

Module 2 Virtualization and Cloud Basic (Task 2.4)

Работа с lxc в Ubuntu

1. Установить lxc (Screenshot)

```

Edit Actions Tab View Window Help
Computer Name Mon 30 Mar 00:27
bruh briukhanov Oleksandr
Login Window...
Users & Groups Preferences...
bruh@wibob-X61:~$ lxc-checkconfig
Kernel configuration not found at /proc/config.gz; searching...
Kernel configuration found at /boot/config-4.15.0-72-generic
--- Namespaces ---
Namespaces: enabled
Utsname namespace: enabled
Ipc namespace: enabled
Pid namespace: enabled
User namespace: enabled
Network namespace: enabled

--- Control groups ---
Cgroups: enabled

Cgroup v1 mount points:
/sys/fs/cgroup/systemd
/sys/fs/cgroup/cpu,cpuacct
/sys/fs/cgroup/net_cls,net_prio
/sys/fs/cgroup/rdma
/sys/fs/cgroup/freezer
/sys/fs/cgroup/perf_event
/sys/fs/cgroup/memory
/sys/fs/cgroup/hugetlb
/sys/fs/cgroup/blkio
/sys/fs/cgroup/cpuset
/sys/fs/cgroup/pids
/sys/fs/cgroup/devices

Cgroup v2 mount points:
/sys/fs/cgroup/unified

Cgroup v1 clone_children flag: enabled
Cgroup device: enabled
Cgroup sched: enabled
Cgroup cpu account: enabled
Cgroup memory controller: enabled
Cgroup cpuset: enabled

--- Misc ---
Veth pair device: enabled, not loaded
Macvlan: enabled, not loaded
Vlan: enabled, not loaded
Bridges: enabled, loaded
Advanced netfilter: enabled, not loaded
CONFIG_NF_NAT_IPV4: enabled, loaded
CONFIG_NF_NAT_IPV6: enabled, not loaded
CONFIG_IP_NF_TARGET_MASQUERADE: enabled, loaded
CONFIG_IP6_NF_TARGET_MASQUERADE: enabled, not loaded
CONFIG_NETFILTER_XT_TARGET_CHECKSUM: enabled, loaded
CONFIG_NETFILTER_XT_MATCH_COMMENT: enabled, loaded
FUSE (for use with lxcfs): enabled, not loaded

--- Checkpoint/Restore ---
checkpoint restore: enabled

```

2. Запустить lxc launch для любой из версий Убунту (Screenshot)

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

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

Общий скрин, отражающий три шага (на большом окне терминал хоста, на маленьком терминал гостевой ОС в контейнере)

```

dit View Session Scripts Profiles Toolbelt Window Help
Computer Name Mon 30 Mar 01:08
bruh briukhanov Oleksandr
Login Window...
Users & Groups Preferences...
bruh@wibob-X61:~$ lxc-start -n cont01 -d
root@wibob-X61:/var/lib/lxc/cont01# lxc-info -n cont01
Name: cont01
State: RUNNING
PID: 20788
IP: 10.0.3.118
CPU use: 0.87 seconds
BlkIO use: 156.00 KiB
Memory use: 16.72 MiB
KMem use: 3.00 MiB
Link: veth5X8PVD
TX bytes: 1.82 KiB
RX bytes: 7.79 KiB
Total bytes: 9.61 KiB
root@wibob-X61:/var/lib/lxc/cont01# lxc -list
Command 'lxc' not found, but can be installed with:
snap install lxd # version 3.23, or
apt install lxd-client
See 'snap info lxd' for additional versions.
root@wibob-X61:/var/lib/lxc/cont01# 

root@wibob-X61:~$ lxc-console -n cont01 -t 0
Connected to tty 0
Type <Ctrl+a q> to exit the console, <Ctrl+a Ctrl+a> to enter Ctrl+a itself
Ubuntu 18.04.4 LTS cont01 console
cont01 login: root
Password:
Welcome to Ubuntu 18.04.4 LTS (GNU/Linux 4.15.0-72-generic i686)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@cont01:~# date
Sun Mar 29 22:07:34 UTC 2020
root@cont01:~# 

```

5. Запустите обновление apt-get update (Screenshot)

```

Edit View Session Scripts Profiles Toolbelt Window Help Computer Name Search
Overview Getting started x61
root@wibob-X61:/var/lib/lxc/cont01# lxc-start -n cont01 -d
root@wibob-X61:/var/lib/lxc/cont01# lxc-info -n cont01
Name: cont01
State: RUNNING
PID: 20788
IP: 10.0.3.118
CPU use: 0.87 seconds
BlkIO use: 156.00 KiB
Memory use: 16.72 MiB
KMem use: 3.00 MiB
Link: veth5X8PVD
TX bytes: 1.82 KiB
RX bytes: 7.79 KiB
Total bytes: 9.61 KiB
root@wibob-X61:/var/lib/lxc/cont01# lxc-ls
cont01
root@wibob-X61:/var/lib/lxc/cont01# lxc -list

Command 'lxc' not found, but can be installed with:

snap install lxd      # version 3.23, or
apt install lxd-client

See 'snap info lxd' for additional versions.
root@wibob-X61:/var/lib/lxc/cont01# 

root@cont01:~# apt 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://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Fetched 177 kB in 1s (193 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
All packages are up to date.
root@cont01:~#

