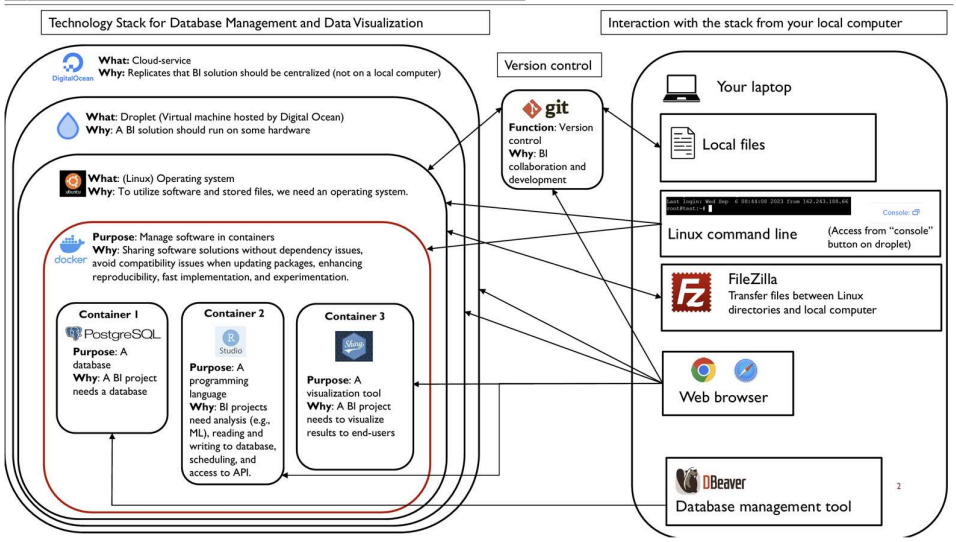
Connect postgress sql to network:

docker network connect db_r_shiny postgres

```
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker network connect db_r_shiny postgres
```

Inspect the network:

docker network inspect db_r_shiny



Images-Docker

A **Docker image** is like a **recipe** or **blueprint**.

It contains **everything needed to run a program**, such as:

- the application code,
- libraries,
- dependencies,
- and settings.

A **container** is basically the **environment where your application actually runs.**

You can use the same image to create many running copies → called **containers**.

Analogy

- **Image = Cake recipe** 🍰
- **Container = Actual cake** 🎂
  - You can bake many cakes (containers) from one recipe (image).

Inspect Image

(docker image ls)

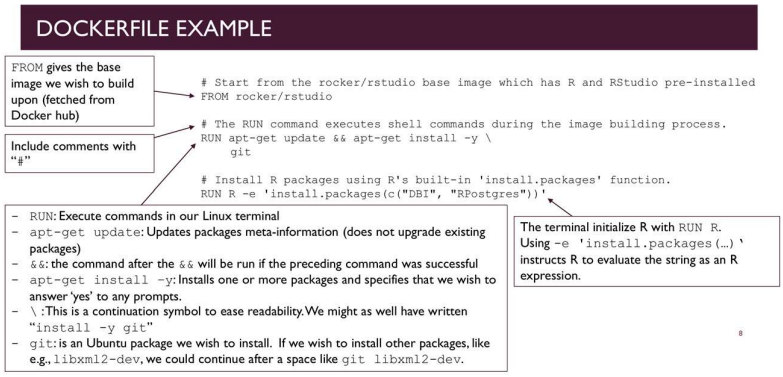
```
*** System restart required ***
root@ubuntu-s-1vcpu-1gb-fra1-01:~# docker image ls
REPOSITORY       TAG       IMAGE ID       CREATED         SIZE
postgres         latest    47fa19484031   2 days ago      454MB
hello-world      latest    1b44b5a3e06a   4 weeks ago     10.1kB
rocker/shiny     latest    26a63566fbca   2 months ago    1.64GB
rocker/rstudio   latest    35c3cf057620   2 months ago    2.32GB
root@ubuntu-s-1vcpu-1gb-fra1-01:~#
```

docker rmi repository:TAG

Removes an image – remember to specify the TAG of the image

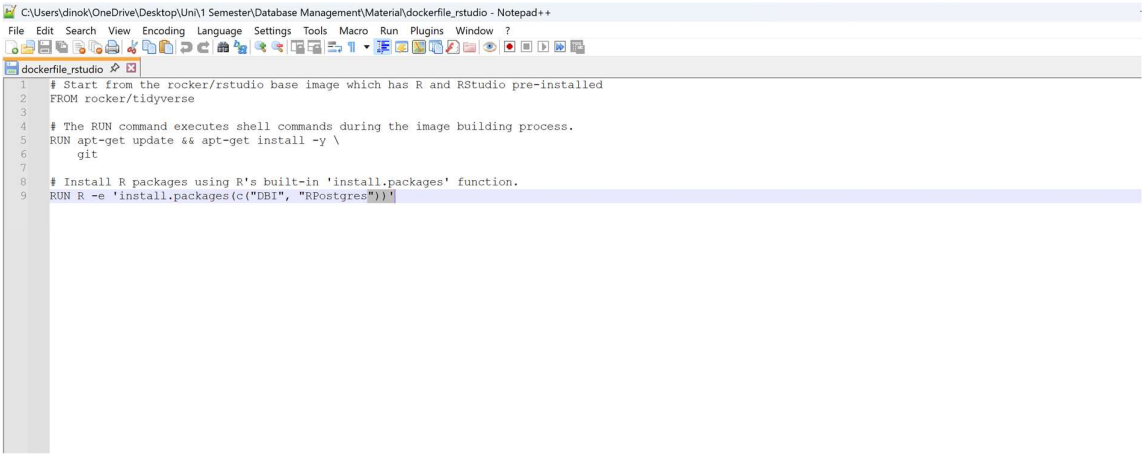
Dockerfile:

- A Dockerfile is just a recipe (text file) that tells Docker how to build an image.
- Each line in the Dockerfile is one instruction (like “add ingredients” or “turn on the oven”).
- Docker reads it top to bottom and creates the image step by step.

