

# EPAM University Programs

## DevOps external course

### Module 2 Virtualization and Cloud Basic

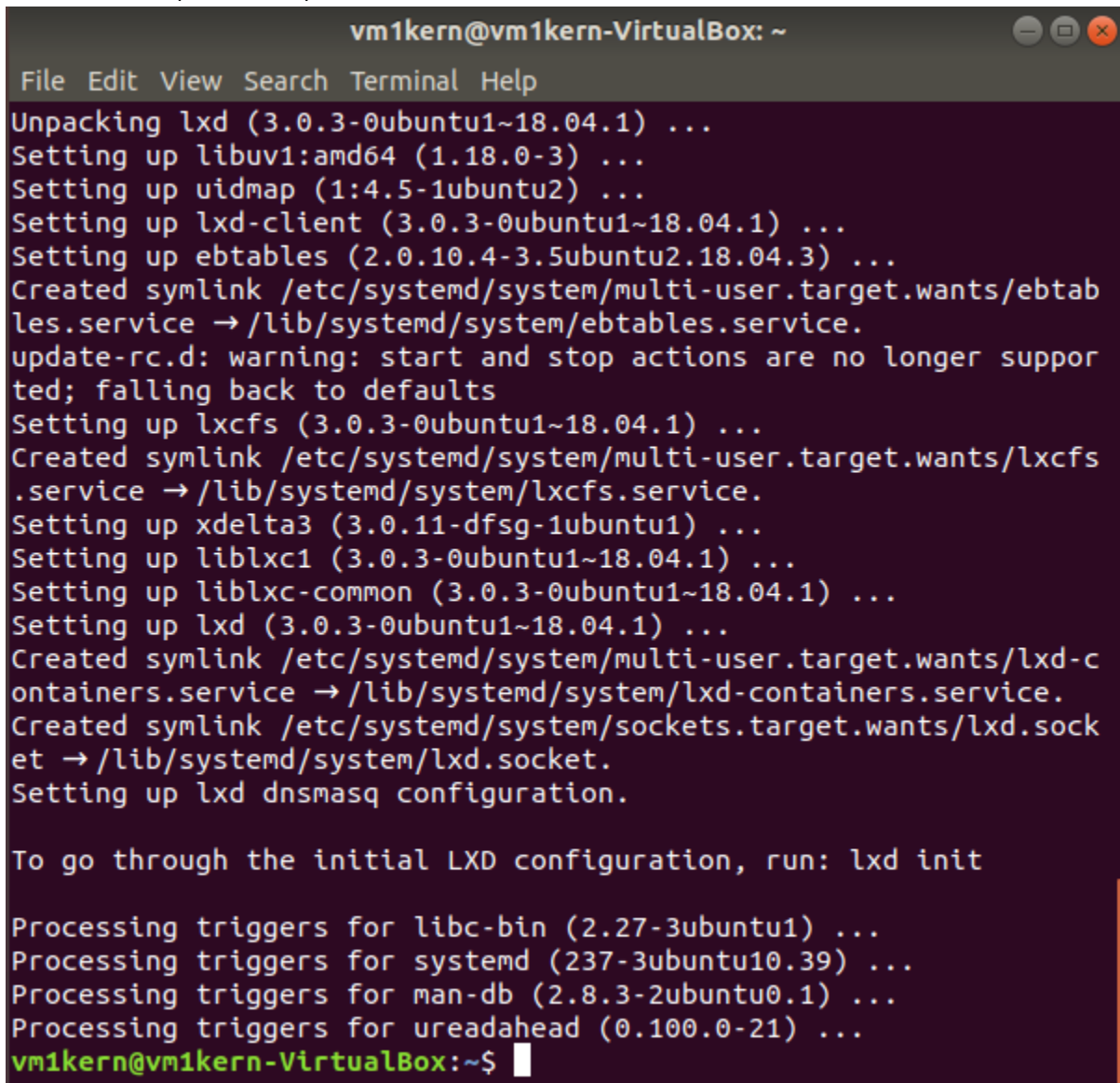
#### TASK 2.4

Работа с Ubuntu

Documentation - <https://help.ubuntu.com/its/serverguide/lxd.html>

<https://linuxcontainers.org/lxd/getting-started-cli/>

1. Установить lxc (screenshot)



```
vm1kern@vm1kern-VirtualBox: ~  
File Edit View Search Terminal Help  
Unpacking lxd (3.0.3-0ubuntu1~18.04.1) ...  
Setting up libuv1:amd64 (1.18.0-3) ...  
Setting up uidmap (1:4.5-1ubuntu2) ...  
Setting up lxd-client (3.0.3-0ubuntu1~18.04.1) ...  
Setting up ebttables (2.0.10.4-3.5ubuntu2.18.04.3) ...  
Created symlink /etc/systemd/system/multi-user.target.wants/ebtables.service → /lib/systemd/system/ebtables.service.  
update-rc.d: warning: start and stop actions are no longer supported; falling back to defaults  
Setting up lxcfs (3.0.3-0ubuntu1~18.04.1) ...  
Created symlink /etc/systemd/system/multi-user.target.wants/lxcfs.service → /lib/systemd/system/lxcfs.service.  
Setting up xdelta3 (3.0.11-dfsg-1ubuntu1) ...  
Setting up liblxc1 (3.0.3-0ubuntu1~18.04.1) ...  
Setting up liblxc-common (3.0.3-0ubuntu1~18.04.1) ...  
Setting up lxd (3.0.3-0ubuntu1~18.04.1) ...  