```

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

```

Edit View Session Scripts Profiles Toolbelt Window Help Computer Name Search
Overview Getting started x61
root@wibob-X61:/var/lib/lxc/cont01# lxc-start -n cont01 -d
root@wibob-X61:/var/lib/lxc/cont01# lxc-info -n cont01
Name: cont01
State: RUNNING
PID: 20788
IP: 10.0.3.118
CPU use: 0.87 seconds
BlkIO use: 156.00 KiB
Memory use: 16.72 MiB
KMem use: 3.00 MiB
Link: veth5X8PVD
TX bytes: 1.82 KiB
RX bytes: 7.79 KiB
Total bytes: 9.61 KiB
root@wibob-X61:/var/lib/lxc/cont01# lxc-ls
cont01
root@wibob-X61:/var/lib/lxc/cont01# lxc -list

Command 'lxc' not found, but can be installed with:

snap install lxd      # version 3.23, or
apt install lxd-client

See 'snap info lxd' for additional versions.
root@wibob-X61:/var/lib/lxc/cont01# 

root@cont01:~# apt-get install mc
Reading package lists...
Building dependency tree...
Reading state information...
The following NEW packages will be installed:
  mc
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 1,144 kB of archives.
After this operation, 4,096 B of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu/bionic/main amd64 mc amd64 4.7.1-1 [1,144 kB]
Fetched 1,144 kB in 0s (2,224 kB/s)
Selecting previously unselected package mc.
(mc:amd64) will be installed
Setting up mc (4.7.1-1) ...
root@cont01:~# mc
[~] ./.profile
[~] ./.bashrc
[~] ./.local
[~] ./.config
[~] ./.cache
[~] UP--DIR
[~] Hint: Want your plain shell? Press C-o, and get back to MC with C-o again.
[~] root@cont01:~# 

```

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

на большом терминале хост с которого делаем push файла main.py, после этого на маленьком окне гостевой ОС делаем просмотр каталога

```

bruh@wibob-X61:~/devops/1st_projects$ ls -la
total 28
drwxrwxr-x 3 bruh bruh 4096 Mar 30 13:56 .
drwxrwxr-x 5 bruh bruh 4096 Mar 30 13:56 ..
-rw-rw-r-- 1 bruh bruh 523 Mar 30 13:16 file.py.un~
drwxrwxr-x 8 bruh bruh 4096 Mar 30 13:56 .git
-rw-rw-r-- 1 bruh bruh 111 Mar 30 13:56 main.py
-rw-rw-r-- 1 bruh bruh 99 Mar 30 12:56 main.py~
bruh@wibob-X61:~/devops/1st_projects$ lxc file push ./main.py c1/tmp/main.py
bruh@wibob-X61:~/devops/1st_projects$ ls -la
total 36
drwxrwxrwt 8 root root 4096 Mar 29 23:37 .
drwxr-xr-x 21 root root 4096 Mar 29 23:39 ..
drwxrwxrwt 2 root root 4096 Mar 29 23:21 ICE-unix
drwxrwxrwt 2 root root 4096 Mar 29 23:21 Test-unix
drwxrwxrwt 2 root root 4096 Mar 29 23:21 X11-unix
drwxrwxrwt 2 root root 4096 Mar 29 23:21 XIM-unix
drwxrwxrwt 2 root root 4096 Mar 29 23:21 font-unix
-rwxrwxr-x 1 ubuntu ubuntu 111 Mar 29 23:37 main.py
drwx----- 2 root root 4096 Mar 29 23:31 mc-root
root@c1:/tmp#