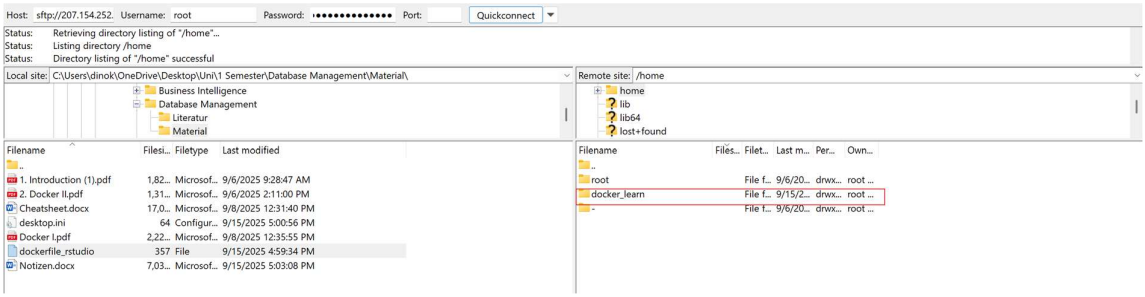


Build Images from Dockerfile

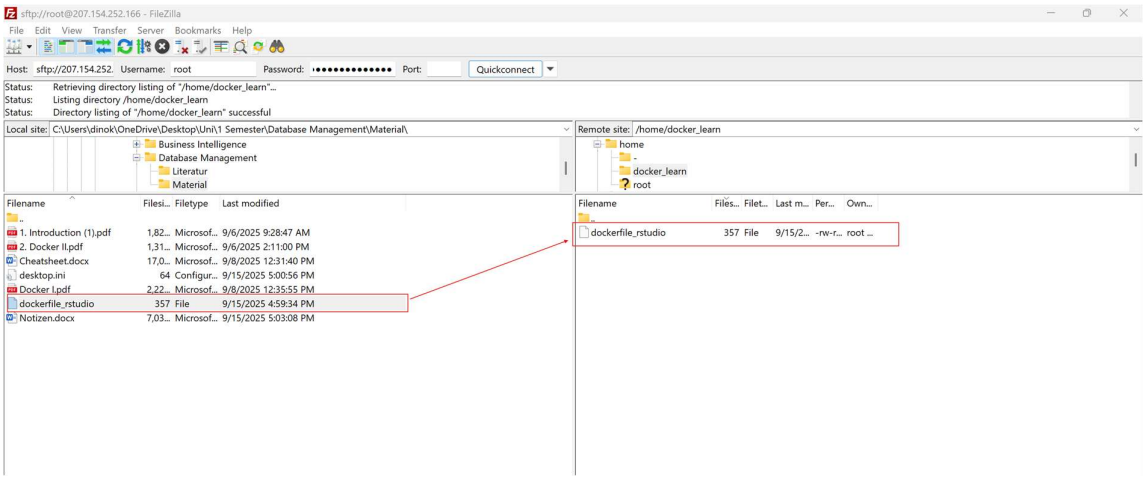
We have the file dockerfile_rstudio



Create a file on remote environment right click mouse



Drag and drop the file from your local environment to the remote environment



Change the cd to where the file is located

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls -l
total 60
lrwxrwxrwx   1 root root     7 Apr  9 12:06 bin -> usr/bin
drwxr-xr-x   5 root root  4096 Sep  4 06:49 boot
drwxr-xr-x  18 root root  3920 Sep  3 10:44 dev
drwxr-xr-x 117 root root  4096 Sep 12 06:23 etc
drwxr-xr-x   5 root root  4096 Sep  6 12:44 home
lrwxrwxrwx   1 root root     7 Apr  9 12:06 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Apr  9 12:06 lib64 -> usr/lib64
drwx------   2 root root 16384 Jul  1 19:57 lost+found
drwxr-xr-x   2 root root  4096 Jul  1 19:54 media
drwxr-xr-x   2 root root  4096 Jul  1 19:54 mnt
drwxr-xr-x   4 root root  4096 Sep  3 12:40 opt
dr-xr-xr-x 186 root root     0 Sep  3 10:44 proc
drwx------   6 root root  4096 Sep 15 08:52 root
drwxr-xr-x  34 root root  1060 Sep 15 15:12 run
lrwxrwxrwx   1 root root     8 Apr  9 12:06 sbin -> usr/sbin
drwxr-xr-x   2 root root  4096 Sep  3 10:44 snap
drwxr-xr-x   2 root root  4096 Jul  1 19:54 srv
dr-xr-xr-x  13 root root     0 Sep  6 06:51 sys
drwxrwxrwt   6 root root   120 Sep 15 14:56 tmp
drwxr-xr-x  12 root root  4096 Sep  6 07:35 usr
drwxr-xr-x  13 root root  4096 Sep  3 10:44 var
root@ubuntu-s-1vcpu-1gb-fra1-01:/# cd home
root@ubuntu-s-1vcpu-1gb-fra1-01:/home# ls -l
total 12
drwxr-xr-x 2 root root 4096 Sep  6 12:44 -
drwxr-xr-x 2 root root 4096 Sep 15 15:05 docker_learn
drwxr-xr-x 3 root root 4096 Sep  6 09:10 root
root@ubuntu-s-1vcpu-1gb-fra1-01:/home# cd docker_learn
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn#
```

To build the image run:

docker image build --tag rstudio:1.0.0 -f dockerfile_rstudio .

- docker image build: Initiate building of the image
- --tag rstudio:1.0.0: Gives the name and tag of the image ([name]:[tag])
- -f dockerfile_rstudio: Gives the name of the Dockerfile
- . : The „space-dot“ indicates that the dockerfile is to be found in your current directory

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker image build --tag rstudio:1.0.0 -f dockerfile_rstudio .
[+] Building 0.8s (7/7) FINISHED
 => [internal] load build definition from dockerfile_rstudio
 => => transferring dockerfile: 404B
 => [internal] load metadata for docker.io/rocker/tidyverse:latest
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [1/3] FROM docker.io/rocker/tidyverse:latest@sha256:6a7e93b235cbdbdf63ca81b11aa7e771cceb1d1b54b30dd8f92f560475155119
 => CACHED [2/3] RUN apt-get update && apt-get install -y  git
 => CACHED [3/3] RUN R -e 'install.packages(c("DBI", "RPostgres"))'
 => exporting to image
 => => exporting layers
 => => writing image sha256:a1cdaf05557396d579db6f6562db79706352397f24f3ae56da02aae4cd96d54b
 => => naming to docker.io/library/rstudio:1.0.0
```

