

# EPAM University Programs

## DevOps external course

### Module 2 Virtualization and Cloud Basic

#### TASK 2.4

Работа с lxc в Ubuntu

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

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

1. Установить lxc

```
alex@ubuntu_18:~$ sudo apt install lxd
Reading package lists... Done
Building dependency tree
Reading state information... Done
lxd is already the newest version (3.0.3-0ubuntu1~18.04.1).
lxd set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 21 not upgraded.
```

2. Запустить lxc launch для любой из версий Убунту

```
root@ubuntu_18:~# lxc launch ubuntu:18.04 first
To start your first container, try: lxc launch ubuntu:18.04

Creating first
Starting first
```

3. По окончании загрузки убедиться, что машина стартовала lxc list

```
root@ubuntu_18:~# lxc list
+-----+-----+-----+-----+-----+
| NAME   | STATE |         IPV4         |         IPV6         |   TYPE   |
| SNAPSHTS |       |                       |                       |          |
+-----+-----+-----+-----+-----+
| first  | RUNNING | 10.203.147.157 (eth0) | fd42:20e2:4f83:2e42:216:3eff:fe91:3040 (eth0) | PERSISTE |
| NT | 0 | | | |
+-----+-----+-----+-----+-----+
```

4. Зайдите в контейнер с командной строкой bash /bin/bash

```
root@ubuntu_18:~# lxc exec first -- /bin/bash
root@first:~# _
```

5. Запустите обновление apt-get update

```

root@first:~# apt-get update
Get:1 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Hit:2 http://archive.ubuntu.com/ubuntu bionic InRelease
Get:3 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Get:5 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [677 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [8570 kB]
Get:7 http://security.ubuntu.com/ubuntu bionic-security/main Translation-en [218 kB]
