Sprawozdanie

Programowanie aplikacji w chmurze obliczeniowej

Laboratorium 4

Tryby sieciowe kontenera docker

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Grupa: 6.6

Index: 097690

Zadanie 4.1. Konfiguracja sieci typu user-defined bridge

Stworzony skrypt realizujący wymagania zadania:

```
#!/bin/bash

# Tworzenie user-defined bridge network
docker network create --driver bridge bridge1
docker network create --driver bridge bridge2

# Tworzenie kontenerów
docker create --name late ubuntu:latest
docker run -d --name T2 --network bridge1 -p 8080:80 nginx
docker run -d --name D2 --network bridge1 -p 8081:80 nginx

docker run -d --name D1 --network bridge2 nginx
docker run -d --name S1 --network bridge2 nginx

# Przyłączenie kontenera 'late' do dwóch sieci
docker network connect bridge1 late
docker network connect bridge2 late

# Uruchomienie kontenera 'late'
docker start late

# Ustawienie reguł iptables dla kontenerów D1 i S1 oraz hosta macierzystego
# W celu umożliwienia dwukierunkowej komunikacji niefiltrowanej z hostem macierzystym
iptables -I INPUT -i bridge2 -j ACCEPT
iptables -I OUTPUT -o bridge2 -j ACCEPT

# Wyświetlenie końcowej konfiguracji sieci
echo "Konfiguracja sieci bridge1:"
docker network inspect bridge1
echo "Konfiguracja sieci bridge2:"
docker network inspect bridge2

# Wyświetlenie tablicy routingu na hoście macierzystym
echo "Tablica routingu na hoście macierzystym:"
ip route show

# Wyświetlenie konfiguracji kontenerów T2 i D2
echo "Konfiguracja kontenera T2:"
docker inspect T2
echo "Konfiguracja kontenera D2:"
docker inspect D2

# Wyświetlenie istotnych fragmentów konfiguracji iptables
echo "Konfiguracja iptables:"
iptables -L
```

Lista dostępnych sterowników sieciowych w środowisku Docker:

```
student@vhost1:~/docker_lab4$ sudo docker network ls
NETWORK ID     NAME      DRIVER    SCOPE
f4693beb5612   bridge    bridge    local
25cf9f820d67   bridge1   bridge    local
2bad3c5eaeb5   bridge2   bridge    local
adac37204f64   host      host      local
3f549808d3aa   none      null      local
```

```
Konfiguracja sieci bridge1:
[
    {
        "Name": "bridge1",
        "Id": "25cf9f820d671b3a6151a831177972b3b1b186f17559fca1038f9828ac3bdad4",
        "Created": "2024-04-05T09:44:31.192945854+02:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "172.20.0.0/16",
                    "Gateway": "172.20.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "312bdff889de3a38dad51d42f438562254cd93274a51a887283e334adcf76328": {
                "Name": "T2",
                "EndpointID": "1e8010410b0a18fd9ac6869b21c1959fa479d67cd4d588591614018679f1f2dc",
                "MacAddress": "02:42:ac:14:00:02",
                "IPv4Address": "172.20.0.2/16",
                "IPv6Address": ""
            },
            "73f25fef029fc4b264a0cc82a9544e1fe1d6b86031cdbaaaffb1a4e74fe4de07": {
                "Name": "late",
                "EndpointID": "71bb20766fa924f065e05c062535d758d2b9c2ca4b9de35d18d460f88680285d",
                "MacAddress": "02:42:ac:14:00:04",
                "IPv4Address": "172.20.0.4/16",
                "IPv6Address": ""
            },
            "d0beefede6dfd7052c82417545e488a9c641c5113909a61aa3f453dbd4b770cd": {
                "Name": "D2",
                "EndpointID": "ed710c48d3a7d437886e9a3f0164414920f454ac0bb5e32915b00649a9bb6681",
                "MacAddress": "02:42:ac:14:00:03",
                "IPv4Address": "172.20.0.3/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {}
    }
]
```

```
Konfiguracja sieci bridge2:
[
    {
        "Name": "bridge2",
        "Id": "2bad3c5eaeb548d491160896ced1ebb5878f85d5f47ce2aa1b605326c202cb94",
        "Created": "2024-04-05T09:44:31.28443222+02:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "172.21.0.0/16",
                    "Gateway": "172.21.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "1ac6eff5757526e080504b72f26a3ba22a452279523087a2b76650c508f8cfac": {
                "Name": "D1",
                "EndpointID": "f9951f2fa12e08e30943bf608b9d632ae21174631db5640a7007a921f82211f9",
                "MacAddress": "02:42:ac:15:00:02",
                "IPv4Address": "172.21.0.2/16",
                "IPv6Address": ""
            },
            "1cffc748e75eb69a222f505a8b64567e86f438844cfa59311e46cebc151ec44c": {
                "Name": "S1",
                "EndpointID": "1872d22264f85f5a9a351d4ff0d42ca03b9ee491f58d6c3e3852da93ee6a4aab",
                "MacAddress": "02:42:ac:15:00:03",
                "IPv4Address": "172.21.0.3/16",
                "IPv6Address": ""
            },
            "73f25fef029fc4b264a0cc82a9544e1fe1d6b86031cdbaaaffb1a4e74fe4de07": {
                "Name": "late",
                "EndpointID": "d8974dfd0582718acdf1e89285a7c1d4d2a22b9ddeca9dd3df624a163a70cbae",
                "MacAddress": "02:42:ac:15:00:04",
                "IPv4Address": "172.21.0.4/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {}
    }
]
```