Now run a container with the new image:
First delete the old container so we can create new container with the name r_studio (we cannot have two containers with the same name)
Delte container by:
docker rm -f rstudio

- -f is a flag that force the container to be stopped if it is running

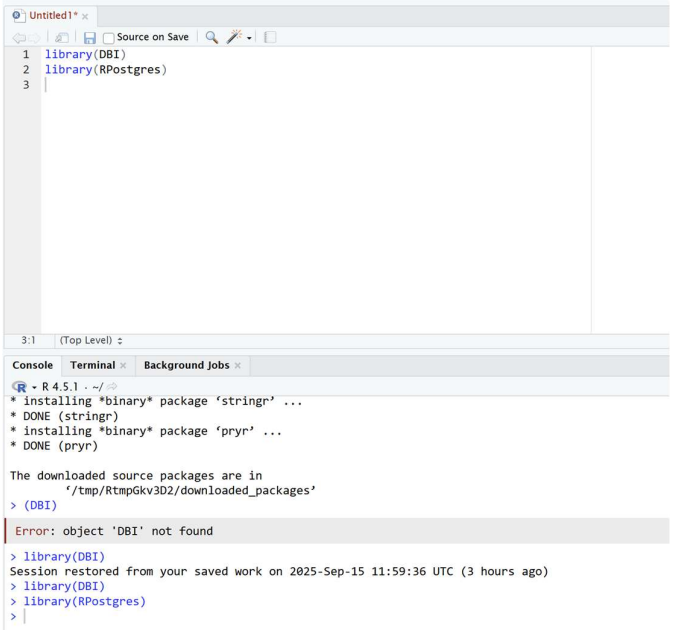
```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker ps
CONTAINER ID   IMAGE            COMMAND                  CREATED          STATUS          PORTS                                                  NAMES
55d33d268eec   rocker/rstudio   "/init"                  15 seconds ago   Up 14 seconds   0.0.0.0:8787->8787/tcp, [::]:8787->8787/tcp            rstudio
1b8cb674df93   postgres         "docker-entrypoint.s…"   9 days ago       Up 9 days       0.0.0.0:5432->5432/tcp, [::]:5432->5432/tcp            postgres
7e30e982ce93   rocker/shiny     "/init"                  9 days ago       Up 9 days       0.0.0.0:3838->3838/tcp, [::]:3838->3838/tcp            rshiny
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker rm -f rstudio
rstudio
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED      STATUS      PORTS                                                  NAMES
1b8cb674df93   postgres       "docker-entrypoint.s…"   9 days ago   Up 9 days   0.0.0.0:5432->5432/tcp, [::]:5432->5432/tcp            postgres
7e30e982ce93   rocker/shiny   "/init"                  9 days ago   Up 9 days   0.0.0.0:3838->3838/tcp, [::]:3838->3838/tcp            rshiny
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn#
```

We now build a new rstudio container using the image we just created:
docker run -d --network db_r_shiny -p 8787:8787 -e PASSWORD=xxxxxxxx --name rstudio -v rstudio_data:/home/rstudio rstudio:1.0.0

- --network db_r_shiny: This option connects your container to the bridge network db_r_shiny
- -v rstudio_data:/home/rstudio
  This is the shared volume
- Rstudio:1.0.0 is the name of the image we created above