Created symlink /etc/systemd/system/multi-user.target.wants/lxd-containers.service → /lib/systemd/system/lxd-containers.service.  
Created symlink /etc/systemd/system/sockets.target.wants/lxd.socket → /lib/systemd/system/lxd.socket.  
Setting up lxd dnsmasq configuration.  
  
To go through the initial LXD configuration, run: lxd init  
  
Processing triggers for libc-bin (2.27-3ubuntu1) ...  
Processing triggers for systemd (237-3ubuntu10.39) ...  
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...  
Processing triggers for ureadahead (0.100.0-21) ...  
vm1kern@vm1kern-VirtualBox:~$
```

2. Запустить lxc launch для любой из версий Ubuntu (screenshot)

```
vm1kern@vm1kern-VirtualBox: ~
File Edit View Search Terminal Help
vm1kern@vm1kern-VirtualBox:~$ lxc launch ubuntu:xenial x1
Creating x1
Starting x1
vm1kern@vm1kern-VirtualBox:~$
```

3. По окончании загрузки убедиться, что машина стартовала lxcist(screenshot)

```
vm1kern@vm1kern-VirtualBox:~$ lxc list
+-----+-----+-----+-----+-----+
| NAME | STATE | IPV4 | IPV6 | TYPE | SNAPSHOTS |
+-----+-----+-----+-----+-----+
| x1 | RUNNING | 10.185.172.82 (eth0) | fd42:8b27:f090:1040:216:3eff:fe98:cecb (eth0) | PERSISTENT | 0 |
+-----+-----+-----+-----+-----+
```