Konfiguracja kontenera T2:


```
[
    {
        "Id": "312bdff889de3a38dad51d42f438562254cd93274a51a887283e334adcf76328",
        "Created": "2024-04-05T07:44:31.470942373Z",
        "Path": "/docker-entrypoint.sh",
        "Args": [
            "nginx",
            "-g",
            "daemon off;"
        ],
        "State": {
            "Status": "exited",
            "Running": false,
            "Paused": false,
            "Restarting": false,
            "OOMKilled": false,
            "Dead": false,
            "Pid": 0,
            "ExitCode": 255,
            "Error": "",
            "StartedAt": "2024-04-05T07:44:31.742712876Z",
            "FinishedAt": "2024-04-08T21:43:11.207075643Z"
        },
        "Image": "sha256:92b11f67642b62bbb98e7e49169c346b30e20cd3c1c034d31087e46924b9312e",
        "ResolvConfPath": "/var/lib/docker/containers/312bdff889de3a38dad51d42f438562254cd93274a51a887283e334adcf76328/resolv.conf",
        "HostnamePath": "/var/lib/docker/containers/312bdff889de3a38dad51d42f438562254cd93274a51a887283e334adcf76328/hostname",
        "HostsPath": "/var/lib/docker/containers/312bdff889de3a38dad51d42f438562254cd93274a51a887283e334adcf76328/hosts",
        "LogPath": "/var/lib/docker/containers/312bdff889de3a38dad51d42f438562254cd93274a51a887283e334adcf76328/312bdff889de3a38dad51d42f438562254cd93274a51a887283e334adcf76328-json.log",
        "Name": "/T2",
        "RestartCount": 0,
        "Driver": "overlay2",
        "Platform": "linux",
        "MountLabel": "",
        "ProcessLabel": "",
        "AppArmorProfile": "docker-default",
        "ExecIDs": null,
        "HostConfig": {
            "Binds": null,
            "ContainerIDFile": "",
            "LogConfig": {
                "Type": "json-file",
                "Config": {}
            },
            "NetworkMode": "bridge1",
            "PortBindings": {
                "80/tcp": [
                    {
                        "HostIp": "",
                        "HostPort": "8080"
                    }
                ]
            },
            "RestartPolicy": {
                "Name": "no",
                "MaximumRetryCount": 0
            },
            "AutoRemove": false,
            "VolumeDriver": "",
            "VolumesFrom": null,
            "ConsoleSize": [
                41,
                166
            ],
            "CapAdd": null,
            "CapDrop": null,
            "CgroupnsMode": "host",
            "Dns": [],
            "DnsOptions": [],
            "DnsSearch": [],
            "ExtraHosts": null,
            "GroupAdd": null,
            "IpcMode": "private",
            "Cgroup": "",
            "Links": null,
            "OomScoreAdj": 0,
            "PidMode": "",
            "Privileged": false,
            "PublishAllPorts": false,
            "ReadonlyRootfs": false,
            "SecurityOpt": null,
            "UTSMode": "",
            "UsernsMode": "",
            "ShmSize": 67108864,
            "Runtime": "runc",
            "Isolation": "",
            "CpuShares": 0,
            "Memory": 0,
            "NanoCpus": 0,
            "CgroupParent": "",
            "BlkioWeight": 0,
            "BlkioWeightDevice": [],
            "BlkioDeviceReadBps": [],
            "BlkioDeviceWriteBps": [],
            "BlkioDeviceReadIOps": [],
            "BlkioDeviceWriteIOps": [],
            "CpuPeriod": 0,
            "CpuQuota": 0,
            "CpuRealtimePeriod": 0,
            "CpuRealtimeRuntime": 0,
            "CpusetCpus": "",
            "CpusetMems": "",
            "Devices": [],
            "DeviceCgroupRules": null,
            "DeviceRequests": null,
            "MemoryReservation": 0,
            "MemorySwap": 0,
            "MemorySwappiness": null,
            "OomKillDisable": false,
            "PidsLimit": null,
            "Ulimits": null,
            "CpuCount": 0,
            "CpuPercent": 0,
            "IOMaximumIOps": 0,
            "IOMaximumBandwidth": 0,
            "MaskedPaths": [
                "/proc/asound",
                "/proc/acpi",
                "/proc/kcore",
                "/proc/keys",
                "/proc/latency_stats",
                "/proc/timer_list",
                "/proc/timer_stats",
                "/proc/sched_debug",
                "/proc/scsi",
                "/sys/firmware"