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED      STATUS      PORTS                                                  NAMES
1b8cb674df93   postgres       "docker-entrypoint.s…"   9 days ago   Up 9 days   0.0.0.0:5432->5432/tcp, [::]:5432->5432/tcp            postgres
7e30e982ce93   rocker/shiny   "/init"                  9 days ago   Up 9 days   0.0.0.0:3838->3838/tcp, [::]:3838->3838/tcp            rshiny
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker run -d --network db_r_shiny -p 8787:8787 -e PASSWORD=gArfield_13_11_2001G --name rstudio -v rstudio_data:/home/rstudio rstudio:1.0.0
47a6295d8f4b868f13b94c85f55ac64647c96a460a8741a6cdb07ba47f5dedb9
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED         STATUS         PORTS                                                  NAMES
47a6295d8f4b   rstudio:1.0.0  "/init"                  22 seconds ago  Up 22 seconds  0.0.0.0:8787->8787/tcp, [::]:8787->8787/tcp            rstudio
1b8cb674df93   postgres       "docker-entrypoint.s…"   9 days ago      Up 9 days      0.0.0.0:5432->5432/tcp, [::]:5432->5432/tcp            postgres
7e30e982ce93   rocker/shiny   "/init"                  9 days ago      Up 9 days      0.0.0.0:3838->3838/tcp, [::]:3838->3838/tcp            rshiny
```

Now when we go to r we can just library(DBI) and library(RPostgres) as we have already installed the packages while creating the image with the file

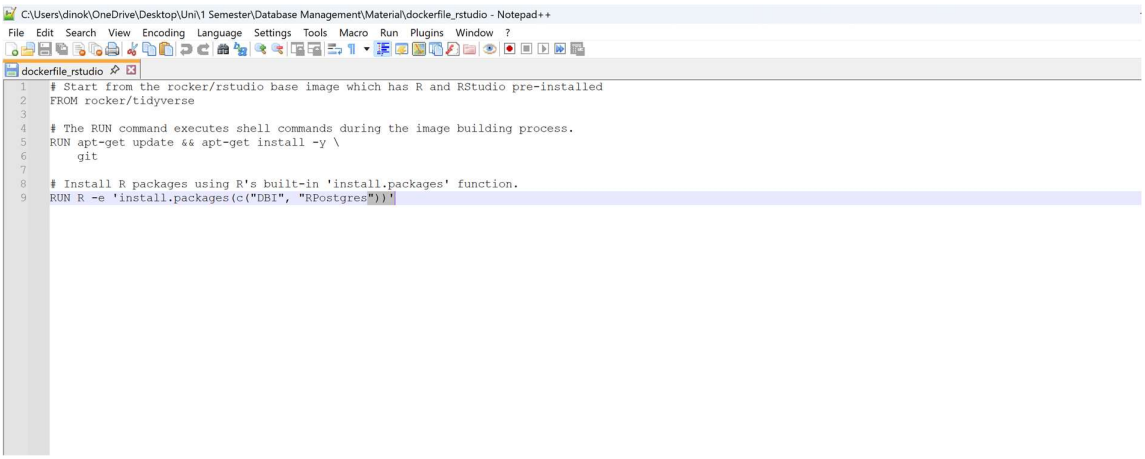


To upload a new image from dockerfile always needs to delete the container
Typically, Images are distributed through Docker hub
Build an Image from dockerfile as .tar file

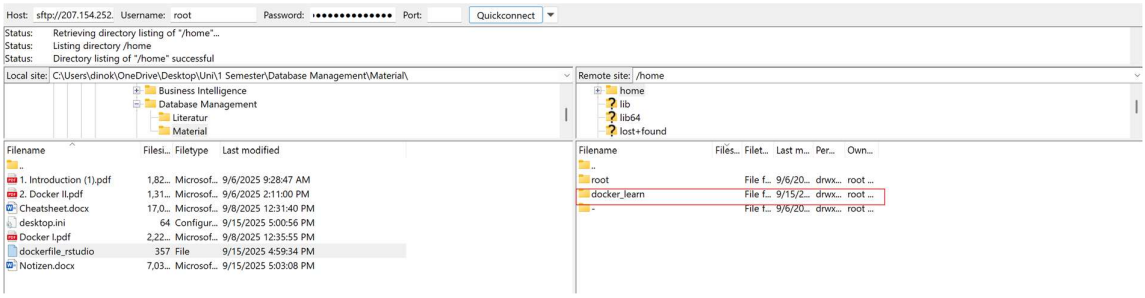
First we need to build an Image again if we haven't done so yet if we already have an Image created skip down to part "Then save image as tar by running "

Build Images from Dockerfile

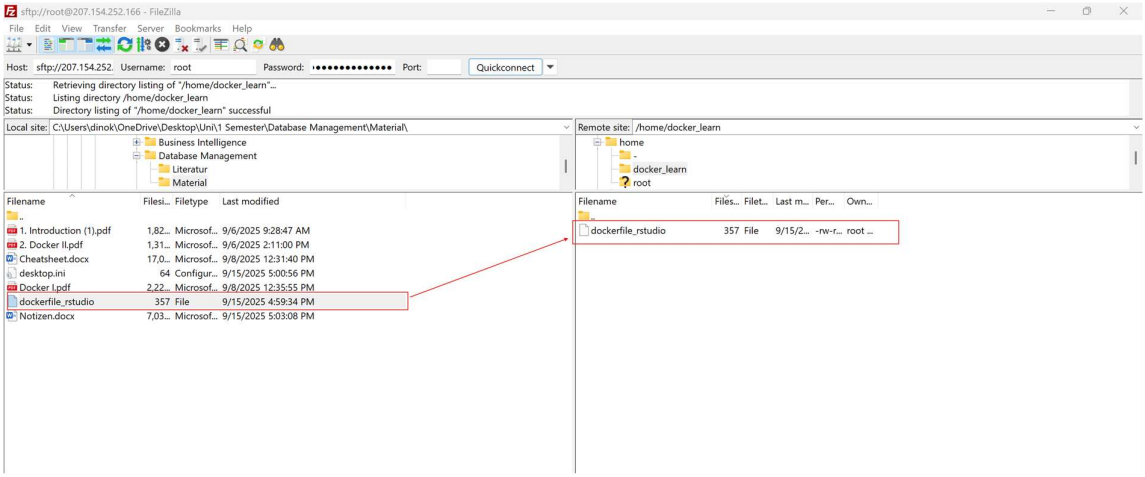
We have the file dockerfile_rstudio



Create a file on remote environment right click mouse



Drag and drop the file from your local environment to the remote environment



Change the cd to where the file is located

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls -l
total 60
lrwxrwxrwx   1 root root     7 Apr  9 12:06 bin -> usr/bin
drwxr-xr-x   5 root root  4096 Sep  4 06:49 boot
drwxr-xr-x  18 root root  3920 Sep  3 10:44 dev
drwxr-xr-x 117 root root  4096 Sep 12 06:23 etc
drwxr-xr-x   5 root root  4096 Sep  6 12:44 home
lrwxrwxrwx   1 root root     7 Apr  9 12:06 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Apr  9 12:06 lib64 -> usr/lib64
drwx------   2 root root 16384 Jul  1 19:57 lost+found
drwxr-xr-x   2 root root  4096 Jul  1 19:54 media
drwxr-xr-x   2 root root  4096 Jul  1 19:54 mnt
drwxr-xr-x   4 root root  4096 Sep  3 12:40 opt
dr-xr-xr-x 186 root root     0 Sep  3 10:44 proc
drwx------   6 root root  4096 Sep 15 08:52 root
drwxr-xr-x  34 root root  1060 Sep 15 15:12 run
lrwxrwxrwx   1 root root     8 Apr  9 12:06 sbin -> usr/sbin
drwxr-xr-x   2 root root  4096 Sep  3 10:44 snap
drwxr-xr-x   2 root root  4096 Jul  1 19:54 srv
dr-xr-xr-x  13 root root     0 Sep  6 06:51 sys
drwxrwxrwt   6 root root   120 Sep 15 14:56 tmp
drwxr-xr-x  12 root root  4096 Sep  6 07:35 usr
drwxr-xr-x  13 root root  4096 Sep  3 10:44 var
root@ubuntu-s-1vcpu-1gb-fra1-01:/# cd home
root@ubuntu-s-1vcpu-1gb-fra1-01:/home# ls -l
total 12
drwxr-xr-x 2 root root 4096 Sep  6 12:44 -
drwxr-xr-x 2 root root 4096 Sep 15 15:05 docker_learn
drwxr-xr-x 3 root root 4096 Sep  6 09:10 root
root@ubuntu-s-1vcpu-1gb-fra1-01:/home# cd docker_learn
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn#
```