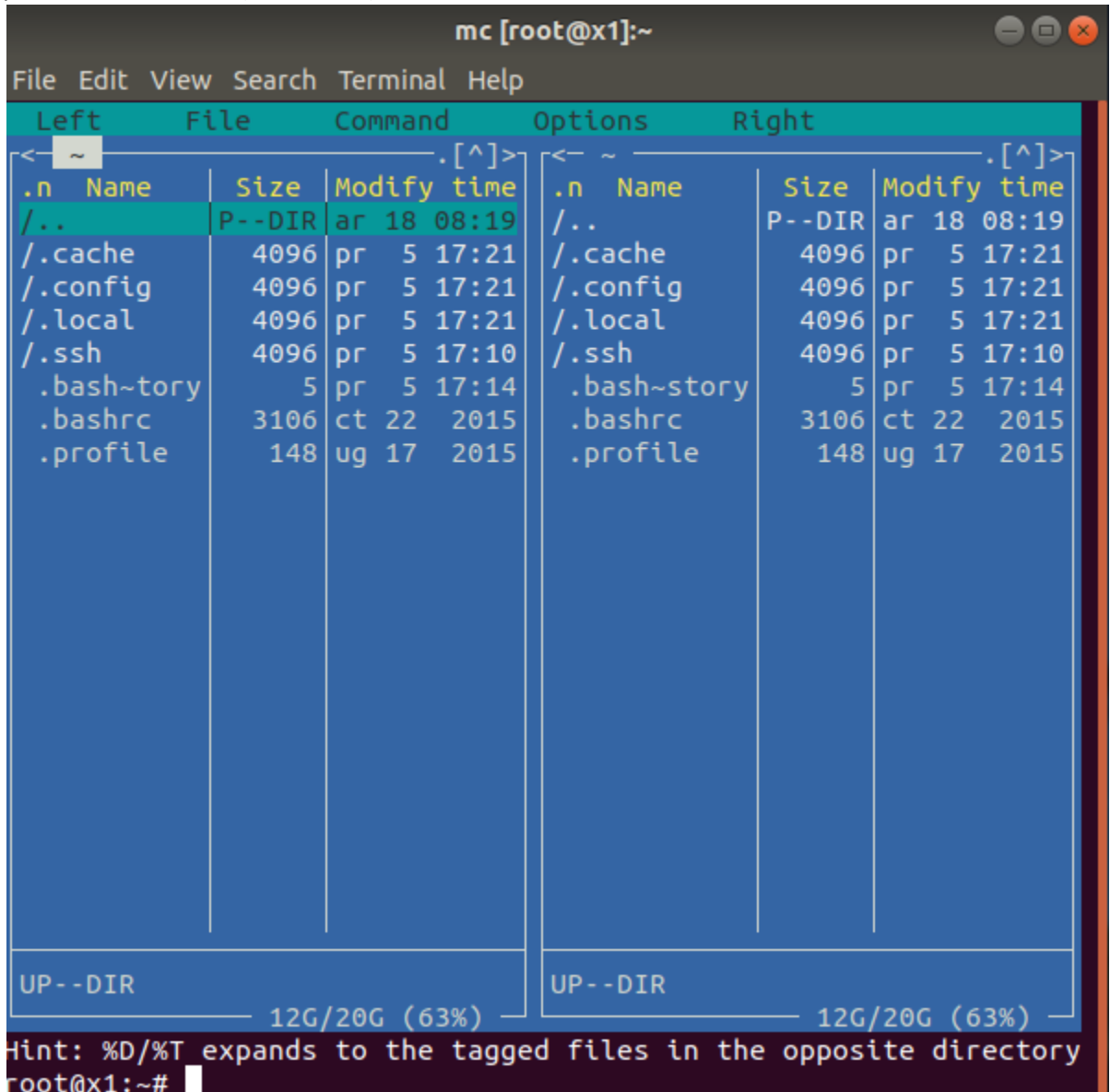
4. Зайдите в контейнер с командной строкой bash /bin/bash(screenshot)

```
root@x1: ~
File Edit View Search Terminal Help
vm1kern@vm1kern-VirtualBox:~$ bash /bin/bash
/bin/bash: /bin/bash: cannot execute binary file
vm1kern@vm1kern-VirtualBox:~$ lxc exec x1 bash
root@x1:~#
```

