**Exercise-3: Exposing Container Ports to the Host**

***NOTE:***Although you should be able to run these commands on any Docker version on any Linux Distribution, for the purposes of these exercises, be sure you are running Docker v1.10+ as well as the latest CentOS or Ubuntu distribution. Be sure to have pulled the 'centos:6' and 'ubuntu:latest' images from the Docker Hub (docker pull) before starting this exercise.

1. Create a container from the 'centos:6' base image on your system. This container does not need to be name but should be run in daemon mode, interactive and connected to the current terminal. Finally, it should start the bash shell on start up.

[user@minion-01 ~]$ docker run -itd docker.io/centos:6 /bin/bash

99f87625ff34a5a25af8edd7e95ad9b6a4bc70db63c2ac6e0850dd4cfae58cef

[user@minion-01 ~]$ docker ps

CONTAINER ID        IMAGE                COMMAND             CREATED             STATUS              PORTS               NAMES

99f87625ff34        docker.io/centos:6   "/bin/bash"         3 seconds ago       Up 2 seconds                            elegant\_bohr

[user@minion-01 ~]$ docker ps

CONTAINER ID        IMAGE                COMMAND             CREATED             STATUS              PORTS               NAMES

99f87625ff34        docker.io/centos:6   "/bin/bash"         5 seconds ago       Up 5 seconds                            elegant\_bohr

2. Using the appropriate Docker inspection command, find the IP address and name for the running container. Once you have the IP, ping the IP to be sure it is running. Finally, attach to the running container so you are logged into the shell.

[user@minion-01 ~]$ docker ps

CONTAINER ID        IMAGE                COMMAND             CREATED             STATUS              PORTS               NAMES

99f87625ff34        docker.io/centos:6   "/bin/bash"         7 minutes ago       Up 7 minutes                            elegant\_bohr

[user@minion-01]$ docker inspect elegant\_bohr | grep IP

        "GlobalIPv6Address": "",

        "GlobalIPv6PrefixLen": 0,

        "IPAddress": "172.17.0.2",

        "IPPrefixLen": 16,

        "IPv6Gateway": "",

        "LinkLocalIPv6Address": "",

        "LinkLocalIPv6PrefixLen": 0,

        "SecondaryIPAddresses": null,

        "SecondaryIPv6Addresses": null

[user@minion-01 ~]$ ping 172.17.0.2

PING 172.17.0.2 (172.17.0.2) 56(84) bytes of data.

64 bytes from 172.17.0.2: icmp\_seq=1 ttl=64 time=0.069 ms

64 bytes from 172.17.0.2: icmp\_seq=2 ttl=64 time=0.096 ms

^C

--- 172.17.0.2 ping statistics ---

2 packets transmitted, 2 received, 0% packet loss, time 999ms

rtt min/avg/max/mdev = 0.069/0.082/0.096/0.016 ms

[user@minion-01 ~]$ docker attach elegant\_bohr

[root@99f87625ff34 /]#

3. From within the container, install the Open-SSH server and make sure the service is running. From another terminal, try to log into the container over SSH by IP and note the result.

[root@99f87625ff34 /]# yum install openssh-server

... Lots of Output Here

Installed:

  openssh-server.x86\_64 0:5.3p1-112.el6\_7

Dependency Installed:

  fipscheck.x86\_64 0:1.2.0-7.el6              fipscheck-lib.x86\_64 0:1.2.0-7.el6       openssh.x86\_64 0:5.3p1-112.el6\_7

  tcp\_wrappers-libs.x86\_64 0:7.6-57.el6

Complete!

[root@99f87625ff34 /]# service sshd start

Generating SSH2 RSA host key:                              [  OK  ]

Generating SSH1 RSA host key:                              [  OK  ]

Generating SSH2 DSA host key:                              [  OK  ]

Starting sshd:

(Different Terminal)

[user@minion-01 ~]$ ssh test@172.17.0.2

ssh: connect to host 172.17.0.2 port 22: Connection refused

4. Exit and stop the container. Remove the container from the list of previously run containers once you obtain the name from the appropriate Docker command.