To build the image run:
docker image build --tag rstudio:1.0.0 -f dockerfile_rstudio .

- docker image build: Initiate building of the image
- --tag rstudio:1.0.0: Gives the name and tag of the image ([name]:[tag])
- -f dockerfile_rstudio: Gives the name of the Dockerfile
- . : The „space-dot“ indicates that the dockerfile is to be found in your current directory

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker image build --tag rstudio:1.0.0 -f dockerfile_rstudio .
[+] Building 0.8s (7/7) FINISHED
 => [internal] load build definition from dockerfile_rstudio
 => => transferring dockerfile: 404B
 => [internal] load metadata for docker.io/rocker/tidyverse:latest
 => [internal] load .dockerignore
 => => transferring context: 2B
 => [1/3] FROM docker.io/rocker/tidyverse:latest@sha256:6a7e93b235cbdbdf63ca81b11aa7e771cceb1d1b54b30dd8f92f560475155119
 => CACHED [2/3] RUN apt-get update && apt-get install -y  git
 => CACHED [3/3] RUN R -e 'install.packages(c("DBI", "RPostgres"))'
 => exporting to image
 => => exporting layers
 => => writing image sha256:a1cdaf05557396d579db6f6562db79706352397f24f3ae56da02aae4cd96d54b
 => => naming to docker.io/library/rstudio:1.0.0
```

(when going to R and writing library the packages are not yet installed for that to be the case we need to run the container first)

Then go to the path were the file should be saved in this case docker_learn

cd docker_learn

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls -l
total 60
lrwxrwxrwx   1 root root     7 Apr  9 12:06 bin -> usr/bin
drwxr-xr-x   5 root root  4096 Sep  4 06:49 boot
drwxr-xr-x  18 root root  3920 Sep  3 10:44 dev
drwxr-xr-x 117 root root  4096 Sep 12 06:23 etc
drwxr-xr-x   5 root root  4096 Sep  6 12:44 home
lrwxrwxrwx   1 root root     7 Apr  9 12:06 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Apr  9 12:06 lib64 -> usr/lib64
drwx------   2 root root 16384 Jul  1 19:57 lost+found
drwxr-xr-x   2 root root  4096 Jul  1 19:54 media
drwxr-xr-x   2 root root  4096 Jul  1 19:54 mnt
drwxr-xr-x   4 root root  4096 Sep  3 12:40 opt
dr-xr-xr-x 191 root root     0 Sep  3 10:44 proc
drwx------   6 root root  4096 Sep 15 08:52 root
drwxr-xr-x  34 root root  1060 Sep 15 17:50 run
lrwxrwxrwx   1 root root     8 Apr  9 12:06 sbin -> usr/sbin
drwxr-xr-x   2 root root  4096 Sep  3 10:44 snap
drwxr-xr-x   2 root root  4096 Jul  1 19:54 srv
dr-xr-xr-x  13 root root     0 Sep  6 06:51 sys
drwxrwxrwt   6 root root   120 Sep 15 17:41 tmp
drwxr-xr-x  12 root root  4096 Sep  6 07:35 usr
drwxr-xr-x  13 root root  4096 Sep  3 10:44 var
root@ubuntu-s-1vcpu-1gb-fra1-01:/# cd home
root@ubuntu-s-1vcpu-1gb-fra1-01:/home# ls -l
total 12
drwxr-xr-x 2 root root 4096 Sep  6 12:44 -
drwxr-xr-x 2 root root 4096 Sep 15 17:48 docker_learn
drwxr-xr-x 3 root root 4096 Sep  6 09:10 root
root@ubuntu-s-1vcpu-1gb-fra1-01:/home# cd docker_learn
```

