

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

```
ubuntu@ip-172-31-42-75:~$ lxc --version
3.0.3
```

2. Запустить lxc launch для любой из версий Ubuntu
3. По окончании загрузки убедиться, что машина стартовала lxc list

```
ubuntu@ip-172-31-47-156:~$ lxc launch ubuntu:18.04
Creating the container
Container name is: correct-donkey
Starting correct-donkey
ubuntu@ip-172-31-47-156:~$ lxc list
```

NAME	STATE	IPV4	IPV6	TYPE	SNAPSHOTS
correct-donkey	RUNNING		fd42:6456:9cd8:8577:216:3eff:fef7:d500 (eth0)	PERSISTENT	0

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

```
Display all 174 possibilities? (y or n)^C
ubuntu@ip-172-31-47-156:~$ lxc exec correct-donkey -- /bin/bash
root@correct-donkey:~# cat /etc/
Display all 174 possibilities? (y or n)^C
root@correct-donkey:~# cat /etc/lsb-release
DISTRIB_ID=Ubuntu
DISTRIB_RELEASE=18.04
DISTRIB_CODENAME=bionic
DISTRIB_DESCRIPTION="Ubuntu 18.04.4 LTS"
```

5. Запустите обновление apt-get update

```

root@correct-donkey:~# apt-get update
Hit:1 http://archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Get:4 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [8570 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic/universe Translation-en [4941 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [151 kB]
Get:8 http://archive.ubuntu.com/ubuntu bionic/multiverse Translation-en [108 kB]
Get:9 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [897 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic-updates/main Translation-en [310 kB]
Get:11 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [37.5 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic-updates/restricted Translation-en [9524 B]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [1061 kB]
Get:14 http://archive.ubuntu.com/ubuntu bionic-updates/universe Translation-en [329 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [10.5 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse Translation-en [4696 B]
Get:17 http://archive.ubuntu.com/ubuntu bionic-backports/main amd64 Packages [2512 B]
Get:18 http://archive.ubuntu.com/ubuntu bionic-backports/main Translation-en [1644 B]
Get:19 http://archive.ubuntu.com/ubuntu bionic-backports/universe amd64 Packages [4020 B]
Get:20 http://archive.ubuntu.com/ubuntu bionic-backports/universe Translation-en [1900 B]
Get:21 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [677 kB]
Get:22 http://security.ubuntu.com/ubuntu bionic-security/main Translation-en [218 kB]
Get:23 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [28.5 kB]
Get:24 http://security.ubuntu.com/ubuntu bionic-security/restricted Translation-en [7568 B]
Get:25 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [653 kB]
Get:26 http://security.ubuntu.com/ubuntu bionic-security/universe Translation-en [217 kB]
Get:27 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 Packages [6968 B]
Get:28 http://security.ubuntu.com/ubuntu bionic-security/multiverse Translation-en [2732 B]
Fetched 18.5 MB in 4s (4428 kB/s)
Reading package lists... Done
root@correct-donkey:~#

```

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

```

root@correct-donkey:~# apt-get install mc
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  libfreetype6
Use 'apt autoremove' to remove it.
The following additional packages will be installed:
  libssh2-1 mc mc-data unzip
Suggested packages:
  arj catdvi | texlive-binaries dbview djvulibre-bin genisoimage gv imagemagick libaspell-dev links | w3m | lynx odt2txt poppler-utils python python-boto python-tz xpdf | pdf-viewer zip
The following NEW packages will be installed:
  libssh2-1 mc mc-data unzip
0 upgraded, 4 newly installed, 0 to remove and 26 not upgraded.
Need to get 1952 kB of archives.
After this operation, 8999 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 0s (9604 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_3:4.8.19-1_all.deb ...
Unpacking mc-data (3:4.8.19-1) ...
Selecting previously unselected package mc.
Preparing to unpack .../mc_3:4.8.19-1_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@correct-donkey:~#

```

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

```

ubuntu@ip-172-31-47-156:~$ lxc file push file_to_push correct-donkey/home/ubuntu/
ubuntu@ip-172-31-47-156:~$ lxc exec correct-donkey -- /bin/bash
root@correct-donkey:~# cd /
bin/ boot/ dev/ etc/ home/ lib/ lib64/ media/ mnt/ opt/ proc/ root/ run/ sbin/ snap/ srv/ sys/ tmp/ usr/ var/
root@correct-donkey:~# cd /home/ubuntu/
root@correct-donkey:/home/ubuntu# ls
file_to_push