```

и теперь Pull в обратную сторону и вывод в терминалах обоих экземпляров файла

```

bruh@wibob-X61:~/devops/1st_projects$ ls -la
total 28
drwxrwxr-x 3 bruh bruh 4096 Mar 30 13:56 .
drwxrwxr-x 5 bruh bruh 4096 Mar 30 13:56 ..
-rw-rw-r-- 1 bruh bruh 523 Mar 30 13:16 file.py.un~
drwxrwxr-x 8 bruh bruh 4096 Mar 30 13:56 .git
-rw-rw-r-- 1 bruh bruh 111 Mar 30 13:56 main.py
-rw-rw-r-- 1 bruh bruh 99 Mar 30 12:56 main.py~
bruh@wibob-X61:~/devops/1st_projects$ lxc file push ./main.py c1/tmp/main.py
bruh@wibob-X61:~/devops/1st_projects$ lxc file pull c1/etc/hosts
Description:
Pull files from containers

Usage:
lxc file pull [<remote>:]<container>/<path> [<remote>:]<container>/<path>... <target path> [flags]

Examples:
lxc file pull foo/etc/hosts .
To pull /etc/hosts from the container and write it to the current directory.

Flags:
-p, --create-dirs Create any directories necessary
-r, --recursive Recursively transfer files

Global Flags:
--debug Show all debug messages
--force-local Force using the local unix socket
-h, --help Print help
-v, --verbose Show all information messages
--version Print version number
Error: Invalid number of arguments
bruh@wibob-X61:~/devops/1st_projects$ lxc file pull c1/etc/hosts ./hosts_from_xlc
bruh@wibob-X61:~/devops/1st_projects$ cat hosts_from_xlc
127.0.0.1 localhost
# The following lines are desirable for IPv6 capable hosts
::1 ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
ff02::3 ip6-allhosts
bruh@wibob-X61:~/devops/1st_projects$ ls -la
total 36
drwxrwxrwt 8 root root 4096 Mar 29 23:37 .
drwxr-xr-x 21 root root 4096 Mar 29 23:39 ..
drwxrwxrwt 2 root root 4096 Mar 29 23:21 ICE-unix
drwxrwxrwt 2 root root 4096 Mar 29 23:21 Test-unix
drwxrwxrwt 2 root root 4096 Mar 29 23:21 X11-unix
drwxrwxrwt 2 root root 4096 Mar 29 23:21 XIM-unix
drwxrwxrwt 2 root root 4096 Mar 29 23:21 font-unix
-rwxrwxr-x 1 ubuntu ubuntu 111 Mar 29 23:37 main.py
drwx----- 2 root root 4096 Mar 29 23:31 mc-root
root@c1:/tmp#

```

Работа с Docker в Ubuntu

1. Установить docker (Screenshot)

```
bruh@wsrv-docker:~$ docker --version
Docker version 19.03.8, build afacb8b7f0
bruh@wsrv-docker:~$
```

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

```
bruh@wsrv-docker:~$ docker --version
Docker version 19.03.8, build afacb8b7f0
bruh@wsrv-docker:~$ docker search ubuntu
NAME                                         DESCRIPTION                                              STARS   OFFICIAL   AUTOMATED
ubuntu                                         Ubuntu is a Debian-based Linux operating sys... 10631   [OK]        [OK]
ubuntu                                         Docker image to provide HTML5 VNC interface ... 410     [OK]        [OK]
ubuntu                                         Dockerized SSH service, built on top of offl... 245     [OK]        [OK]
ubuntu                                         Ubuntu container with "headless" VNC session... 212     [OK]        [OK]
ubuntu                                         Upstart is an event-based replacement for th... 107     [OK]        [OK]
neurodebian                                     NeuroDebian provides neuroscience research s... 67      [OK]        [OK]
ubuntu-16-nginx-php-phphmyadmin-mysql-5       ubuntu-16-nginx-php-phphmyadmin-mysql-5          50      [OK]        [OK]
debootstrap                                     Simple always updated Ubuntu docker images w... 24      [OK]        [OK]
ubuntu                                         Ubuntu is a Debian-based Linux operating sys... 19      [OK]        [OK]
ubuntu-16-apache-php-5.6                      ubuntu-16-apache-php-5.6                         14      [OK]        [OK]
ubuntu-16-apache-php-7.0                      ubuntu-16-apache-php-7.0                         13      [OK]        [OK]
ubuntu                                         Ubuntu is a Debian-based Linux operating sys... 13      [OK]        [OK]
ubuntu-16-nginx-php-phphmyadmin-mariadb-10    ubuntu-16-nginx-php-phphmyadmin-mariadb-10        11      [OK]        [OK]
ubuntu-16-nginx-php-5.6                      ubuntu-16-nginx-php-5.6                         8       [OK]        [OK]
ubuntu-16-nginx-php-5.6-wordpress-4           ubuntu-16-nginx-php-5.6-wordpress-4             7       [OK]        [OK]
ubuntu-16-apache-php-7.1                     ubuntu-16-apache-php-7.1                         6       [OK]        [OK]
darksheer                                       Base Ubuntu Image -- Updated hourly            5       [OK]        [OK]
pivotaldato/ubuntu                            A quick freshening-up of the base Ubuntu doc... 4       [OK]        [OK]
ubuntu-16-nginx-php-7.0                       ubuntu-16-nginx-php-7.0                         4       [OK]        [OK]
pivotaldato/ubuntu16_04-build                 Ubuntu 16.04 Image for GPDB compilation        2       [OK]        [OK]
pivotaldato/ubuntu16-04-build                 ubuntu-16-ph-7.1                               1       [OK]        [OK]
smartentry/ubuntu                             ubuntu with smartentry                          1       [OK]        [OK]
pivotaldato/ubuntu-gpdb-dev                  Ubuntu images for GPDB development            1       [OK]        [OK]
pivotaldato/ubuntu-16-ssh                     ubuntu-16-ssh                                1       [OK]        [OK]
bruh@wsrv-docker:~$
```