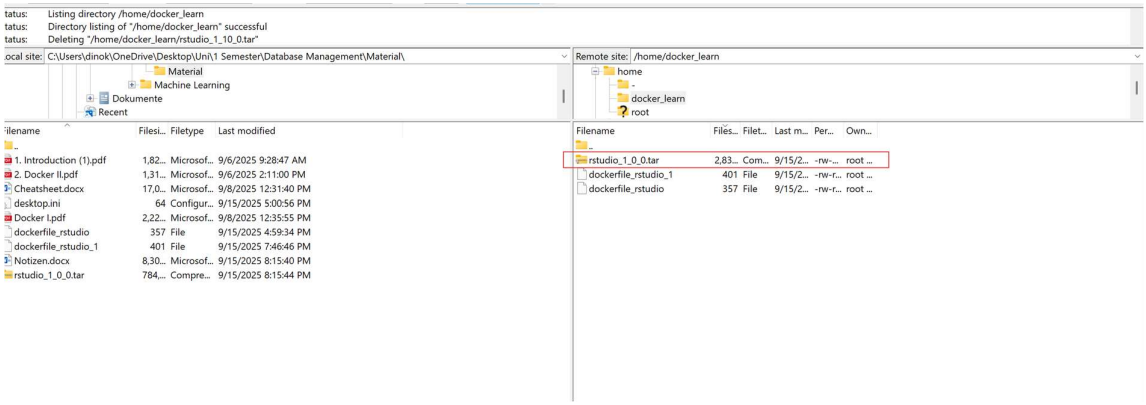
Then save image as tar by running

docker save -o rstudio_1_0_0.tar rstudio:1.0.0

- rstudio_1_0_0.tar is the name the new file is gonna be given
- rstudio:1.0.0 is the image that will be saved as tar

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker save -o rstudio_1_0_0.tar rstudio:1.0.0
```

Check FileZilla



Then load the image by running

docker load -i /path/to/your-image-file.tar

- **-i** = input file (the tarball containing your image).

- If you are already in the same directory as myimage.tar, you don't need the full path — just the filename.

First go to the path were the file is saved in this case docker_learn
cd docker_learn

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/# ls -l
total 60
lrwxrwxrwx   1 root root     7 Apr  9 12:06 bin -> usr/bin
drwxr-xr-x   5 root root  4096 Sep  4 06:49 boot
drwxr-xr-x  18 root root  3920 Sep  3 10:44 dev
drwxr-xr-x 117 root root  4096 Sep 12 06:23 etc
drwxr-xr-x   5 root root  4096 Sep  6 12:44 home
lrwxrwxrwx   1 root root     7 Apr  9 12:06 lib -> usr/lib
lrwxrwxrwx   1 root root     9 Apr  9 12:06 lib64 -> usr/lib64
drwx------   2 root root 16384 Jul  1 19:57 lost+found
drwxr-xr-x   2 root root  4096 Jul  1 19:54 media
drwxr-xr-x   2 root root  4096 Jul  1 19:54 mnt
drwxr-xr-x   4 root root  4096 Sep  3 12:40 opt
dr-xr-xr-x 191 root root     0 Sep  3 10:44 proc
drwx------   6 root root  4096 Sep 15 08:52 root
drwxr-xr-x  34 root root  1060 Sep 15 17:50 run
lrwxrwxrwx   1 root root     8 Apr  9 12:06 sbin -> usr/sbin
drwxr-xr-x   2 root root  4096 Sep  3 10:44 snap
drwxr-xr-x   2 root root  4096 Jul  1 19:54 srv
dr-xr-xr-x  13 root root     0 Sep  6 06:51 sys
drwxrwxrwt   6 root root   120 Sep 15 17:41 tmp
drwxr-xr-x  12 root root  4096 Sep  6 07:35 usr
drwxr-xr-x  13 root root  4096 Sep  3 10:44 var
root@ubuntu-s-1vcpu-1gb-fra1-01:/# cd home
root@ubuntu-s-1vcpu-1gb-fra1-01:/home# ls -l
total 12
drwxr-xr-x 2 root root 4096 Sep  6 12:44 -
drwxr-xr-x 2 root root 4096 Sep 15 17:48 docker_learn
drwxr-xr-x 3 root root 4096 Sep  6 09:10 root
root@ubuntu-s-1vcpu-1gb-fra1-01:/home# cd docker_learn
```

Now run a container with the new image:
First delete the old container so we can create new container with the name r_studio

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker stop rstudio
rstudio
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker rm rstudio
rstudio
```

Then remove the old image which we was saved as tar

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker rmi rstudio:1.0.0
Untagged: rstudio:1.0.0
Deleted: sha256:d82d32f5006405d1b6c7c102ff25eb49d54670442a3aad75e2eee51383b5dae0
```

Now load an Image from the tar file using
docker load -i /path/to/your-image-file.tar

- If we are in the input files directory, we do not need to specify the path, only the filename in this case: docker load -i rstudio_1_0_0.tar