Get:8 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [28.5 kB]
Get:9 http://security.ubuntu.com/ubuntu bionic-security/restricted Translation-en [7568 B]
Get:10 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [653 kB]
Get:11 http://security.ubuntu.com/ubuntu bionic-security/universe Translation-en [217 kB]
Get:12 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 Packages [6968 B]
Get:13 http://security.ubuntu.com/ubuntu bionic-security/multiverse Translation-en [2732 B]
Get:14 http://archive.ubuntu.com/ubuntu bionic/universe Translation-en [4941 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [151 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic/multiverse Translation-en [108 kB]
Get:17 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [897 kB]
Get:18 http://archive.ubuntu.com/ubuntu bionic-updates/main Translation-en [310 kB]
Get:19 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [37.5 kB]
Get:20 http://archive.ubuntu.com/ubuntu bionic-updates/restricted Translation-en [9524 B]
Get:21 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [1060 kB]
Get:22 http://archive.ubuntu.com/ubuntu bionic-updates/universe Translation-en [328 kB]
Get:23 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [10.5 kB]
Get:24 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse Translation-en [4696 B]
Get:25 http://archive.ubuntu.com/ubuntu bionic-backports/main amd64 Packages [2512 B]
Get:26 http://archive.ubuntu.com/ubuntu bionic-backports/main Translation-en [1644 B]
Get:27 http://archive.ubuntu.com/ubuntu bionic-backports/universe amd64 Packages [4020 B]
Get:28 http://archive.ubuntu.com/ubuntu bionic-backports/universe Translation-en [1900 B]
Fetched 18.5 MB in 15s (1264 kB/s)
Reading package lists... Done

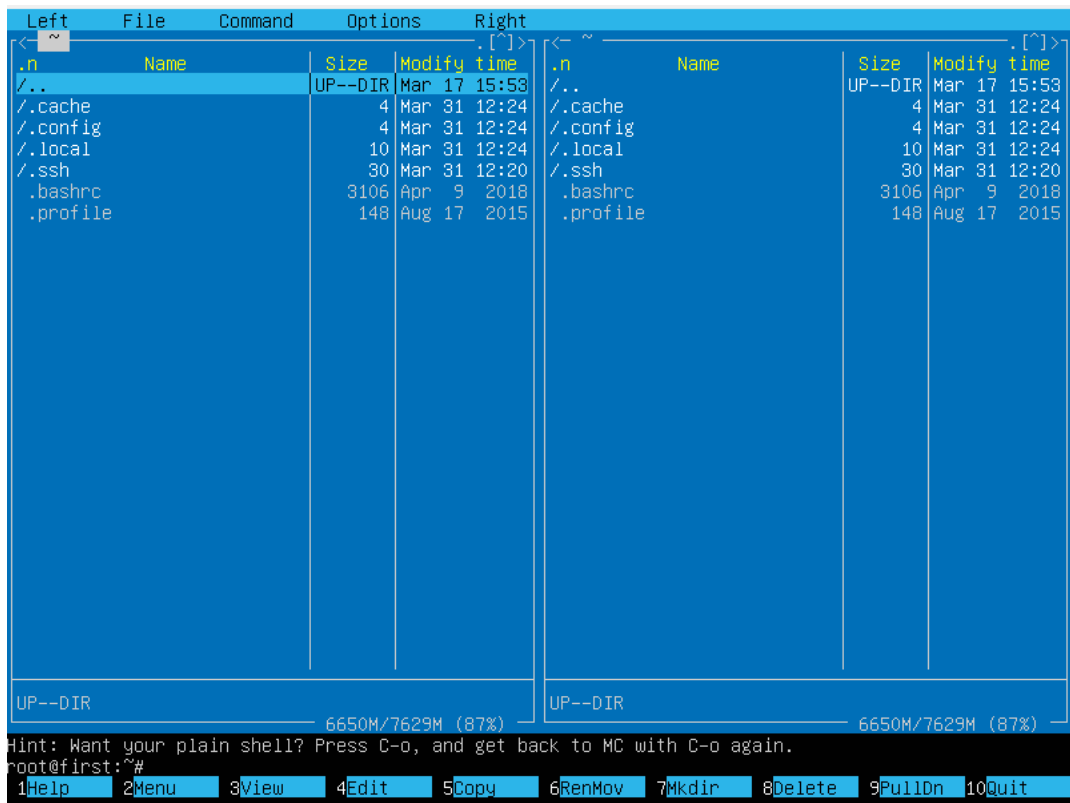
```