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

```
bruh@wsrv-docker:~$ docker --version
Docker version 19.03.8, build afacb8b7f0
bruh@wsrv-docker:~$ docker search ubuntu
NAME                                         DESCRIPTION                                              STARS   OFFICIAL   AUTOMATED
ubuntu                                         Ubuntu is a Debian-based Linux operating sys... 10631   [OK]        [OK]
ubuntu                                         Docker image to provide HTML5 VNC interface ... 410     [OK]        [OK]
ubuntu                                         Dockerized SSH service, built on top of offl... 245     [OK]        [OK]
ubuntu                                         Ubuntu container with "headless" VNC session... 212     [OK]        [OK]
ubuntu                                         Upstart is an event-based replacement for th... 107     [OK]        [OK]
neurodebian                                     NeuroDebian provides neuroscience research s... 67      [OK]        [OK]
ubuntu-16-nginx-php-phphmyadmin-mysql-5       ubuntu-16-nginx-php-phphmyadmin-mysql-5          50      [OK]        [OK]
debootstrap                                     Simple always updated Ubuntu docker images w... 24      [OK]        [OK]
ubuntu                                         Ubuntu is a Debian-based Linux operating sys... 19      [OK]        [OK]
ubuntu-16-apache-php-5.6                      ubuntu-16-apache-php-5.6                         14      [OK]        [OK]
ubuntu-16-apache-php-7.0                      ubuntu-16-apache-php-7.0                         13      [OK]        [OK]
ubuntu                                         Ubuntu is a Debian-based Linux operating sys... 13      [OK]        [OK]
ubuntu-16-nginx-php-phphmyadmin-mariadb-10    ubuntu-16-nginx-php-phphmyadmin-mariadb-10        11      [OK]        [OK]
ubuntu-16-nginx-php-5.6                      ubuntu-16-nginx-php-5.6                         8       [OK]        [OK]
ubuntu-16-nginx-php-5.6-wordpress-4           ubuntu-16-nginx-php-5.6-wordpress-4             7       [OK]        [OK]
ubuntu-16-apache-php-7.1                     ubuntu-16-apache-php-7.1                         6       [OK]        [OK]
darksheer                                       Base Ubuntu Image -- Updated hourly            5       [OK]        [OK]
pivotaldato/ubuntu                            A quick freshening-up of the base Ubuntu doc... 4       [OK]        [OK]
ubuntu-16-nginx-php-7.0                       ubuntu-16-nginx-php-7.0                         4       [OK]        [OK]
pivotaldato/ubuntu16_04-build                 Ubuntu 16.04 Image for GPDB compilation        2       [OK]        [OK]
pivotaldato/ubuntu16-04-build                 ubuntu-16-ph-7.1                               1       [OK]        [OK]
smartentry/ubuntu                             ubuntu with smartentry                          1       [OK]        [OK]
pivotaldato/ubuntu-gpdb-dev                  Ubuntu images for GPDB development            1       [OK]        [OK]
pivotaldato/ubuntu-16-ssh                     ubuntu-16-ssh                                1       [OK]        [OK]
bruh@wsrv-docker:~$ docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
5bed26d33875: Pull complete
f11b2909c730: Pull complete
930bd0a195c84: Pull complete
78bf9a5ad49e: Pull complete
Digest: sha256:bec5a2727be7ffff3d308193cfde3491f8fbala2bd392b7546b43a051853a341d
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
bruh@wsrv-docker:~$ docker images
REPOSITORY      TAG          IMAGE ID      CREATED      SIZE
ubuntu          latest       4e5021d210f6  9 days ago   64.2MB
jenkins-ubuntu18 1.0         8fc0cb30fce  10 days ago  627MB
ubuntu          18.04       72300a873c2c  5 weeks ago  64.2MB
hello-world     latest       fcc289e99eb9  15 months ago 1.84kB
bruh@wsrv-docker:~$
```

4. Запустить команду просмотра загруженных на компьютер образов. (Screenshot). ([см выше](#))
5. Запустите обновление apt-get update (Screenshot)

```

Royal TSX File Edit Actions Tab View Window Help Computer Name Search
New Document dEvOps Кружок Docker Overview Getting started x61 Docker
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]
Base Ubuntu Image -- Updated hourly
A quick freshening up of the base Ubuntu doc...
ubuntu-16-nginx-php-7.0 ubuntu-16-nginx-php-7.0 4 [OK]
Ubuntu 16.04 image for GPDB compilation 2 [OK]
ubuntu-16-php-7.1 ubuntu-16-php-7.1 1 [OK]
ubuntu with smartentry ubuntu with smartentry 1 [OK]
Ubuntu images for GPDB development 1 [OK]
ubuntu-16-sshd ubuntu-16-sshd 1 [OK]

bruhwrv-docker:~$ docker pull ubuntu
Using default tag: latest
latest: Pulling from library/ubuntu
5bed26d33875: Pull complete
f11b29a9c730: Pull complete
930bd195c84: Pull complete
78bf9d5add49: Pull complete
Digest: sha256:bec5a2727beffff3d308193cfde3491f8fbala2ba392b7546b43a051853a341d
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest

bruhwrv-docker:~$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
ubuntu latest 4e5021d210f6 9 days ago 64.2MB
Jenkins-ubuntu18 1.0 8fcac30fce 10 days ago 627MB
ubuntu 18.04 72300a873c2c 5 weeks ago 64.2MB
hello-world latest fce289e99eb9 15 months ago 1.84kB

bruhwrv-docker:~$ docker run -it -p 8822:22 ubuntu
root@b1005da6bc3c:/# apt update
Get:1 http://archive.ubuntu.com/ubuntu bionic InRelease [242 kB]
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://archive.ubuntu.com/ubuntu bionic/main amd64 Packages [10.8 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic/restricted amd64 Packages [13.5 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [11.3 MB]
Get:7 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:8 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [35.2 kB]
Get:9 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [861 kB]
Get:10 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 Packages [7904 B]
Get:11 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [832 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [186 kB]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [1362 kB]
Get:14 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [11.9 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [1155 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [48.7 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 9s (2069 kB/s)
Reading package lists... Done
Building dependency tree
Reading state information... Done
9 packages can be upgraded. Run 'apt list --upgradable' to see them.

root@b1005da6bc3c:/#