```

```

ubuntu@ip-172-31-47-156:~$ sudo lxc file pull correct-donkey/home/ubuntu/file_to_pull ./
ubuntu@ip-172-31-47-156:~$ ls
file_to_pull file_to_push
ubuntu@ip-172-31-47-156:~$

```

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

```
ubuntu@ip-172-31-47-156:~$ sudo apt install docker-ce
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  aufs-tools cgroupfs-mount containerd.io docker-ce-cli libltdl7 pigz
The following NEW packages will be installed:
  aufs-tools cgroupfs-mount containerd.io docker-ce docker-ce-cli libltdl7 pigz
0 upgraded, 7 newly installed, 0 to remove and 104 not upgraded.
Need to get 85.8 MB of archives.
After this operation, 385 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://eu-west-3.ec2.archive.ubuntu.com/ubuntu bionic/universe amd64 pigz amd64 2.4-1 [57.4 kB]
Get:2 https://download.docker.com/linux/ubuntu bionic/stable amd64 containerd.io amd64 1.2.13-1 [20.1 MB]
Get:3 http://eu-west-3.ec2.archive.ubuntu.com/ubuntu bionic/universe amd64 aufs-tools amd64 1:4.9+20170918-1ubuntu1 [104 kB]
Get:4 http://eu-west-3.ec2.archive.ubuntu.com/ubuntu bionic/universe amd64 cgroupfs-mount all 1.4 [6320 B]
Get:5 http://eu-west-3.ec2.archive.ubuntu.com/ubuntu bionic/main amd64 libltdl7 amd64 2.4.6-2 [38.8 kB]
Get:6 https://download.docker.com/linux/ubuntu bionic/stable amd64 docker-ce-cli amd64 5:19.03.8-3-0-ubuntu-bionic [42.6 MB]
Get:7 https://download.docker.com/linux/ubuntu bionic/stable amd64 docker-ce amd64 5:19.03.8-3-0-ubuntu-bionic [22.9 MB]
Fetched 85.8 MB in 2s (48.7 MB/s)
Selecting previously unselected package pigz.
(Reading database ... 56545 files and directories currently installed.)
Preparing to unpack .../0-pigz_2.4-1_amd64.deb ...
Unpacking pigz (2.4-1) ...
Selecting previously unselected package aufs-tools.
Preparing to unpack .../1-aufs-tools_1%3a4.9+20170918-1ubuntu1_amd64.deb ...
Unpacking aufs-tools (1:4.9+20170918-1ubuntu1) ...
Selecting previously unselected package cgroupfs-mount.
Preparing to unpack .../2-cgroupfs-mount_1.4_all.deb ...
Unpacking cgroupfs-mount (1.4) ...
Selecting previously unselected package containerd.io.
Preparing to unpack .../3-containerd.io_1.2.13-1_amd64.deb ...
Unpacking containerd.io (1.2.13-1) ...
Selecting previously unselected package docker-ce-cli.
Preparing to unpack .../4-docker-ce-cli_5%3a19.03.8-3-0-ubuntu-bionic_amd64.deb ...
Unpacking docker-ce-cli (5:19.03.8-3-0-ubuntu-bionic) ...
Selecting previously unselected package docker-ce.
Preparing to unpack .../5-docker-ce_5%3a19.03.8-3-0-ubuntu-bionic_amd64.deb ...
Unpacking docker-ce (5:19.03.8-3-0-ubuntu-bionic) ...
Selecting previously unselected package libltdl7:amd64.
Preparing to unpack .../6-libltdl7_2.4.6-2_amd64.deb ...
Unpacking libltdl7:amd64 (2.4.6-2) ...
Setting up aufs-tools (1:4.9+20170918-1ubuntu1) ...
Setting up containerd.io (1.2.13-1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/containerd.service → /lib/systemd/system/containerd.service.
Setting up cgroupfs-mount (1.4) ...
Setting up libltdl7:amd64 (2.4.6-2) ...
Setting up docker-ce-cli (5:19.03.8-3-0-ubuntu-bionic) ...
Setting up pigz (2.4-1) ...
Setting up docker-ce (5:19.03.8-3-0-ubuntu-bionic) ...
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /lib/systemd/system/docker.socket.
Processing triggers for libc-bin (2.27-3ubuntu1) ...
Processing triggers for systemd (237-3ubuntu10.31) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for ureadahead (0.100.0-21) ...
```

