

Sprawozdanie

Programowanie aplikacji w chmurze obliczeniowej

Laboratorium 3

Uruchomienie usługi w kontenerze docker

Łukasz Oleksiuk

Grupa: 6.6

Index: 097690

Zadanie 3.1 Aktualizacja systemu kontenerowego

Pobranie obrazu bazowego ubuntu:latest:

```
student@vhost1:~$ sudo docker pull ubuntu:latest
[sudo] password for student:
latest: Pulling from library/ubuntu
bccd10f490ab: Pull complete
Digest: sha256:77906da86b60585ce12215807090eb327e7386c8fafb5402369e421f44eff17e
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
```

Uruchomienie kontenera na bazie obrazu ubuntu:latest:

```
student@vhost1:~$ sudo docker run -it --name zadanie3_1 ubuntu:latest /bin/bash
```

Zaktualizowanie bazy repozytoriów ubuntu:

```
root@e066242dd373:/# apt-get update
Get:1 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]
Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [1568 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy/restricted amd64 Packages [164 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy/main amd64 Packages [1792 kB]
Get:9 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [1077 kB]
Get:10 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [44.6 kB]
Get:11 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [1960 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [50.4 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1350 kB]
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1847 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [1997 kB]
Get:17 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [29.9 kB]
Get:18 http://archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [50.4 kB]
Fetched 30.3 MB in 6s (4873 kB/s)
Reading package lists... Done
```

Zainstalowanie pakietu wget:

```
root@e066242dd373:/# apt-get install wget
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ca-certificates libpsl5 openssl publicsuffix
The following NEW packages will be installed:
  ca-certificates libpsl5 openssl publicsuffix wget
0 upgraded, 5 newly installed, 0 to remove and 1 not upgraded.
Need to get 1896 kB of archives.
After this operation, 3944 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssl amd64 3.0.2-0ubuntu1.15 [1186 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ca-certificates all 20230311ubuntu0.22.04.1 [155 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/main amd64 libpsl5 amd64 0.21.0-1.2build2 [58.4 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/main amd64 publicsuffix all 20211207.1025-1 [129 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 wget amd64 1.21.2-2ubuntu1 [367 kB]
Fetched 1896 kB in 3s (565 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package openssl.
(Reading database ... 4393 files and directories currently installed.)
Preparing to unpack .../openssl_3.0.2-0ubuntu1.15_amd64.deb ...
Unpacking openssl (3.0.2-0ubuntu1.15) ...
Selecting previously unselected package ca-certificates.
Preparing to unpack .../ca-certificates_20230311ubuntu0.22.04.1_all.deb ...
Unpacking ca-certificates (20230311ubuntu0.22.04.1) ...
Selecting previously unselected package libpsl5:amd64.
Preparing to unpack .../libpsl5_0.21.0-1.2build2_amd64.deb ...
Unpacking libpsl5:amd64 (0.21.0-1.2build2) ...
Selecting previously unselected package publicsuffix.
Preparing to unpack .../publicsuffix_20211207.1025-1_all.deb ...
Unpacking publicsuffix (20211207.1025-1) ...
Selecting previously unselected package wget.
Preparing to unpack .../wget_1.21.2-2ubuntu1_amd64.deb ...
Unpacking wget (1.21.2-2ubuntu1) ...
Setting up libpsl5:amd64 (0.21.0-1.2build2) ...
Setting up wget (1.21.2-2ubuntu1) ...
Setting up openssl (3.0.2-0ubuntu1.15) ...
Setting up publicsuffix (20211207.1025-1) ...
Setting up ca-certificates (20230311ubuntu0.22.04.1) ...
debconf: unable to initialize frontend: Dialog
debconf: (No usable dialog-like program is installed, so the dialog based frontend cannot be used. at /usr/share/per
debconf: falling back to frontend: Readline
debconf: unable to initialize frontend: Readline
debconf: (Can't locate Term/ReadLine.pm in @INC (you may need to install the Term::ReadLine module) (@INC contains:
p/x86_64-linux-gnu/perl5/5.34 /usr/share/perl5 /usr/lib/x86_64-linux-gnu/perl-base /usr/lib/x86_64-linux-gnu/perl/5.
dline.pm line 7.)
debconf: falling back to frontend: Teletype
Updating certificates in /etc/ssl/certs...
137 added, 0 removed; done.
Processing triggers for libc-bin (2.35-0ubuntu3.6) ...
Processing triggers for ca-certificates (20230311ubuntu0.22.04.1) ...
Updating certificates in /etc/ssl/certs...
0 added, 0 removed; done.
Running hooks in /etc/ca-certificates/update.d...
done.
```