```

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

The screenshot shows a macOS terminal window with a tmux session titled "bruhwrv-docker". Inside the tmux session, there are two panes. The left pane shows a file browser with a directory structure under "/bin". The right pane shows another file browser with a similar directory structure under "/bin". Both panes show files like "/bin", "/bin", "/bin", etc., with sizes and modification times. At the bottom of the terminal, there is a status bar with various icons and a message: "Hint: Want your plain shell? Press C-o, and get back to MC with C-o again." Below the status bar, there is a menu bar with "File", "Command", "Options", and "Right".

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

The screenshot shows the Royal TSX application window. On the left, there's a sidebar with sections like 'dEVOPS Кружок' (containing Docker, Docker copy, Hyper-V, Ansible, Jenkins, Git, Jenkins, Zabbix), 'Connections' (x61), and 'Application' (Credentials, Tasks, Default Settings). The main pane shows a terminal session with the command: `bruh@bruh-srv-docker:~$ sudo docker cp /etc/hosts b1005da6bc3c:/tmp/hosts_from_host`. A password prompt follows: `[sudo] password for bruh:`. The terminal then shows the contents of the copied file: `[root]# ls -la`.

This screenshot shows the same Royal TSX interface. The terminal session now displays the contents of the copied file on the host side: `[root]# ls -la`. The output includes files like `hosts_from_host`, `hosts_from_container`, and several Jenkins-related files.

This screenshot shows a more complex setup. The terminal session shows commands for copying files between multiple hosts and containers. It includes commands like `sudo docker cp` and `cd /tmp & ls -la`. The output lists various Jenkins configuration files and system logs.

8. Прочитать документацию и кратко описать основные 7 команд Dockerfile

FROM - указывает на имидж на основе которого делается билд (контейнер)

RUN - выполняет команды (apt-get update, apt-get install)

EXPOSE - информирует Docker о том, какие порты слушает контейнер

COPY - копирует файлы в докер образ

LABEL - добавляет метаданные в образ в формате "ключ"="значение"

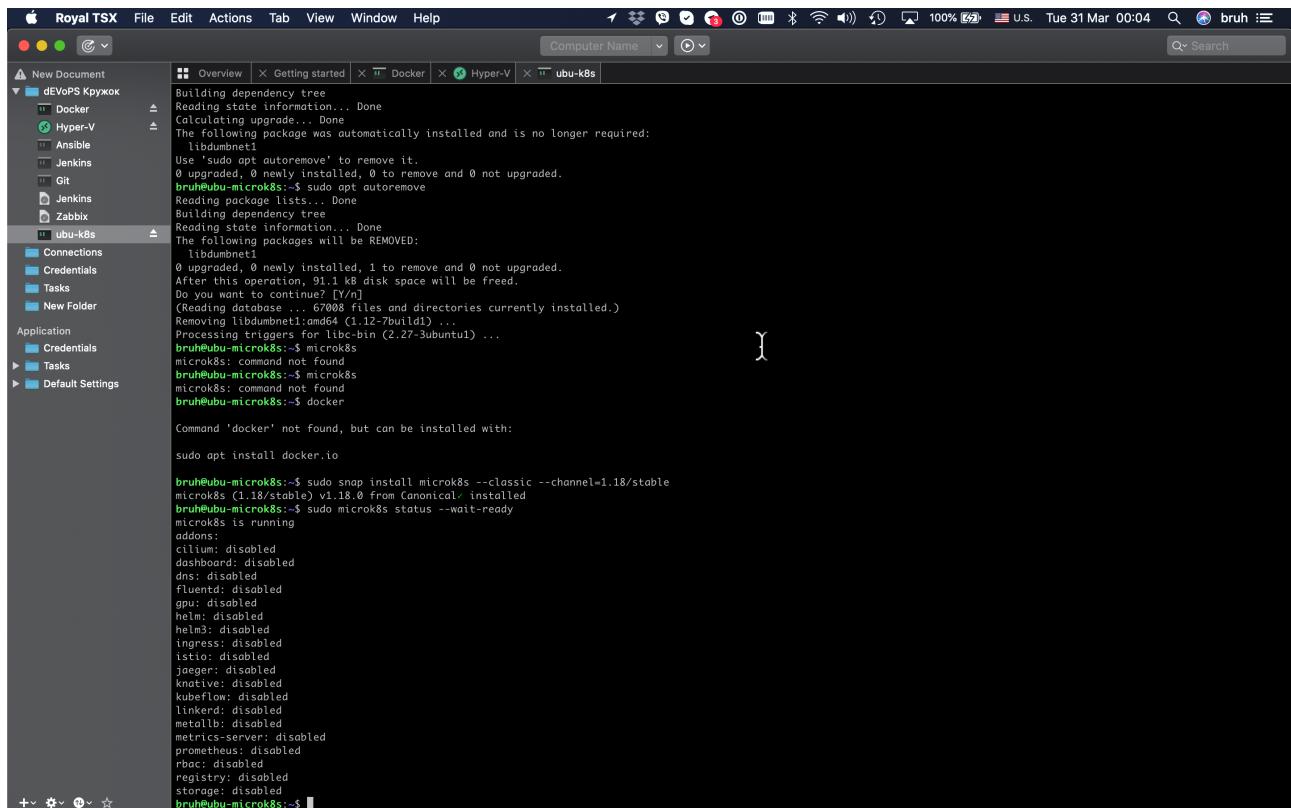
ADD - в отличие от COPY может копировать с URL и декомпрессировать файлы (имеет больший приоритет)