6. Установите (apt-get install) любую программу в контейнер. Например mc. Проверьте работоспособность.

```

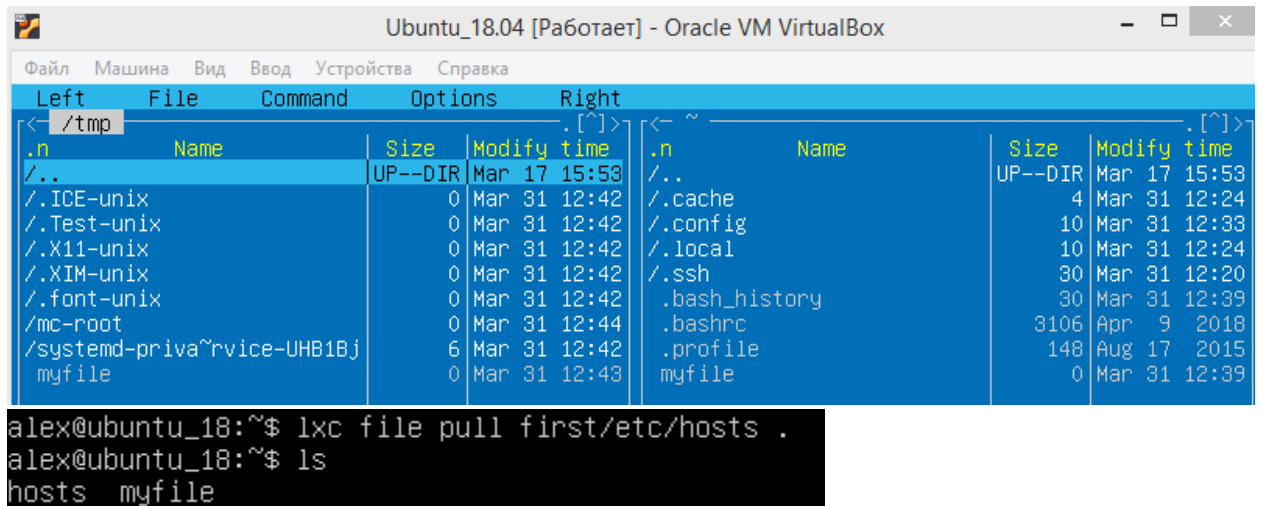
After this operation, 8099 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libssh2-1 amd64 1.8.0-1 [73.2 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic/universe amd64 mc-data all 3:4.8.19-1 [1238 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic/universe amd64 mc amd64 3:4.8.19-1 [474 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic/main amd64 unzip amd64 6.0-21ubuntu1 [167 kB]
Fetched 1952 kB in 2s (950 kB/s)
Selecting previously unselected package libssh2-1:amd64.
(Reading database ... 28688 files and directories currently installed.)
Preparing to unpack .../libssh2-1_1.8.0-1_amd64.deb ...
Unpacking libssh2-1:amd64 (1.8.0-1) ...
Selecting previously unselected package mc-data.
Preparing to unpack .../mc-data_3%3a4.8.19-1_all.deb ...
Unpacking mc-data (3:4.8.19-1) ...
Selecting previously unselected package mc.
Preparing to unpack .../mc_3%3a4.8.19-1_amd64.deb ...
Unpacking mc (3:4.8.19-1) ...
Selecting previously unselected package unzip.
Preparing to unpack .../unzip_6.0-21ubuntu1_amd64.deb ...
Unpacking unzip (6.0-21ubuntu1) ...
Setting up mc-data (3:4.8.19-1) ...
Setting up unzip (6.0-21ubuntu1) ...
Setting up libssh2-1:amd64 (1.8.0-1) ...
Setting up mc (3:4.8.19-1) ...
Processing triggers for mime-support (3.60ubuntu1) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
root@first:~# apt-get install mc
Reading package lists... Done
Building dependency tree
Reading state information... Done
mc is already the newest version (3:4.8.19-1).
The following package was automatically installed and is no longer required:
  libfreetype6
Use 'apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 26 not upgraded.