2. Запустить поиск сконфигурированных решений для “ubuntu”

```
ubuntu@ip-172-31-47-156:~$ sudo docker search ubuntu
NAME                DESCRIPTION                STARS     OFFICIAL    AUTOMATED
ubuntu              Ubuntu is a Debian-based Linux operating sys... 10718     [OK]        [AUTOMATED]
borowu/ubuntu-desktop-lxd-vnc Docker image to provide HTML5 VNC interface... 410      [OK]
pastasheep/ubuntu-sshd Dockerized SSH service, built on top of offi... 245      [OK]
consol/ubuntu-xfce-vnc Ubuntu container with "headless" VNC session... 212      [OK]
ubuntu-upstart       Upstart is an event-based replacement for th... 107      [OK]
neurodebian          NeuroDebian provides neuroscience research s... 68       [OK]
landlinternet/ubuntu-16-nginx-php-phpmyadmin-mysql-5 ubuntu-16-nginx-php-phpmyadmin-mysql-5 50      [OK]
ubuntu-debootstrap  debootstrap --variant=minbase --components=m... 43       [OK]
magebec/ubuntu      Simple always updated Ubuntu docker images w... 24      [OK]
1386/ubuntu         Ubuntu is a Debian-based Linux operating sys... 19      [OK]
landlinternet/ubuntu-16-apache-php-5.6 ubuntu-16-apache-php-5.6 14      [OK]
landlinternet/ubuntu-16-apache-php-7.0 ubuntu-16-apache-php-7.0 13      [OK]
ppc64le/ubuntu      Ubuntu is a Debian-based Linux operating sys... 13      [OK]
landlinternet/ubuntu-16-nginx-php-phpmyadmin-mariadb-10 ubuntu-16-nginx-php-phpmyadmin-mariadb-10 11      [OK]
landlinternet/ubuntu-16-nginx-php-5.6 ubuntu-16-nginx-php-5.6 8      [OK]
landlinternet/ubuntu-16-nginx-php-5.6-wordpress-4 ubuntu-16-nginx-php-5.6-wordpress-4 7      [OK]
landlinternet/ubuntu-16-apache-php-7.1 ubuntu-16-apache-php-7.1 6      [OK]
marksheer/ubuntu    Base Ubuntu Image -- Updated hourly 5      [OK]
pivotaldata/ubuntu  A quick freshening-up of the base Ubuntu doc... 4      [OK]
landlinternet/ubuntu-16-nginx-php-7.0 ubuntu-16-nginx-php-7.0 2      [OK]
pivotaldata/ubuntu16.04-build Ubuntu 16.04 image for GPDB compilation 2
smarterentry/ubuntu ubuntu with smarterentry 1      [OK]
landlinternet/ubuntu-16-sshd ubuntu-16-sshd 1      [OK]
landlinternet/ubuntu-16-php-7.1 ubuntu-16-php-7.1 1      [OK]
pivotaldata/ubuntu-gpdb-dev Ubuntu images for GPDB development 1
```

3. Скачать любой из образов на локальную машину.

```
ubuntu@ip-172-31-47-156:~$ 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
```

4. Запустить команду просмотра загруженных на компьютер образов.

```
ubuntu@ip-172-31-47-156:~$ sudo docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
ubuntu              latest             4e5021d210f6       2 weeks ago        64.2MB
ubuntu@ip-172-31-47-156:~$
```

5. Запустите обновление apt-get update.

```
ubuntu@ip-172-31-47-156:~$ sudo docker run -it ubuntu
root@e78cfcf829fd:/# apt-get update
Get:1 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic InRelease [242 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://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [870 kB]
Get:6 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 Packages [7904 B]
Get:7 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [835 kB]
Get:8 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [37.0 kB]
Get:9 http://archive.ubuntu.com/ubuntu bionic/main amd64 Packages [1344 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [11.3 MB]
Get:11 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [186 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic/restricted amd64 Packages [13.5 kB]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [1367 kB]
Get:14 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [1161 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [50.4 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [12.2 kB]
Get:17 http://archive.ubuntu.com/ubuntu bionic-backports/universe amd64 Packages [4247 B]
Get:18 http://archive.ubuntu.com/ubuntu bionic-backports/main amd64 Packages [2496 B]
Fetched 17.7 MB in 2s (8001 kB/s)
Reading package lists... Done
root@e78cfcf829fd:/#
```