            ],
            "ReadonlyPaths": [
                "/proc/bus",
                "/proc/fs",
                "/proc/irq",
                "/proc/sys",
                "/proc/sysrq-trigger"
            ]
```

```
            ],
            "ReadonlyPaths": [
                "/proc/bus",
                "/proc/fs",
                "/proc/irq",
                "/proc/sys",
                "/proc/sysrq-trigger"
            ]
        },
        "GraphDriver": {
            "Data": {
                "LowerDir": "/var/lib/docker/overlay2/8b5e7f3c7363d883f1e4e60b3590789132d5310799db7dcb3fb672612ab30158-init/diff:/var/lib/docker/overlay2/ea22a6717c50101c2000054f6ad92d7eb1644a2231219eb425629e75f3fc
fdd222add/diff:/var/lib/docker/overlay2/c26537cabcfc2d66b34f4876ed855458fdbf94787e13fad90ddf1cc5f0bd9e1d/diff:/var/lib/docker/overlay2/4bc9237721b9e3a6f43311d60f9350f5093588fafdc022bfa80a90c3df31ef74/diff:/var/lib/
                "MergedDir": "/var/lib/docker/overlay2/8b5e7f3c7363d883f1e4e60b3590789132d5310799db7dcb3fb672612ab30158/merged",
                "UpperDir": "/var/lib/docker/overlay2/8b5e7f3c7363d883f1e4e60b3590789132d5310799db7dcb3fb672612ab30158/diff",
                "WorkDir": "/var/lib/docker/overlay2/8b5e7f3c7363d883f1e4e60b3590789132d5310799db7dcb3fb672612ab30158/work"
            },
            "Name": "overlay2"
        },
        "Mounts": [],
        "Config": {
            "Hostname": "312bdff889de",
            "Domainname": "",
            "User": "",
            "AttachStdin": false,
            "AttachStdout": false,
            "AttachStderr": false,
            "ExposedPorts": {
                "80/tcp": {}
            },
            "Tty": false,
            "OpenStdin": false,
            "StdinOnce": false,
            "Env": [
                "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
                "NGINX_VERSION=1.25.4",
                "NJS_VERSION=0.8.3",
                "PKG_RELEASE=1~bookworm"
            ],
            "Cmd": [
                "nginx",
                "-g",
                "daemon off;"
            ],
            "Image": "nginx",
            "Volumes": null,
            "WorkingDir": "",
            "Entrypoint": [
                "/docker-entrypoint.sh"
            ],
            "OnBuild": null,
            "Labels": {
                "maintainer": "NGINX Docker Maintainers <docker-maint@nginx.com>"
            },
            "StopSignal": "SIGQUIT"
        },
        "NetworkSettings": {
            "Bridge": "",
            "SandboxID": "5953b010e612ffedbee66d7442ceaa217520f80d175ef92a653bc33eed27fe1d",
            "HairpinMode": false,
            "LinkLocalIPv6Address": "",
            "LinkLocalIPv6PrefixLen": 0,
            "Ports": {
                "80/tcp": [
                    {
                        "HostIp": "0.0.0.0",
                        "HostPort": "8080"
                    },
                    {
                        "HostIp": "::",
                        "HostPort": "8080"
                    }
                ]
            },
            "SandboxKey": "/var/run/docker/netns/5953b010e612",
            "SecondaryIPAddresses": null,
            "SecondaryIPv6Addresses": null,
            "EndpointID": "",
            "Gateway": "",
            "GlobalIPv6Address": "",
            "GlobalIPv6PrefixLen": 0,
            "IPAddress": "",
            "IPPrefixLen": 0,
            "IPv6Gateway": "",
            "MacAddress": "",
            "Networks": {
                "bridge1": {
                    "IPAMConfig": null,
                    "Links": null,
                    "Aliases": [
                        "312bdff889de"
                    ],
                    "NetworkID": "25cf9f820d671b3a6151a831177972b3b1b186f17559fca1038f9828ac3bdad4",
                    "EndpointID": "1e8010410b0a18fd9ac6869b21c1959fa479d67cd4d58859161401867 9f1f2dc",
                    "Gateway": "172.20.0.1",
                    "IPAddress": "172.20.0.2",
                    "IPPrefixLen": 16,
                    "IPv6Gateway": "",
                    "GlobalIPv6Address": "",
                    "GlobalIPv6PrefixLen": 0,
                    "MacAddress": "02:42:ac:14:00:02",
                    "DriverOpts": null
                }
            }
        }
    }
]
```