Sprawdzenie, czy wget jest w systemie:

```
root@e066242dd373:/# which wget
/usr/bin/wget
```

Polecenie docker diff

```
student@vhost1:~$ sudo docker diff zadanie3_1
[sudo] password for student:
C /usr
C /usr/share
C /usr/share/lintian
C /usr/share/lintian/overrides
A /usr/share/lintian/overrides/openssl
C /usr/share/doc
```

Zatrzymanie zmodyfikowanego kontenera:

```
root@e066242dd373:/# exit
exit
```

Utworzenie obrazu ze zmodyfikowanego kontenera:

```
student@vhost1:~$ sudo docker commit zadanie3_1 zadanie3_1m
sha256:90cbca9fce86db6634d9c3ee045b7ee19c54e7a4145989d4c2151a7be06dd3b9
```

Sprawdzenie warstw obrazu:

```
student@vhost1:~$ sudo docker history zadanie3_1m
```

IMAGE	CREATED	CREATED BY	SIZE	COMMENT
90cbca9fce86	40 seconds ago	/bin/bash	53.1MB	
ca2b0f26964c	13 days ago	/bin/sh -c #(nop) CMD ["/bin/bash"]	0B	
<missing>	13 days ago	/bin/sh -c #(nop) ADD file:21c2e8d95909bec6f...	77.9MB	
<missing>	13 days ago	/bin/sh -c #(nop) LABEL org.opencontainers...	0B	
<missing>	13 days ago	/bin/sh -c #(nop) LABEL org.opencontainers...	0B	
<missing>	13 days ago	/bin/sh -c #(nop) ARG LAUNCHPAD_BUILD_ARCH	0B	
<missing>	13 days ago	/bin/sh -c #(nop) ARG RELEASE	0B	

Zadanie 3.2 Budowanie obrazu z pliku Dockerfile

Stworzenie pliku Dockerfile:

```
student@vhost1:~/docker$ touch Dockerfile
student@vhost1:~/docker$ ls
Dockerfile
```

Zawartość pliku Dockefile:

```
1 # Użyj obrazu bazowego Ubuntu
2 FROM ubuntu:latest
3
4 # Autor obrazu
5 LABEL author="Lukasz"
6 LABEL email="s97690@pollub.edu.pl"
7
8 # Aktualizacja systemu Ubuntu i instalacja serwera Apache
9 RUN apt-get update && \
10     apt-get install -y apache2 && \
11     apt-get clean
12
13 # Zmiana port nasłuchiwania Apache na 8080
14 RUN sed -i 's/Listen 80/Listen 8080/g' /etc/apache2/ports.conf
15
16 # Ustawienie serwera Apache na nasłuchiwanie na porcie 8080
17 EXPOSE 8080
18
19 # Uruchomienie serwera Apache podczas startu kontenera
20 CMD ["apache2ctl", "-D", "FOREGROUND"]
```

Zbudowanie obrazu:

```
student@vhost1:~/docker$ sudo docker build -t web100 .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
             Install the buildx component to build images with BuildKit:
             https://docs.docker.com/go/buildx/

Sending build context to Docker daemon   2.56kB
Step 1/7 : FROM ubuntu:latest
----> ca2b0f26964c
Step 2/7 : LABEL author="Lukasz"
----> Running in 56381d2d5f8a
Removing intermediate container 56381d2d5f8a
----> d73e55c688c9
Step 3/7 : LABEL email="s97690@pollub.edu.pl"
----> Running in 30e0718607da
Removing intermediate container 30e0718607da
----> 6fde5d7a17fd
Step 4/7 : RUN apt-get update &&      apt-get install -y apache2 &&      apt-get clean
----> Running in 1c3b920020a9
Get:1 http://archive.ubuntu.com/ubuntu jammy InRelease [270 kB]
Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:3 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [1961 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]
Get:8 http://archive.ubuntu.com/ubuntu jammy/main amd64 Packages [1792 kB]
```