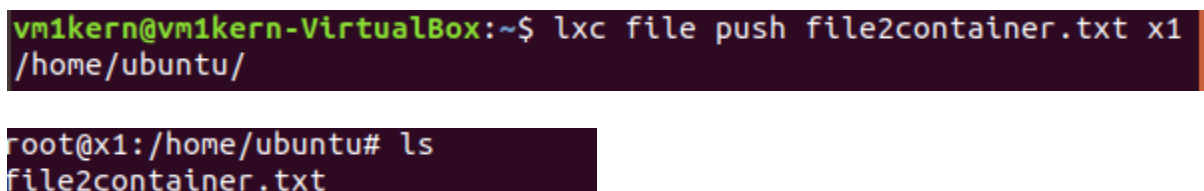
5. Запустите обновление apt-get update (screenshot)

```
root@x1: ~
File Edit View Search Terminal Help
root@x1:~# apt-get update
Hit:1 http://archive.ubuntu.com/ubuntu xenial InRelease
Get:2 http://archive.ubuntu.com/ubuntu xenial-updates InRelease [109 kB]
Get:3 http://security.ubuntu.com/ubuntu xenial-security InRelease [109 kB]
Get:4 http://archive.ubuntu.com/ubuntu xenial-backports InRelease [107 kB]
Get:5 http://archive.ubuntu.com/ubuntu xenial/universe amd64 Packages [7532 kB]
Get:6 http://security.ubuntu.com/ubuntu xenial-security/main amd64 Packages [841 kB]
```

6. Установите (apt-getinstall) любую программу в контейнер. Например mc. Проверьте работоспособность. (screenshot)



7. Загрузите в контейнер файл(screenshot)



и скачайте с контейнера другой файл(screenshot).

```
vm1kern@vm1kern-VirtualBox:~$ lxc file pull x1/home/ubuntu/file2host.txt .
vm1kern@vm1kern-VirtualBox:~$ ls
Desktop      examples.desktop  Music          Templates
Documents    file2container.txt Pictures        Videos
Downloads    file2host.txt     Public
```

Работа с Docker в Ubuntu

Documentation - <https://www.digitalocean.com/community/tutorials/how-to-install-and-use-docker-on-ubuntu-18-04>