ENV - указывает на переменные окружения

VOLUME - проброс и монтирует директории хранящиеся на хостовой машине
 USER - используется для указания пользователя от имени которого выполняются команды

Работа с Kubernetes в Ubuntu

1. Установить microk8s (Screenshot)

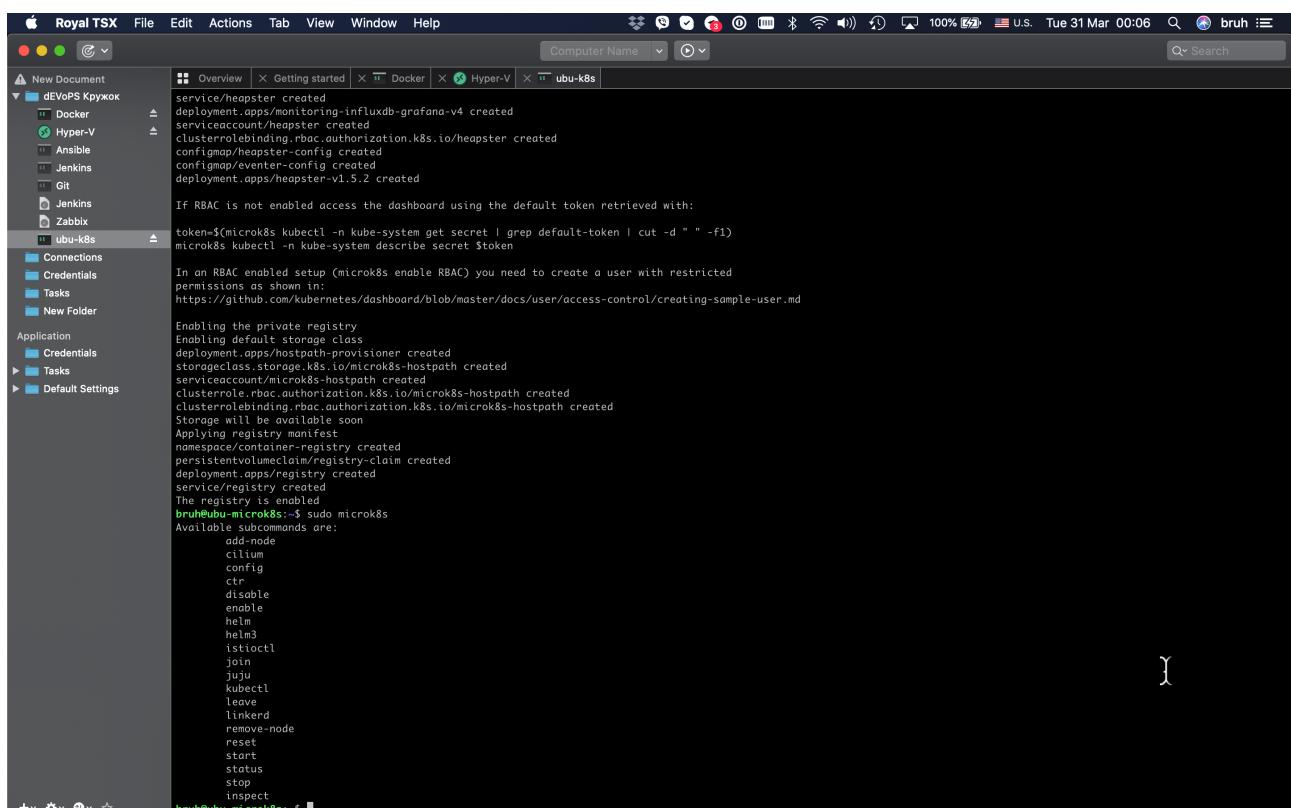


```

bruh@ubu-microk8s:~$ sudo apt autoremove
Reading dependency tree... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
bruh@ubu-microk8s:~$ sudo apt autoremove
Reading package lists... Done
Building dependency tree...
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libdumbnet1
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
After this operation, 91.1 kB disk space will be freed.
Do you want to continue? [Y/n]
(Reading database ... 67008 files and directories currently installed.)
Removing libdumbnet1:amd64 (1.12-2build1) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
bruh@ubu-microk8s:~$ microk8s
microk8s: command not found
bruh@ubu-microk8s:~$ microk8s
microk8s: command not found
bruh@ubu-microk8s:~$ docker
Command 'docker' not found, but can be installed with:
sudo apt install docker.io

bruh@ubu-microk8s:~$ sudo snap install microk8s --classic --channel=1.18/stable
microk8s (1.18/stable) v1.18.0 From Canonical✓ installed
bruh@ubu-microk8s:~$ sudo 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
  linked: disabled
  metrics-server: disabled
  prometheus: disabled
  rbac: disabled
  registry: disabled
  storage: disabled
bruh@ubu-microk8s:~$ 
  