```



7. Загрузите в контейнер файл и скачайте с контейнера другой файл.

```
alex@ubuntu_18:~$ touch myfile
alex@ubuntu_18:~$ lxc file push myfile first/tmp/
```



## Работа с Docker в Ubuntu

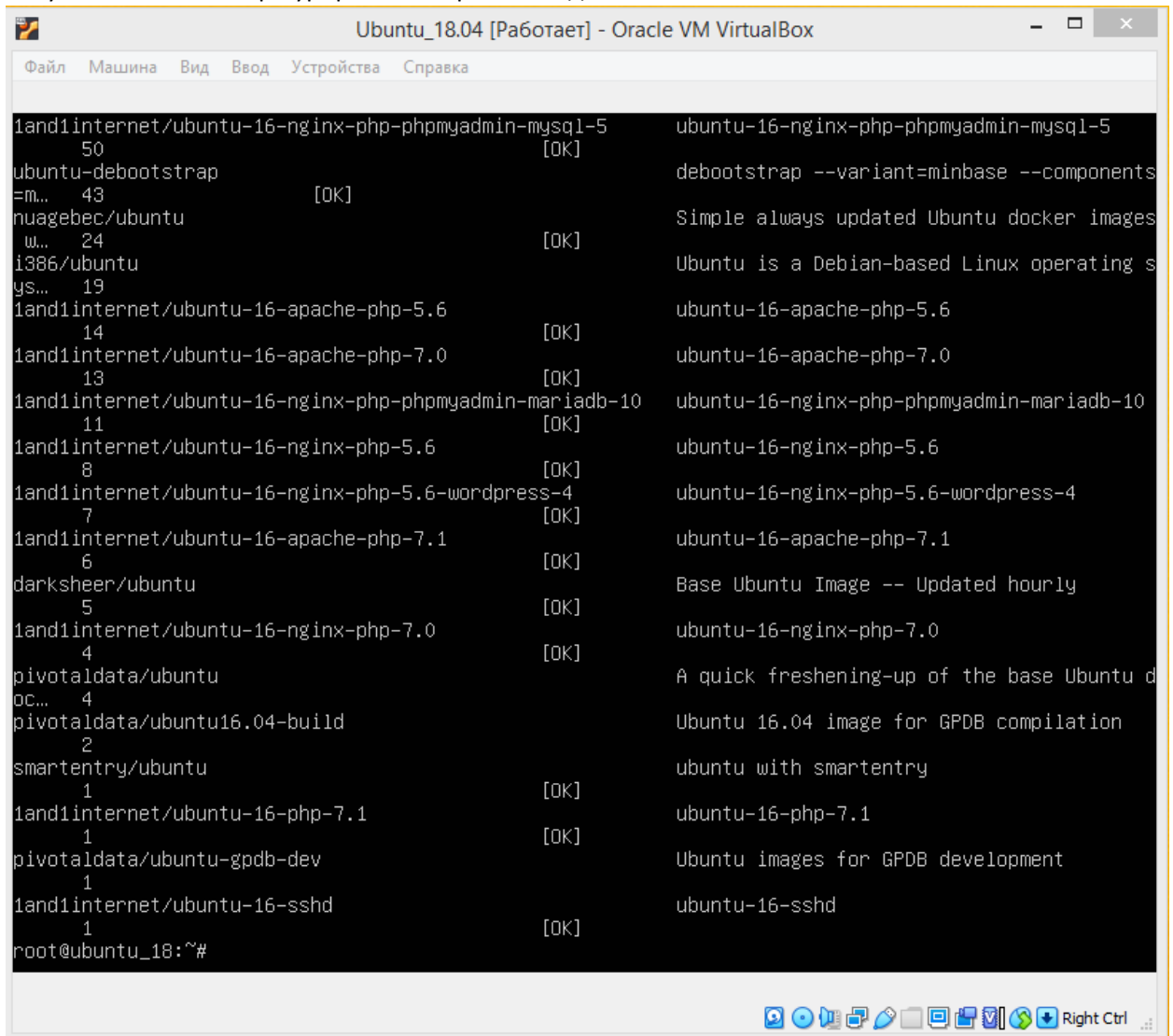
Documentation - <https://www.digitalocean.com/community/tutorials/how-to-install-and-use-docker-on-ubuntu-18-04>

<https://docs.docker.com>

### 1. Установить docker

```
alex@ubuntu_18:~$ sudo systemctl status docker
• docker.service - Docker Application Container Engine
  Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)
  Active: active (running) since Tue 2020-03-31 13:23:43 UTC; 1min 41s ago
    Docs: https://docs.docker.com
  Main PID: 4064 (dockerd)
    Tasks: 8
   CGroup: /system.slice/docker.service
           └─4064 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock
```

### 2. Запустить поиск сконфигурированных решений для “ubuntu”



### 3. Скачать любой из образов на локальную машину.

```

root@ubuntu_18:~# 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

```

4. Запустить команду просмотра загруженных на компьютер образов.

```

root@ubuntu_18:~# docker images

```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
ubuntu	latest	4e5021d210f6	10 days ago	64.2MB
hello-world	latest	fce289e99eb9	15 months ago	1.84kB