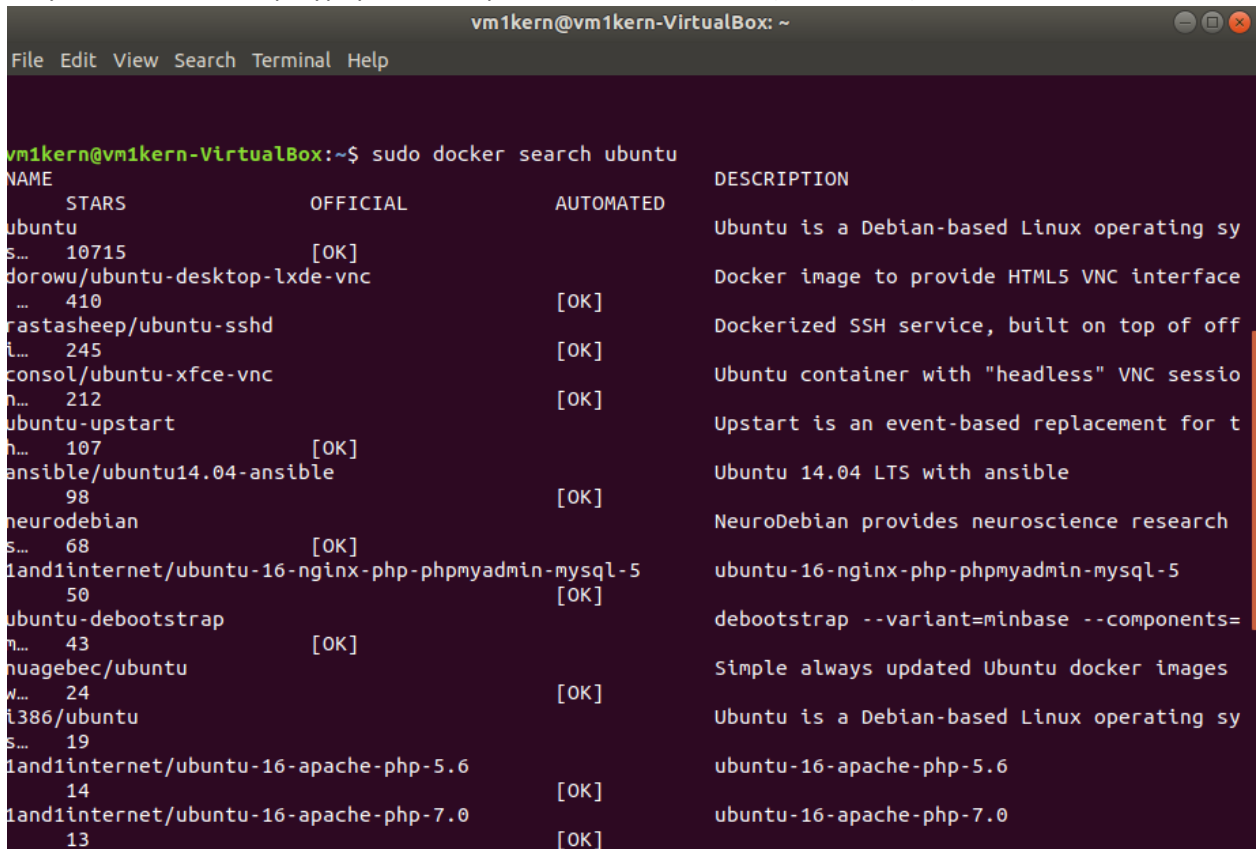
<https://docs.docker.com>

1. Установить docker (screenshot)

```
vm1kern@vm1kern-VirtualBox:~$ sudo systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enabled; v
   Active: active (running) since Sun 2020-04-05 22:06:22 EEST; 1
     Docs: https://docs.docker.com
  Main PID: 7386 (dockerd)
    Tasks: 8
   CGroup: /system.slice/docker.service
           └─7386 /usr/bin/dockerd -H fd:// --containerd=/run/con

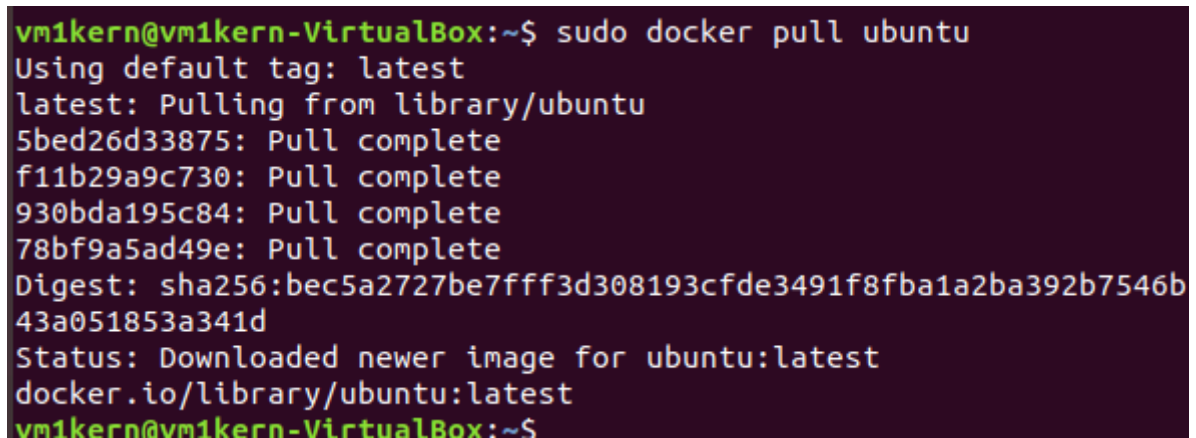
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
квi 05 22:06:22 vm1kern-VirtualBox systemd[1]: Started Docker App
квi 05 22:06:22 vm1kern-VirtualBox dockerd[7386]: time="2020-04-0
```