```

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



```

bruh@ubu-microk8s:~$ sudo microk8s
service/heapster created
deployment.apps/monitoring-influxdb-grafana-v4 created
serviceaccount/heapster created
clusterrolebinding.rbac.authorization.k8s.io/heapster created
configmap/heapster-config created
configmap/eventer-config created
deployment.apps/heapster-v1.5.2 created

If RBAC is not enabled access the dashboard using the default token retrieved with:
token=$(microk8s kubectl -n kube-system get secret l grep default-token | cut -d " " -f1)
microk8s kubectl -n kube-system describe secret Stoken

In an RBAC enabled setup (microk8s enable RBAC) you need to create a user with restricted
permissions as shown in:
https://github.com/kubernetes/dashboard/blob/master/docs/user/access-control/creating-sample-user.md

Enabling the private registry
Enabling default storage class
deployment.apps/hostpath-provisioner created
storageclass.storage.k8s.io/microk8s-hostpath created
serviceaccount/microk8s-hostpath created
clusterrolebinding.rbac.authorization.k8s.io/microk8s-hostpath created
clusterrolebinding.rbac.authorization.k8s.io/microk8s-hostpath created
Storage will be available soon
Applying registry manifest
namespace/container-registry created
persistentvolumeclaim/registry-claim created
deployment.apps/registry created
service/registry created
The registry is enabled
bruh@ubu-microk8s:~$ sudo microk8s
Available subcommands are:
  add-node
  cilium
  config
  ctr
  disable
  enable
  helm
  helm3
  istioctl
  join
  juju
  kubectl
  leave
  linkerd
  remove-node
  reset
  start
  status
  stop
  inspect
bruh@ubu-microk8s:~$ 
  
```

```
root@ubu-microk8s:~# microk8s.status
microk8s is running
addons:
  dashboard: enabled
  dns: enabled
  metrics-server: enabled
  registry: enabled
  storage: enabled
  cilium: disabled
  fluentd: disabled
  gpu: disabled
  helm: disabled
  helm3: disabled
  istio: disabled
  jaeger: disabled
  knative: disabled
  kubeflow: disabled
  linkerd: disabled
  metallb: disabled
  prometheus: disabled
  rbac: disabled
root@ubu-microk8s:~#
```

3. Просмотрите установленные в докере образы; заверните один из них в образ *.tar на скрине хвостик билда, его запуск (для проверки), экспорт и копирование на хост с k8s

```
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site _000-default.
invoke-rc.d: could not determine current runlevel
invoke-rc.d: policy-rc.d denied execution of start.
Setting up libmagick1:amd64 (1:5.25-2ubuntu1.3) ...
Setting up file (1:5.25-2ubuntu1.3) ...
Setting up iproute2 (4.3.0-1ubuntu3.16.04.5) ...
Setting up ifupdown (0.8.10ubuntu1.4) ...
Creating /etc/network/interfaces.
Setting up libdisc-export160 (1:9.10.3.dfsg.1-0ubuntu1.15) ...
Setting up libdisc-export162 (1:9.10.3.dfsg.1-0ubuntu1.15) ...
Setting up libdisc-client (4.3.3-Subuntu12.10) ...
Setting up isc-dhcp-common (4.3.3-Subuntu12.10) ...
Setting up libtunable1:amd64 (1:6.0-2ubuntu3) ...
Setting up netbase (5.3) ...
Setting up libssl2-modules:amd64 (2.1.26.dfsg1-14ubuntu0.2) ...
Setting up openssl (1.0.2g-1ubuntu4.15) ...
Setting up xml-core (0.13+nmu2) ...
Setting up rename (0.29-4) ...
update-alternatives: using /usr/bin/file-rename to provide /usr/bin/rename (rename) in auto mode
Setting up ssl-cert (1.0.37) ...
debconf: unable to initialize frontend: Dialog
debconf: (TERM is not set, so the dialog frontend is not usable.)
debconf: falling back to frontend: Readline
Processing triggers for libc-bin (2.23-0ubuntu11) ...
Processing triggers for systemd (229-4ubuntu21.27) ...
Processing triggers for sgml-base (1.26+nmu4ubuntu1) ...
Removing intermediate container 91b91867a95e
--> c6321a64b066
Step 5/7 : RUN echo 'Hello World From LAB-server!' > /var/www/html/index.html
--> Running in 36d4d4ec1e5b
Removing intermediate container 36d4d4ec1e5b
--> 8d9c6c2816fb
Step 6/7 : CMD "/usr/sbin/apache2ctl", "-D", "FOREGROUND"
--> Running in 3b6f3f23b8c4
Removing intermediate container 3b6f3f23b8c4
--> 284c00bd85b5
Step 7/7 : EXPOSE 80
--> Running in 804212d0275c
Removing intermediate container 804212d0275c
--> 8ac01a1816fb
Successfully built 8ac01a1816fb
Successfully tagged wapache:v1
bruh@wsrv-docker:~/apache$ docker run -d -p 8880:80 wapache:v1
98eecc59e3b741fe8cb6013b174816e8e29c171adaf42689d24806ef490f59f9
bruh@wsrv-docker:~/apache$ docker save wapache:v1 > wapache.tar
bruh@wsrv-docker:~/apache$ scp w
wapache.tar wsrv-docker:
bruh@wsrv-docker:~/apache$ scp wapache.tar bruh@192.168.199.102:/home/bruh
wapache.tar
bruh@wsrv-docker:~/apache$
```