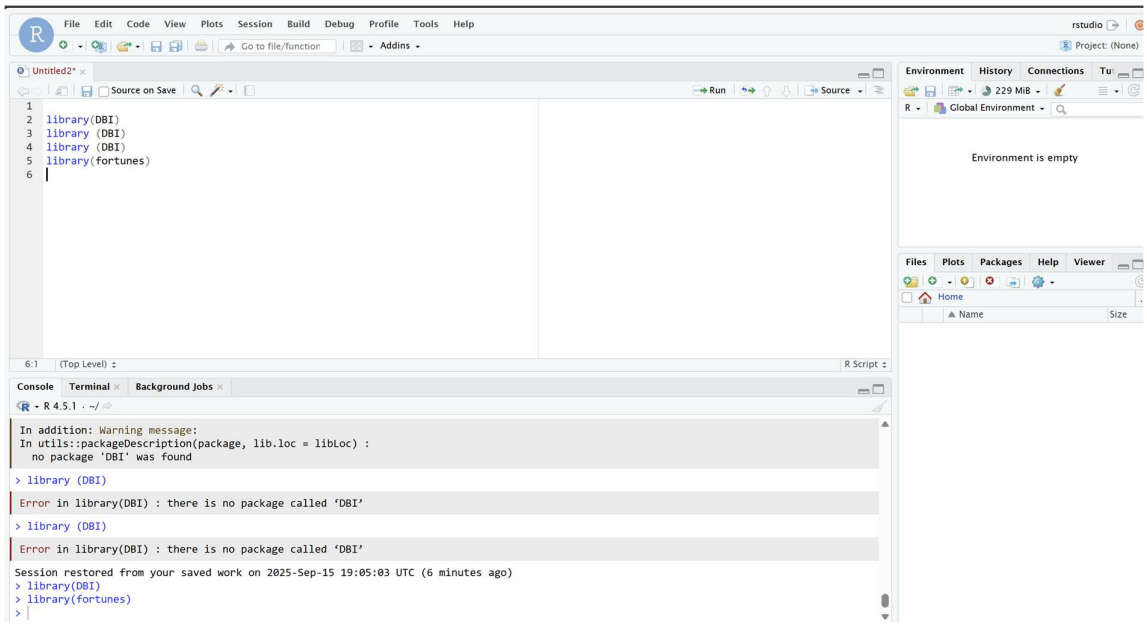
```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker load -i rstudio_1_0_0.tar
Loaded image: rstudio:1.0.0
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker image ls
REPOSITORY       TAG       IMAGE ID       CREATED             SIZE
rstudio          1.0.0     d82d32f50064   11 minutes ago      2.81GB
rstudio          1.0.1     81724e39a678   About an hour ago   2.82GB
postgres         latest    47fa19484031   11 days ago         454MB
hello-world      latest    1b44b5a3e06a   5 weeks ago         10.1kB
rocker/shiny     latest    26a63566fbca   3 months ago        1.64GB
rocker/rstudio   latest    35c3cf057620   3 months ago        2.32GB
```

We now build a new rstudio container using the image we just created:
docker run -d --network db_r_shiny -p 8787:8787 -e PASSWORD=xxxxxxx --name rstudio -v rstudio_data:/home/rstudio rstudio:1.0.0

- --network db_r_shiny: This option connects your container to the bridge network db_r_shiny
- Rstudio:1.0.0 is the name of the image we created above

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker run -d --network db_r_shiny -p 8787:8787 -e PASSWORD=gArfield_13_11_2001G --name rstudio -v rstudio_data:/home/rstudio rstudio:1.0.0
013f3b0fe49fd98481ed4ff63439134348d8c2fc18e1f4bb32043e3d5a628ed8
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker ps -a
CONTAINER ID   IMAGE             COMMAND                  CREATED          STATUS          PORTS                                       NAMES
013f3b0fe49f   rstudio:1.0.0     "/init"                  18 seconds ago   Up 18 seconds   0.0.0.0:8787->8787/tcp, [::]:8787->8787/tcp   rstudio
1b8cb674df93   postgres          "docker-entrypoint.s…"   9 days ago       Up 9 days       0.0.0.0:5432->5432/tcp, [::]:5432->5432/tcp   postgres
7e30e982ce93   rocker/shiny      "/init"                  9 days ago       Up 9 days       0.0.0.0:3838->3838/tcp, [::]:3838->3838/tcp   rshiny
```

Now check R to see if it worked



SAVE IMAGE TO .TAR FILE

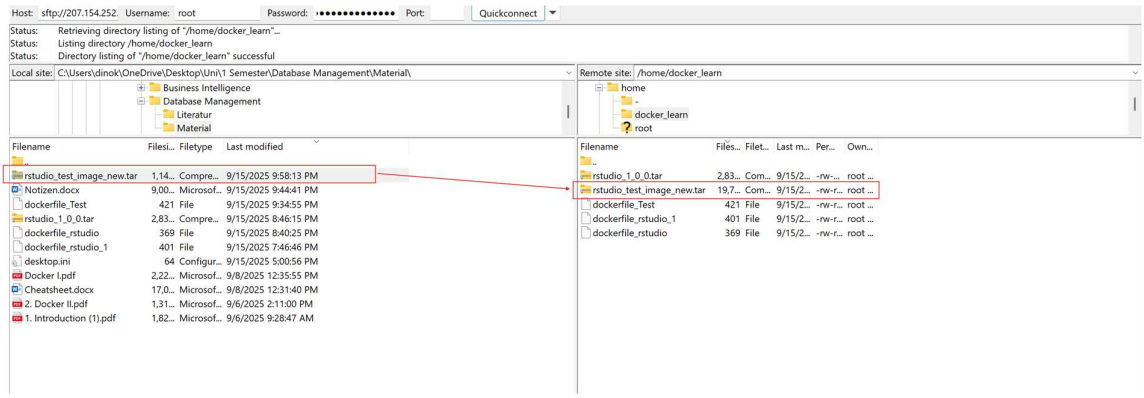
docker save -o rstudio_1_0_0.tar rstudio:1.0.0

- rstudio_1_0_0.tar is the name the new file is gonna be given
- rstudio:1.0.0 is the image that will be saved as tar

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker save -o rstudio_1_0_0.tar rstudio:1.0.0
```