2. Запустить поиск сконфигурированных решений для “ubuntu”(screenshot)



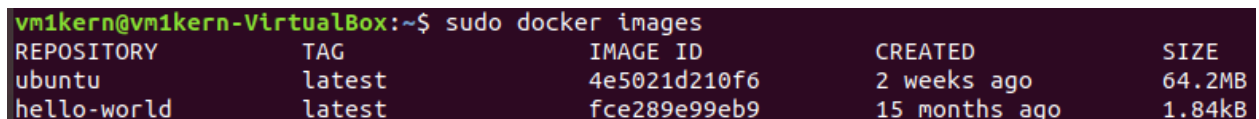
```
vm1kern@vm1kern-VirtualBox: ~  
File Edit View Search Terminal Help  
  
vm1kern@vm1kern-VirtualBox:~$ sudo docker search ubuntu  
NAME                STARS              OFFICIAL            AUTOMATED            DESCRIPTION  
ubuntu              10715              [OK]                  
s... 10715              [OK]                  
dorowu/ubuntu-desktop-lxde-vnc 410                [OK]                Docker image to provide HTML5 VNC interface  
... 410                [OK]                  
rastasheep/ubuntu-sshd 245                [OK]                Dockerized SSH service, built on top of off  
i... 245                [OK]                  
consol/ubuntu-xfce-vnc 212                [OK]                Ubuntu container with "headless" VNC sessio  
n... 212                [OK]                  
ubuntu-upstart      107                [OK]                Upstart is an event-based replacement for t  
n... 107                [OK]                  
ansible/ubuntu14.04-ansible 98                [OK]                Ubuntu 14.04 LTS with ansible  
neurodebian         68                [OK]                NeuroDebian provides neuroscience research  
s... 68                [OK]                  
1and1internet/ubuntu-16-nginx-php-phpmyadmin-mysql-5 50                [OK]                ubuntu-16-nginx-php-phpmyadmin-mysql-5  
ubuntu-debootstrap 43                [OK]                debootstrap --variant=minbase --components=  
n... 43                [OK]                  
nuagebec/ubuntu     24                [OK]                Simple always updated Ubuntu docker images  
w... 24                [OK]                  
i386/ubuntu         19                [OK]                Ubuntu is a Debian-based Linux operating sy  
s... 19                [OK]                  
1and1internet/ubuntu-16-apache-php-5.6 14                [OK]                ubuntu-16-apache-php-5.6  
1and1internet/ubuntu-16-apache-php-7.0 13                [OK]                ubuntu-16-apache-php-7.0
```

3. Скачать любой из образов на локальную машину.(screenshot)



```
vm1kern@vm1kern-VirtualBox:~$ sudo docker pull ubuntu  
Using default tag: latest  
latest: Pulling from library/ubuntu  
5bed26d33875: Pull complete  
f11b29a9c730: Pull complete  
930bda195c84: Pull complete  
78bf9a5ad49e: Pull complete  
Digest: sha256:bec5a2727be7fff3d308193cfde3491f8fba1a2ba392b7546b43a051853a341d  
Status: Downloaded newer image for ubuntu:latest  
docker.io/library/ubuntu:latest  
vm1kern@vm1kern-VirtualBox:~$
```

4. Запустить команду просмотра загруженных на компьютер образов.(screenshot)



```
vm1kern@vm1kern-VirtualBox:~$ sudo docker images  
REPOSITORY          TAG             IMAGE ID         CREATED          SIZE  
ubuntu              latest          4e5021d210f6    2 weeks ago     64.2MB  
hello-world         latest          fce289e99eb9    15 months ago   1.84kB
```

5. Запустите обновление apt-get update (screenshot)

```
Get:18 http://archive.ubuntu.com/ubuntu bionic-backports/universe a
md64 Packages [4247 B]
Fetched 17.7 MB in 6s (2930 kB/s)
Reading package lists... Done
root@d7d332de43e1:/#
```