[user@minion-01 ~]$ docker ps -a

CONTAINER ID        IMAGE                COMMAND             CREATED             STATUS                         PORTS               NAMES

99f87625ff34        docker.io/centos:6   "/bin/bash"         About an hour ago   Exited (0) 4 seconds ago                           elegant\_bohr

8ef073d5c7f4        docker.io/centos:6   "/bin/bash"         About an hour ago   Exited (0) About an hour ago                       silly\_poincare

[user@minion-01 ~]$ docker rm elegant\_bohr

elegant\_bohr

[user@minion-01 ~]$ docker rm silly\_poincare

silly\_poincare

[user@minion-01 ~]$ docker images

REPOSITORY          TAG                 IMAGE ID            CREATED             VIRTUAL SIZE

docker.io/ubuntu    latest              91e54dfb1179        4 days ago          188.3 MB

docker.io/centos    6                   a005304e4e74        9 weeks ago         203.1 MB

[user@minion-01 ~]$

5. Create another container, name this container 'test\_ssh'. When creating the container, it should be run in interactive mode and attached to the current terminal running the bash shell. Finally, expose port 22 on the container to port 8022 on the host system. Once logged in, install the Open-SSH server and make sure the service is running. Find the IP address of the container and note it.

[user@minion-01 ~]$ docker ps

CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES

[user@minion-01 ~]$ docker ps -a

CONTAINER ID        IMAGE                COMMAND             CREATED             STATUS                         PORTS               NAMES

99f87625ff34        docker.io/centos:6   "/bin/bash"         About an hour ago   Exited (0) 4 seconds ago                           elegant\_bohr

8ef073d5c7f4        docker.io/centos:6   "/bin/bash"         About an hour ago   Exited (0) About an hour ago                       silly\_poincare

[user@minion-01 ~]$ docker rm elegant\_bohr

elegant\_bohr

[user@minion-01 ~]$ docker rm silly\_poincare

silly\_poincare

[user@minion-01 ~]$ docker images

REPOSITORY          TAG                 IMAGE ID            CREATED             VIRTUAL SIZE

docker.io/ubuntu    latest              91e54dfb1179        4 days ago          188.3 MB

docker.io/centos    6                   a005304e4e74        9 weeks ago         203.1 MB

[user@minion-01 ~]$ docker images

REPOSITORY          TAG                 IMAGE ID            CREATED             VIRTUAL SIZE

docker.io/ubuntu    latest              91e54dfb1179        4 days ago          188.3 MB

docker.io/centos    6                   a005304e4e74        9 weeks ago         203.1 MB

[user@minion-01 ~]$ docker run -it --name="test\_ssh" -p 8022:22 docker.io/centos:6 /bin/bash

Usage of loopback devices is strongly discouraged for production use. Either use `--storage-opt dm.thinpooldev` or use `--storage-opt dm.no\_warn\_on\_loop\_devices=true` to suppress this warning.

[root@de1119934beb /]# yum install openssh-server

Loaded plugins: fastestmirror

Setting up Install Process

base                                                                                                    | 3.7 kB     00:00

base/primary\_db                                                                                         | 4.6 MB     00:07

extras                                                                                                  | 3.4 kB     00:00

extras/primary\_db                                                                                       |  27 kB     00:00

updates                                                                                                 | 3.4 kB     00:00

updates/primary\_db                                                                                      | 1.3 MB     00:01

Resolving Dependencies

--> Running transaction check

---> Package openssh-server.x86\_64 0:5.3p1-112.el6\_7 will be installed

--> Processing Dependency: openssh = 5.3p1-112.el6\_7 for package: openssh-server-5.3p1-112.el6\_7.x86\_64

--> Processing Dependency: libwrap.so.0()(64bit) for package: openssh-server-5.3p1-112.el6\_7.x86\_64