Sprawdzenie za pomocą polecenia: docker inspect

```
student@vhost1:~/docker$ sudo docker inspect web100
[
  {
    "Id": "sha256:995f6611f801cc09d80087c212b41ed54b541d6383fe8564f7ec90d4679dc9e9",
    "RepoTags": [
      "web100:latest"
    ],
    "RepoDigests": [],
    "Parent": "sha256:570ad6873754fb2d246220824cbef0fc4718845ad815aecb3fc8c33c27bc002e",
    "Comment": "",
    "Created": "2024-03-19T00:39:46.31594326Z",
    "Container": "c7bf0c0ca0727a753ebe3e43e62912a28814271c673dfa5313ba5fe831d55e67",
    "ContainerConfig": {
      "Hostname": "c7bf0c0ca072",
      "Domainname": "",
      "User": "",
      "AttachStdin": false,
      "AttachStdout": false,
      "AttachStderr": false,
      "ExposedPorts": {
        "8080/tcp": {}
      },

```

Sprawdzenie za pomocą polecenia: docker history

```
student@vhost1:~/docker$ sudo docker history web100
IMAGE          CREATED          CREATED BY          SIZE      COMMENT
995f6611f801   21 minutes ago  /bin/sh -c #(nop)  CMD ["apache2ctl" "-D" "F...  0B
570ad6873754   21 minutes ago  /bin/sh -c #(nop)  EXPOSE 8080          0B
fb9838df7baa   21 minutes ago  /bin/sh -c sed -i 's/Listen 80/Listen 8080/g... 322B
2e6130e1757f   21 minutes ago  /bin/sh -c apt-get update && apt-get ins... 157MB
6fde5d7a17fd   22 minutes ago  /bin/sh -c #(nop)  LABEL email=s97690@pollub... 0B
d73e55c688c9   22 minutes ago  /bin/sh -c #(nop)  LABEL author=Lukasz   0B
ca2b0f26964c   2 weeks ago     /bin/sh -c #(nop)  CMD ["/bin/bash"]    0B
<missing>      2 weeks ago     /bin/sh -c #(nop)  ADD file:21c2e8d95909bec6f... 77.9MB
<missing>      2 weeks ago     /bin/sh -c #(nop)  LABEL org.opencontainers... 0B
<missing>      2 weeks ago     /bin/sh -c #(nop)  LABEL org.opencontainers... 0B
<missing>      2 weeks ago     /bin/sh -c #(nop)  ARG LAUNCHPAD_BUILD_ARCH 0B
<missing>      2 weeks ago     /bin/sh -c #(nop)  ARG RELEASE           0B
```

Uruchomienie kontenera:

```
student@vhost1:~/docker$ sudo docker run -d -p 8080:8080 web100
b6da3322efa3a6fed28ad776d22ca7dddf4d2fc109e5296b58ac088ab5f01d7d
```

Wnioski

Dla zadania 3.1:

W tym zadaniu można poznać proces aktualizacji systemu i instalowania nowych pakietów wewnątrz kontenera. Zadaniu umożliwia poznanie jednego z sposobów zarządzania kontenerami i wykonywania operacji na systemach wewnątrz nich.

Dla zadania 3.2:

Zadanie pozwala poznać proces budowania własnego obrazu Docker w wykorzystaniem pliku Dockerfile i proces skonfigurowania i uruchomienia serwera Apache. Podczas wykonywania tego zadania napotkałem na problem z serwerem, ponieważ serwer domyślnie nasłuchiwał na innym porcie. Po dodaniu do pliku Dockerfile odpowiedniego polecenia (RUN sed -i 's/Listen 80/Listen 8080/g' /etc/apache2/ports.conf) serwer uruchomił się poprawnie i można było z nim nawiązać komunikację. Dodatkową kwestią jest upewnienie się czy wybrany port nie jest już zajęty przez inny proces.