6. Установите (apt-getinstall) любую программу в контейнер. Например mc.

```
root@d7d332de43e1:/# apt-get install mc
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

Проверьте работоспособность. (screenshot)

mc [root@d7d332de43e1]:/

File Edit View Search Terminal Help

Left	File	Command	Options	Right
<- /				<- /
.n Name	Size	Modify time		.n Name
/bin	4096	ar 11 21:05		/bin
/boot	4096	pr 24 2018		/boot
/dev	360	pr 5 19:27		/dev
/etc	4096	pr 5 19:31		/etc
/home	4096	pr 24 2018		/home
/lib	4096	ay 23 2017		/lib
/lib64	4096	ar 11 21:03		/lib64
/media	4096	ar 11 21:03		/media
/mnt	4096	ar 11 21:03		/mnt
/opt	4096	ar 11 21:03		/opt
/proc	0	pr 5 19:27		/proc
/root	4096	pr 5 19:32		/root
/run	4096	ar 20 19:20		/run
/sbin	4096	ar 20 19:20		/sbin
/srv	4096	ar 11 21:03		/srv
/sys	0	pr 5 19:27		/sys
/tmp	4096	pr 5 19:32		/tmp
/usr	4096	ar 11 21:03		/usr
/var	4096	ar 11 21:05		/var
*.dockerenv	0	pr 5 19:27		*.dockerenv

/bin 13G/20G (64%)

Hint: Want your plain shell? Press C-o, and get back to MC with C

```
root@d7d332de43e1:/#
```

7. Загрузите в контейнер файл(screenshot)

```
vm1kern@vm1kern-VirtualBox:~$ sudo docker cp ./file2image.txt dockern-y:/home/
```

```
root@d7d332de43e1:/home# ls  
file2image.txt
```

и скачайте с контейнера другой файл(screenshot).

```
vm1kern@vm1kern-VirtualBox:~$ sudo docker cp dockern-y:/home/back2host.txt /home/vm1kern  
vm1kern@vm1kern-VirtualBox:~$ pwd  
/home/vm1kern  
vm1kern@vm1kern-VirtualBox:~$ ls  
back2host.txt  Downloads      Music          Templates  
Desktop        examples.desktop  Pictures       Videos  
Documents      file2image.txt   Public
```

8. Прочитать документацию и кратко описать основные 7 команд Dockerfile according to `docker --help` commands are divided for Management commands and other commands, that makes work with CLI more convenient

`help` - not wordy documentation about docker commands  
`ps` - shows the list of containers (with details such as ID, name, status etc..)  
`rename` - rename a container  
`exec` - run a command in a running container  
`push/pull` are related to image/repository and a registry(not as in lxd, where we used these commands to transfer files between the container and the host)  
`create` - create a new container  
`cp` - copy files/folders between a container and the local filesystem

Работа с Kubernetes в Ubuntu

<https://ubuntu.com/kubernetes/install>; <https://microk8s.io/docs/>

1. Установить microk8s (screenshot)

```
vm1kern@vm1kern-VirtualBox:~$ sudo snap install microk8s --classic --channel=1.18/stable  
microk8s (1.18/stable) v1.18.0 from Canonical ✓ installed
```

2. Проверьте статус (screenshot) и команды менеджера кластера (screenshot).

```
vm1kern@vm1kern-VirtualBox:~$ microk8s status --wait-ready
microk8s is running
addons:
cilium: disabled
dashboard: disabled
dns: disabled
fluentd: disabled
gpu: disabled
helm: disabled
helm3: disabled
ingress: disabled
istio: disabled
jaeger: disabled
knative: disabled
kubeflow: disabled
linkerd: disabled
metallb: disabled
metrics-server: disabled
prometheus: disabled
rbac: disabled
registry: disabled
storage: disabled
```

```
vm1kern@vm1kern-VirtualBox:~$ microk8s.kubectl
kubectl controls the Kubernetes cluster manager.