--> Processing Dependency: libfipscheck.so.1()(64bit) for package: openssh-server-5.3p1-112.el6\_7.x86\_64

--> Running transaction check

---> Package fipscheck-lib.x86\_64 0:1.2.0-7.el6 will be installed

--> Processing Dependency: /usr/bin/fipscheck for package: fipscheck-lib-1.2.0-7.el6.x86\_64

---> Package openssh.x86\_64 0:5.3p1-112.el6\_7 will be installed

---> Package tcp\_wrappers-libs.x86\_64 0:7.6-57.el6 will be installed

--> Running transaction check

---> Package fipscheck.x86\_64 0:1.2.0-7.el6 will be installed

--> Finished Dependency Resolution

Dependencies Resolved

===============================================================================================================================

 Package                            Arch                    Version                             Repository                Size

===============================================================================================================================

Installing:

 openssh-server                     x86\_64                  5.3p1-112.el6\_7                     updates                  324 k

Installing for dependencies:

 fipscheck                          x86\_64                  1.2.0-7.el6                         base                      14 k

 fipscheck-lib                      x86\_64                  1.2.0-7.el6                         base                     8.3 k

 openssh                            x86\_64                  5.3p1-112.el6\_7                     updates                  274 k

 tcp\_wrappers-libs                  x86\_64                  7.6-57.el6                          base                      62 k

Transaction Summary

===============================================================================================================================

Install       5 Package(s)

Total download size: 682 k

Installed size: 1.6 M

Is this ok [y/N]: y

Downloading Packages:

(1/5): fipscheck-1.2.0-7.el6.x86\_64.rpm                                                                 |  14 kB     00:00

(2/5): fipscheck-lib-1.2.0-7.el6.x86\_64.rpm                                                             | 8.3 kB     00:00

(3/5): openssh-5.3p1-112.el6\_7.x86\_64.rpm                                                               | 274 kB     00:00

(4/5): openssh-server-5.3p1-112.el6\_7.x86\_64.rpm                                                        | 324 kB     00:00

(5/5): tcp\_wrappers-libs-7.6-57.el6.x86\_64.rpm                                                          |  62 kB     00:00

-------------------------------------------------------------------------------------------------------------------------------

Total                                                                                          306 kB/s | 682 kB     00:02

warning: rpmts\_HdrFromFdno: Header V3 RSA/SHA1 Signature, key ID c105b9de: NOKEY

Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-6

Importing GPG key 0xC105B9DE:

 Userid : CentOS-6 Key (CentOS 6 Official Signing Key) <centos-6-key@centos.org>

 Package: centos-release-6-6.el6.centos.12.2.x86\_64 (@CentOS/$releasever)

 From   : /etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-6

Is this ok [y/N]: y

Running rpm\_check\_debug

Running Transaction Test

Transaction Test Succeeded

Running Transaction

Warning: RPMDB altered outside of yum.

  Installing : fipscheck-1.2.0-7.el6.x86\_64                                                                                1/5

  Installing : fipscheck-lib-1.2.0-7.el6.x86\_64                                                                            2/5

  Installing : openssh-5.3p1-112.el6\_7.x86\_64                                                                              3/5

  Installing : tcp\_wrappers-libs-7.6-57.el6.x86\_64                                                                         4/5

  Installing : openssh-server-5.3p1-112.el6\_7.x86\_64                                                                       5/5

  Verifying  : tcp\_wrappers-libs-7.6-57.el6.x86\_64                                                                         1/5

  Verifying  : fipscheck-lib-1.2.0-7.el6.x86\_64                                                                            2/5

  Verifying  : fipscheck-1.2.0-7.el6.x86\_64                                                                                3/5

  Verifying  : openssh-5.3p1-112.el6\_7.x86\_64                                                                              4/5

  Verifying  : openssh-server-5.3p1-112.el6\_7.x86\_64                                                                       5/5

Installed:

  openssh-server.x86\_64 0:5.3p1-112.el6\_7

Dependency Installed:

  fipscheck.x86\_64 0:1.2.0-7.el6              fipscheck-lib.x86\_64 0:1.2.0-7.el6       openssh.x86\_64 0:5.3p1-112.el6\_7

  tcp\_wrappers-libs.x86\_64 0:7.6-57.el6

Complete!