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

```
root@e78cfcf829fd:/# apt-get install htop
Reading package lists... Done
Building dependency tree
Reading state information... Done
Suggested packages:
  lsof strace
The following NEW packages will be installed:
  htop
0 upgraded, 1 newly installed, 0 to remove and 12 not upgraded.
Need to get 80.0 kB of archives.
After this operation, 221 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 htop amd64 2.1.0-3 [80.0 kB]
Fetched 80.0 kB in 0s (1117 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package htop.
(Reading database ... 4046 files and directories currently installed.)
Preparing to unpack .../htop_2.1.0-3_amd64.deb ...
Unpacking htop (2.1.0-3) ...
Setting up htop (2.1.0-3) ...
```

```
CPU[| 0.7%] Tasks: 2, 0 thr; 1 running
Mem[| 302M/984M] Load average: 0.13 0.09 0.03
Swp[| 0K/0K] Uptime: 02:31:01

  PID USER      PRI  NI  VIRT   RES   SHR  S CPU% MEM%   TIME+  Command
  1 root        20   0 18508   3408  2992  S   0.0   0.3   0:00.29 /bin/bash
253 root        20   0 24536   4436  3088  R   0.0   0.4   0:00.00 htop
```

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

```
ubuntu@ip-172-31-47-156:~$ cd /home/ubuntu/
ubuntu@ip-172-31-47-156:~$ ls
file_to_pull  file_to_push
ubuntu@ip-172-31-47-156:~$ sudo docker cp infallible_agnesi:/home/ubuntu/file_to_pull_from_docker ./
ubuntu@ip-172-31-47-156:~$ ls
file_to_pull  file_to_pull_from_docker  file_to_push
ubuntu@ip-172-31-47-156:~$

file_to_pull  file_to_pull_from_docker  file_to_push
ubuntu@ip-172-31-47-156:~$ touch file_to_push_to_docker
ubuntu@ip-172-31-47-156:~$ sudo docker ex
exec  export
ubuntu@ip-172-31-47-156:~$ sudo docker exec -i infallible_agnesi sh -c 'cat > /home/ubuntu/file_to_pull_to_docker' <
.bash_logout      .cache/           .gnupg/           .ssh/             file_to_pull      file_to_push
.bashrc           .config/          .profile          .sudo_as_admin_successful  file_to_pull_from_docker  file_to_push_to_docker
ubuntu@ip-172-31-47-156:~$ sudo docker exec -i infallible_agnesi sh -c 'cat > /home/ubuntu/file_to_pull_to_docker' < file_to_push
file_to_push      file_to_push_to_docker
ubuntu@ip-172-31-47-156:~$ sudo docker exec -i infallible_agnesi sh -c 'cat > /home/ubuntu/file_to_push_to_docker' < file_to_push_to_docker
ubuntu@ip-172-31-47-156:~$ sudo docker exec -it infallible_agnesi /bin/bash
root@e78cfcf829fd:/# cd /home/ubuntu/
root@e78cfcf829fd:/home/ubuntu# ls
file_to_pull_from_docker  file_to_push_to_docker
root@e78cfcf829fd:/home/ubuntu#
```

8. Прочитать документацию и кратко описать основные 7 команд Dockerfile

- 1) docker - показывает все (большую часть) доступные команды
- 2) docker search - поиск образа
- 3) docker ps - список запущенный контейнеров
- 4) docker pull - загрузка образа
- 5) docker build - собрание контейнера
- 6) docker exec -it <name> /bin/bash - командная строка контейнера
- 7) docker logs - логи

Работа с Kubernetes в Ubuntu

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

1. Установить microk8s

```
ubuntu@ip-172-31-47-156:~$ sudo snap install microk8s --classic
microk8s v1.18.0 from Canonical✓ installed
ubuntu@ip-172-31-47-156:~$
```