5. Запустите обновление apt-get update (screenshot)

```

root@ubuntu_18:~# docker run -it ubuntu
root@bd677e671a03:/# apt-get update
Get:1 http://archive.ubuntu.com/ubuntu bionic InRelease [242 kB]
Get:2 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic/main amd64 Packages [1344 kB]
Get:6 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [870 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [11.3 MB]
Get:8 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [186 kB]
Get:9 http://archive.ubuntu.com/ubuntu bionic/restricted amd64 Packages [13.5 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [50.4 kB]
Get:11 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [12.2 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [1161 kB]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [1365 kB]
Get:14 http://archive.ubuntu.com/ubuntu bionic-backports/main amd64 Packages [2496 B]
Get:15 http://archive.ubuntu.com/ubuntu bionic-backports/universe amd64 Packages [4247 B]
Get:16 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [834 kB]
Get:17 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 Packages [7904 B]
Get:18 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [37.0 kB]
Fetched 17.7 MB in 3s (5370 kB/s)
Reading package lists... Done

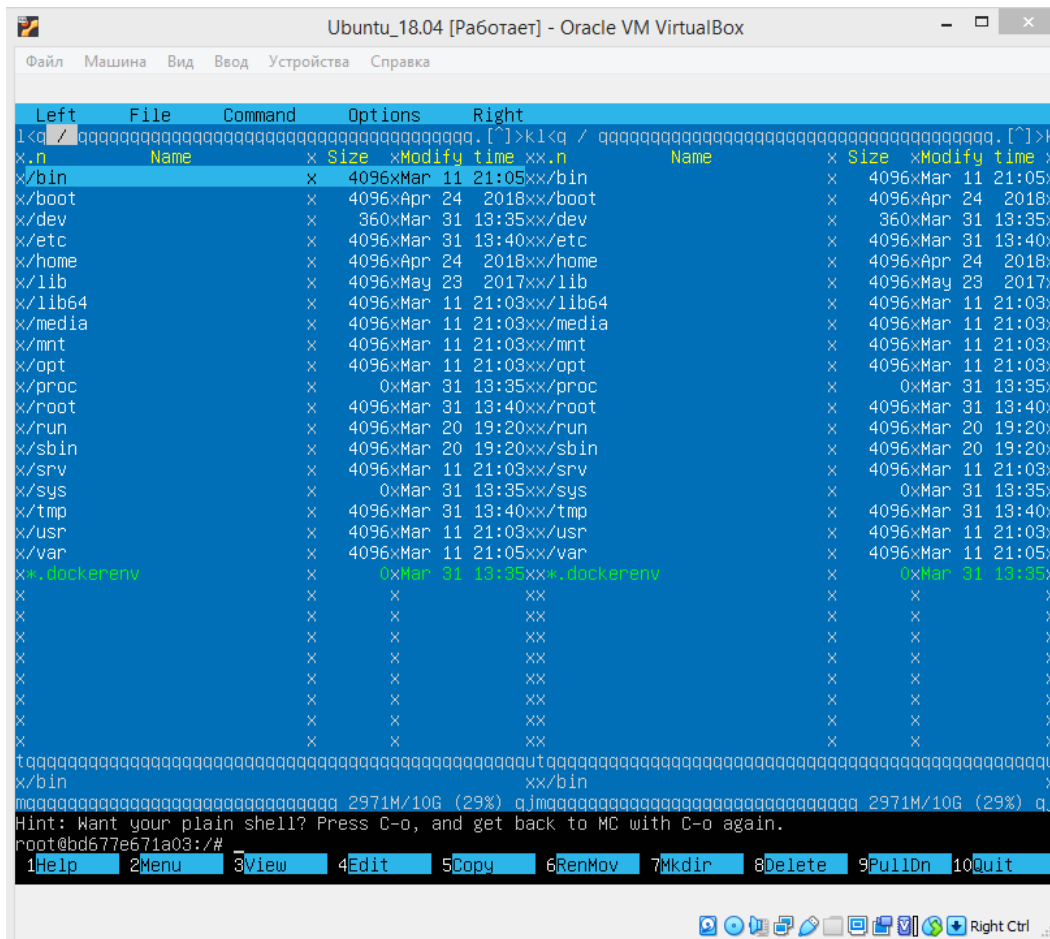
```