[root@de1119934beb /]# service sshd start

Generating SSH2 RSA host key:                              [  OK  ]

Generating SSH1 RSA host key:                              [  OK  ]

Generating SSH2 DSA host key:                              [  OK  ]

Starting sshd:                                             [  OK  ]

[root@de1119934beb /]# ifconfig

eth0      Link encap:Ethernet  HWaddr 02:42:AC:11:00:03

          inet addr:172.17.0.3  Bcast:0.0.0.0  Mask:255.255.0.0

          inet6 addr: fe80::42:acff:fe11:3/64 Scope:Link

          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1

          RX packets:3944 errors:0 dropped:0 overruns:0 frame:0

          TX packets:2104 errors:0 dropped:0 overruns:0 carrier:0

          collisions:0 txqueuelen:0

          RX bytes:7151212 (6.8 MiB)  TX bytes:116622 (113.8 KiB)

lo        Link encap:Local Loopback

          inet addr:127.0.0.1  Mask:255.0.0.0

          inet6 addr: ::1/128 Scope:Host

          UP LOOPBACK RUNNING  MTU:65536  Metric:1

          RX packets:0 errors:0 dropped:0 overruns:0 frame:0

          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0

          collisions:0 txqueuelen:0

          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)

[root@de1119934beb /]#

6. Install the 'sudo' utility. Add a user called 'test' and set a password for that user. Add the 'test' user to the 'sudoers' file. From another terminal window, attempt to log into the container via SSH on port 8022 as the 'test' user and confirm access.

[root@de1119934beb /]# yum install sudo

Loaded plugins: fastestmirror

Setting up Install Process

Determining fastest mirrors

 \* base: repos.dfw.quadranet.com

 \* extras: centos.mirror.lstn.net

 \* updates: mirror.steadfast.net

Resolving Dependencies

--> Running transaction check

---> Package sudo.x86\_64 0:1.8.6p3-20.el6\_7 will be installed

--> Finished Dependency Resolution

Dependencies Resolved

===============================================================================================================================

 Package                  Arch                       Version                                 Repository                   Size

===============================================================================================================================

Installing:

 sudo                     x86\_64                     1.8.6p3-20.el6\_7                        updates                     707 k

Transaction Summary

===============================================================================================================================

Install       1 Package(s)

Total download size: 707 k

Installed size: 2.4 M

Is this ok [y/N]: y

Downloading Packages:

sudo-1.8.6p3-20.el6\_7.x86\_64.rpm                                                                        | 707 kB     00:02

Running rpm\_check\_debug

Running Transaction Test

Transaction Test Succeeded

Running Transaction

  Installing : sudo-1.8.6p3-20.el6\_7.x86\_64                                                                                1/1

  Verifying  : sudo-1.8.6p3-20.el6\_7.x86\_64                                                                                1/1

Installed:

  sudo.x86\_64 0:1.8.6p3-20.el6\_7

Complete!

[root@de1119934beb /]# adduser test

[root@de1119934beb /]# passwd test

Changing password for user test.

New password:

BAD PASSWORD: it is based on a dictionary word

Retype new password:

passwd: all authentication tokens updated successfully.

[root@de1119934beb /]#

(Other Terminal Window)

[user@minion-01 ~]$ ssh test@172.17.0.3

The authenticity of host '172.17.0.3 (172.17.0.3)' can't be established.

RSA key fingerprint is e8:5e:28:d8:64:1f:81:3a:d9:4c:2c:0c:8e:a1:27:b7.

Are you sure you want to continue connecting (yes/no)? yes

Warning: Permanently added '172.17.0.3' (RSA) to the list of known hosts.

test@172.17.0.3's password:

[test@de1119934beb ~]$