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

```
ubuntu@ip-172-31-47-156:~$ sudo microk8s.status
microk8s is not running. Use microk8s inspect for a deeper inspection.
ubuntu@ip-172-31-47-156:~$
```

```

ubuntu@ip-172-31-47-156:~$ sudo microk8s status
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

```

```

ubuntu@ip-172-31-47-156:~$ 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 Replication Controller
  autoscale Auto-scale a Deployment, ReplicaSet, or ReplicationController

Cluster Management Commands:
  certificate Modify certificate resources.
  cluster-info Display cluster info
  top         Display Resource (CPU/Memory/Storage) usage.
  cordon      Mark node as unschedulable
  uncordon    Mark node as schedulable
  drain       Drain node in preparation for maintenance
  taint       Update the taints on one or more nodes

Troubleshooting and Debugging Commands:
  describe   Show details of a specific resource or group of resources
  logs       Print the logs for a container in a pod
  attach     Attach to a running container
  exec       Execute a command in a container
  port-forward Forward one or more local ports to a pod
  proxy      Run a proxy to the Kubernetes API server
  cp         Copy files and directories to and from containers.
  auth       Inspect authorization

Advanced Commands:
  diff       Diff live version against would-be applied version
  apply      Apply a configuration to a resource by filename or stdin
  patch      Update field(s) of a resource using strategic merge patch
  replace    Replace a resource by filename or stdin
  wait       Experimental: Wait for a specific condition on one or many resources.
  convert    Convert config files between different API versions
  kustomize  Build a kustomization target from a directory or a remote url.

Settings Commands:
  label      Update the labels on a resource
  annotate    Update the annotations on a resource
  completion Output shell completion code for the specified shell (bash or zsh)

```

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

```

Error response from daemon: No such image: etcdv3:latest
ubuntu@ip-172-31-47-156:~$ sudo docker save -o infallible_agnesi.tar ubuntu
ubuntu@ip-172-31-47-156:~$ ls
file_to_pull  file_to_pull_from_docker  file_to_push  file_to_push_to_docker  infallible_agnesi.tar  snap
ubuntu@ip-172-31-47-156:~$ █

```

4. Импортируйте образ в Kubernetes

```
ubuntu@ip-172-31-47-156:~$ microk8s ctr image import infallible_agnesi.tar
unpacking docker.io/library/ubuntu:latest (sha256:6867deccdd432c925dfcf1f265443d878079f790f34bfa428116e955328cd9dc)...done
```

5. Запустите образ и убедитесь, что он работает.

```
ubuntu@ip-172-31-32-11:~$ microk8s kubectl get deployment
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
kubernetes-bootcamp 0/1     0             0            63m
kubernetes-bootcamp2 0/1     0             0            22m
ubuntu-deployment    0/1     0             0            4m21s
ubuntu@ip-172-31-32-11:~$ microk8s kubectl get pods
No resources found in default namespace.
ubuntu@ip-172-31-32-11:~$
```

```
ubuntu@ip-172-31-32-11:~$ microk8s kubectl get namespaces
NAME                STATUS   AGE
default              Active   72m
kube-node-lease      Active   72m
kube-public          Active   72m
kube-system          Active   72m
```

С шаблоном из инструкции - вывод идентичный. Ошибок нет, но pod не активен.

```
ubuntu@ip-172-31-32-11:~$ kubectl get pods -l app=nginx
kubectl: command not found
ubuntu@ip-172-31-32-11:~$ microk8s kubectl describe deployment nginx-deployment
^[[A^[[AName:                nginx-deployment
Namespace:                  default
CreationTimestamp:          Mon, 06 Apr 2020 19:26:29 +0000
Labels:                     <none>
Annotations:                Selector: app=nginx
Replicas:                   2 desired | 0 updated | 0 total | 0 available | 0 unavailable
StrategyType:               RollingUpdate
MinReadySeconds:            0
RollingUpdateStrategy:      25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=nginx
  Containers:
    nginx:
      Image:          nginx:1.14.2
      Port:           80/TCP
      Host Port:      0/TCP
      Environment:    <none>
      Mounts:         <none>
  Volumes:            <none>
OldReplicaSets:        <none>
NewReplicaSet:         <none>
Events:                <none>
ubuntu@ip-172-31-32-11:~$ microk8s kubectl get pods -l app=nginx
No resources found in default namespace.
ubuntu@ip-172-31-32-11:~$
```