6. Установите (apt-get install) любую программу в контейнер. Например mc. Проверьте работоспособность.

```

root@bd677e671a03:/# apt-get install mc
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  file libgdbm-compat4 libgdbm5 libglib2.0-0 libglib2.0-data libgpm2 libicu60 libmagic-mgc
  libmagic1 libperl5.26 libslang2 libssh2-1 libxml2 mc-data mime-support netbase perl
  perl-modules-5.26 shared-mime-info unzip xdg-user-dirs xz-utils
Suggested packages:
  gdbm-110n gpm arj catdvi | texlive-binaries dbview djvulibre-bin genisoimage gv imagemagick
  libaspell-dev links | w3m | lynx odft2txt poppler-utils python python-boto python-tz xpdf
  | pdf-viewer zip perl-doc libterm-readline-gnu-perl | libterm-readline-perl-perl make
The following NEW packages will be installed:
  file libgdbm-compat4 libgdbm5 libglib2.0-0 libglib2.0-data libgpm2 libicu60 libmagic-mgc
  libmagic1 libperl5.26 libslang2 libssh2-1 libxml2 mc mc-data mime-support netbase perl
  perl-modules-5.26 shared-mime-info unzip xdg-user-dirs xz-utils
0 upgraded, 23 newly installed, 0 to remove and 12 not upgraded.
Need to get 19.7 MB of archives.
After this operation, 98.1 MB of additional disk space will be used.
Do you want to continue? [Y/n]

```



7. Загрузите в контейнер файл (screenshot) и скачайте с контейнера другой файл (screenshot).

```
root@ubuntu_18:~# touch again
root@ubuntu_18:~# ls
again myfile
root@ubuntu_18:~# docker cp ./again test1:/
root@ubuntu_18:~# docker start test1
test1
root@ubuntu_18:~# docker exec -it test1 /bin/bash
root@2ea6082c73af:/# ls
again boot etc lib media myfile proc run srv tmp var
bin dev home lib64 mnt opt root sbin sys usr
root@2ea6082c73af:/# touch notagain
root@2ea6082c73af:/# ls
again boot etc lib media myfile opt root sbin sys usr
bin dev home lib64 mnt notagain proc run srv tmp var
root@2ea6082c73af:/# exit
exit
root@ubuntu_18:~# cp test1:/notagain .
cp: cannot stat 'test1:/notagain': No such file or directory
root@ubuntu_18:~# docker cp test1:/notagain .
root@ubuntu_18:~# ls
again myfile notagain
```

8. Прочитать документацию и кратко описать основные 7 команд Dockerfile

Cp – copy files/folders between a container and the hostOS or vice versa.

Create – create a new container.

Exec – run a command in a running container.

Ps – list containers.

Build – build an image from a Dockerfile.

Create – create a new container.

Commit – create a new image from a container's changes.

## Работа с Kubernetes в Ubuntu

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

1. Установить microk8s

```
root@server:~# snap install microk8s --classic --channel=1.18/stable
microk8s (1.18/stable) v1.18.0 from Canonical✓ installed
```

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

```
root@server:~# 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

root@server:~#

```
root@server:~# microk8s kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
------	--------	-------	-----	---------

server	Ready	<none>	6m4s	v1.18.0
--------	-------	--------	------	---------

```
root@server:~# microk8s kubectl get services
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
kubernetes	ClusterIP	10.152.183.1	<none>	443/TCP	6m16s

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

```
root@server:~# docker save ubuntu > ubuntu.tar
```

```
root@server:~# ls
```

Dockerfile snap ubuntu.tar

```
root@server:~# 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

4. Импортируйте образ в Kubernetes

```
root@server:~# microk8s ctr image import ubuntu.tar
unpacking docker.io/library/ubuntu:latest (sha256:6867deccdd432c925dfcf1f265443d878079f790f34bf16e955328cd9dc)...done
```

5. Запустите образ и убедитесь, что он работает.

```
alex@server:~$ microk8s kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
kubernetes-bootcamp-6f6656d949-56rwj 1/1     Running   0           5m53s
alex@server:~$ kubectl exec -it kubernetes-bootcamp-6f6656d949-56rwj -- /bin/bash
root@kubernetes-bootcamp-6f6656d949-56rwj:/# _
```