Loading Data from extern .Tar file (extern docker image)

First download the .tar and drag and drop it from local machine to remote machine



Now load an Image from the tar file using

docker load -i /path/to/your-image-file.tar

- If we are in the input files directory, we do not need to specify the path, only the filename in this case: docker load -i rstudio_test_image_new.tar

The image will be created automatically rstudio_test_image

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker load -i rstudio_test_image_new.tar
Loaded image: rstudio_test_image:latest
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker image ls
REPOSITORY           TAG       IMAGE ID       CREATED             SIZE
rstudio_test_image   latest    491805f23105   41 minutes ago      2.83GB
rstudio              1.0.0     d82d32f50064   About an hour ago   2.81GB
rstudio              1.0.1     81724e39a678   2 hours ago         2.82GB
postgres             latest    47fa19484031   11 days ago         454MB
hello-world          latest    1b44b5a3e06a   5 weeks ago         10.1kB
rocker/shiny         latest    26a63566fbca   3 months ago        1.64GB
rocker/rstudio       latest    35c3cf057620   3 months ago        2.32GB
```

This does not install packages or anything in R for that we need to restart the container

Delte container by:

docker rm -f rstudio

- -f is a flag that force the container to be stopped if it is running

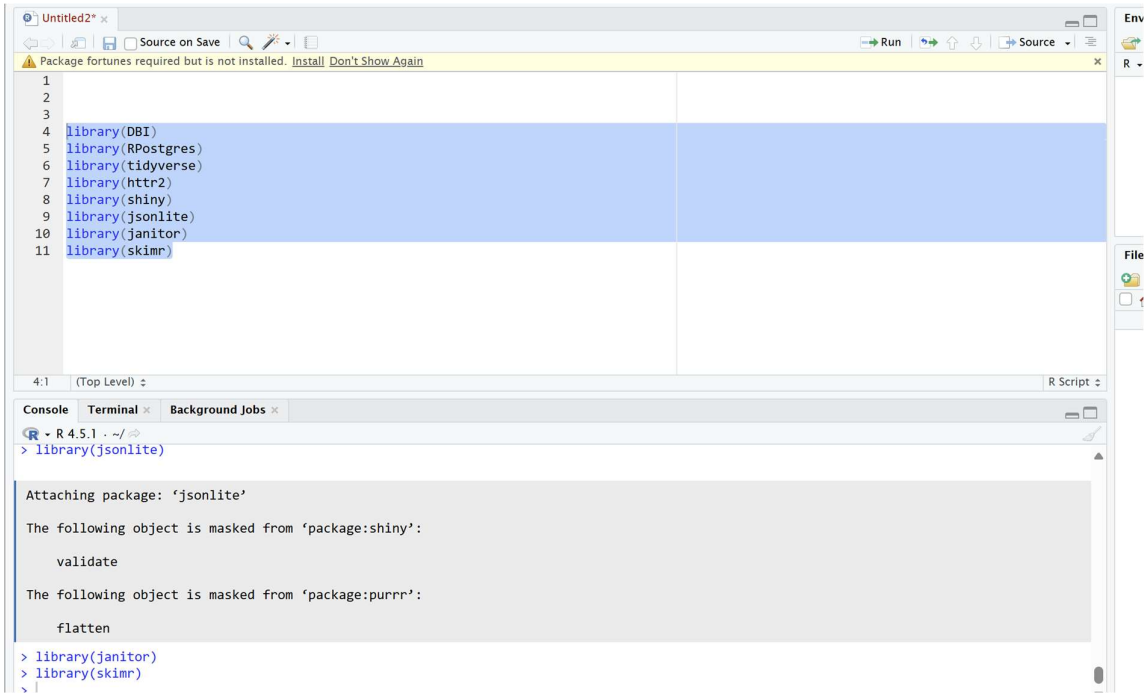
```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker rm -f rstudio
rstudio
```

docker run -d --network db_r_shiny -p 8787:8787 -e PASSWORD=xxxxxxx --name rstudio -v rstudio_data:/home/rstudio rstudio_test_image

- --network db_r_shiny: This option connects your container to the bridge network db_r_shiny
- rstudio_test_image is the name of the image we created above

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker run -d --network db_r_shiny -p 8787:8787 -e PASSWORD=gArfield_13_11_2001G --name
 rstudio -v rstudio_data:/home/rstudio rstudio_test_image
986726c27a4e3e4f937639e51e149c37d7e8137dfcea393ab2894cd7bfdfe41a
```

Check R



Dangling:

- Whenbuilding an image with a name and tag similar to an existing image (e.g. rstudio:1.0.0), the old image will be ”dangling”.
- A dangling image is an image that has no tag, and where no containers are referencing (using) the image
- To remove dangling image:
  docker image prune

```
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn# docker image prune
WARNING! This will remove all dangling images.
Are you sure you want to continue? [y/N] y
Total reclaimed space: 0B
root@ubuntu-s-1vcpu-1gb-fra1-01:/home/docker_learn#
```

➔ goal to free up disk space

docker switch passcode of postgres:
Option 1: Reset the password without removing data
If you want to keep your data, you can change the password from inside the container:

docker exec -it <container_name> psql -U postgres

Then in the Postgres prompt:

ALTER USER postgres WITH PASSWORD ‘xxxxxxxxxxx’;
\q