Find more information at: https://kubernetes.io/docs/reference/kubectl/overview/

Basic Commands (Beginner):
  create      Create a resource from a file or from stdin.
  expose      Take a replication controller, service, deployment or pod and expose it as a new Kubernetes Service
  run         Run a particular image on the cluster
  set         Set specific features on objects

Basic Commands (Intermediate):
  explain     Documentation of resources
  get         Display one or many resources
  edit        Edit a resource on the server
  delete      Delete resources by filenames, stdin, resources and names, or by resources and label selector

Deploy Commands:
  rollout     Manage the rollout of a resource
  scale       Set a new size for a Deployment, ReplicaSet or R
```



3. Просмотрите установленные в докере образы; заверните один из них в образ \*.tar

```
vm1kern@vm1kern-VirtualBox:/tmp$ sudo docker save ubuntu > /tmp/
ubuntu.tar
```

```
vm1kern@vm1kern-VirtualBox:/tmp$ ls
config-ann-Hg7H8q
ash-f90hHLE7IHgnd.
sysdend-private-cc9ff904b00041f0bf0ead0f00219bcf-bolt.service-f4
68f18
sysdend-private-cc9ff904b00041f0bf0ead0f00219bcf-colord.service-
k5d00A
sysdend-private-cc9ff904b00041f0bf0ead0f00219bcf-flupd.service-H
af000
sysdend-private-cc9ff904b00041f0bf0ead0f00219bcf-ModemManager.s
ervice-2EAa7a
sysdend-private-cc9ff904b00041f0bf0ead0f00219bcf-ritik-daemon.s
ervice-HpLDog
sysdend-private-cc9ff904b00041f0bf0ead0f00219bcf-sysdend-resolve
d.service-5p0Yol
ubuntu.tar
```

4. Импортируйте образ в Kubernetes (screenshot)

According to doc <https://microk8s.io/docs/registry-images> it requires to have an image with The Tag local, not latest, so I changed the tag with following commands:

```
$ docker tag ubuntu:latest ubuntu:local
$ docker rmi ubuntu:latest
```

When I imported the image to microk8s, after running command `images ls` I did not see the image, so I ran the command again. And then got 2 images

```
vm1kern@vm1kern-VirtualBox:~$ sudo microk8s ctr image import ubu
ntu.tar
unpacking docker.io/library/ubuntu:local (sha256:6867deccdd432c9
25dfcf1f265443d878079f790f34bfa428116e955328cd9dc)...done
vm1kern@vm1kern-VirtualBox:~$ sudo microk8s ctr images ls
REF
      TYPE
      PLATFORMS  LABELS
docker.io/library/ubuntu:local
      application/vnd.oci.image.manifest.v1+json sha256:6867de
ccdd432c925dfcf1f265443d878079f790f34bfa428116e955328cd9dc 63.5
MiB linux/amd64 io.cri-containerd.image=managed
sha256:4e5021d210f65ebe915670c7089120120bc0a303b90208592851708c1
b8c04bd application/vnd.oci.image.manifest.v1+json sha256:6867de
ccdd432c925dfcf1f265443d878079f790f34bfa428116e955328cd9dc 63.5
MiB linux/amd64 io.cri-containerd.image=managed
```

Запустите образ и убедитесь, что он работает. (screenshot)

```
vm1kern@vm1kern-VirtualBox:~$ sudo microk8s.kubectl run -it pfir  
st --image=ubuntu:local --restart=Never  
If you don't see a command prompt, try pressing enter.  
root@pfirst:/#
```

```
vm1kern@vm1kern-VirtualBox:~$ sudo microk8s.kubectl get pods  
NAME      READY   STATUS    RESTARTS   AGE  
pfirst    1/1     Running   0           6m1s
```