4. Импортируйте образ в Kubernetes (Screenshot)

```

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Application Credentials Tasks Default Settings
  Credentia...
  Tasks
  Default Settings

root@ubu-microk8s:~# microk8s ctr image import apache.tar
unpacking docker.io/library/wapache:v1 (sha256:f8ceb69c3e165a7ddbdb4b5247b4daf1faa64822416d6070f12ec1717ed8d97)...done
root@ubu-microk8s:~#

```

```

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  Credentia...
  Tasks
  Default Settings

root@ubu-microk8s:~# microk8s kubectl apply -f wapache_service.yml
service/wapache-service created
root@ubu-microk8s:~# microk8s.kubectl get all
NAME           READY   STATUS    RESTARTS   AGE
pod/wapache-54df7d8488-gf9nz   1/1     Running   0          4m54s

NAME            TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.152.183.1   <none>       443/TCP   38m
service/wapache-service   ClusterIP   10.152.183.83   <none>       80/TCP    29s

NAME           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/wapache   1/1     1           1          4m54s

NAME           DESIRED   CURRENT   READY   AGE
replicaset.apps/wapache-54df7d8488   1         1         1        4m54s
root@ubu-microk8s:~# curl 10.152.183.83:80
Hello World from LAB-server!
root@ubu-microk8s:~# data

```

5. Запустите образ и убедитесь, что он работает. (Screenshot)

apache отвечает по 80-му порту адреса внутри кластера

```

root@ubu-microk8s:~# microk8s.kubectl apply -f wapache_service.yml
service/wapache-service created
root@ubu-microk8s:~# microk8s.kubectl get all
NAME           READY   STATUS    RESTARTS   AGE
pod/wapache-54df7d8488-gf9nz   1/1     Running   0          4m54s

NAME            TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.152.183.1   <none>       443/TCP   38m
service/wapache-service   ClusterIP   10.152.183.83   <none>       80/TCP    29s

NAME           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/wapache   1/1     1           1          4m54s

NAME           DESIRED   CURRENT   READY   AGE
replicaset.apps/wapache-54df7d8488   1         1         1        4m54s
root@ubu-microk8s:~# curl 10.152.183.83:80
Hello World from LAB-server!
root@ubu-microk8s:~# data

```

Command 'data' not found, did you mean:

```

  command 'dat' from deb liballegro4-dev
  command 'date' from deb coreutils

```

Try: apt install <deb name>

root@ubu-microk8s:~# date

Tue Mar 31 00:04:21 UTC 2020

root@ubu-microk8s:~#

вариант конфигурации когда апач отвечает по порту 30000 по адресу хостовой машины

```

root@ubu-microk8s:~# cat wapache_service.yaml
kind: Service
apiVersion: v1
metadata:
  name: wapache-service
spec:
  selector:
    pod: wapache-container
  ports:
    - protocol: TCP
      port: 80
      nodePort: 30000
      #targetPort: 8001
      # type: ClusterIP
    type: NodePort

root@ubu-microk8s:~# microk8s.kubectl get all
NAME           READY   STATUS    RESTARTS   AGE
pod/wapache-54df7d8488-gf9nz   1/1     Running   0          60m
NAME              TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)      AGE
service/kubernetes   ClusterIP   10.152.183.1   <none>       443/TCP     94m
service/wapache-service   NodePort    10.152.183.83  <none>       80:30000/TCP  55m

NAME           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/wapache   1/1     1           1           60m

NAME            DESIRED   CURRENT   READY   AGE
replicaset.apps/wapache-54df7d8488   1         1         1         60m
root@ubu-microk8s:~# curl http://192.168.199.102:30000
Hello World from LAB-server!
root@ubu-microk8s:~#

```