Konfiguracja kontenera D2:


```
[
    {
        "Id": "d0beefede6dfd7052c82417545e488a9c641c5113909a61aa3f453dbd4b770cd",
        "Created": "2024-04-05T07:44:31.7629605567",
        "Path": "/docker-entrypoint.sh",
        "Args": [
            "nginx",
            "-g",
            "daemon off;"
        ],
        "State": {
            "Status": "exited",
            "Running": false,
            "Paused": false,
            "Restarting": false,
            "OOMKilled": false,
            "Dead": false,
            "Pid": 0,
            "ExitCode": 255,
            "Error": "",
            "StartedAt": "2024-04-05T07:44:32.028284791Z",
            "FinishedAt": "2024-04-08T21:43:11.219115715Z"
        },
        "Image": "sha256:92b11f67642b62bbb98e7e49169c346b30e20cd3c1c034d31087e46924b9312e",
        "ResolvConfPath": "/var/lib/docker/containers/d0beefede6dfd7052c82417545e488a9c641c5113909a61aa3f453dbd4b770cd/resolv.conf",
        "HostnamePath": "/var/lib/docker/containers/d0beefede6dfd7052c82417545e488a9c641c5113909a61aa3f453dbd4b770cd/hostname",
        "HostsPath": "/var/lib/docker/containers/d0beefede6dfd7052c82417545e488a9c641c5113909a61aa3f453dbd4b770cd/hosts",
        "LogPath": "/var/lib/docker/containers/d0beefede6dfd7052c82417545e488a9c641c5113909a61aa3f453dbd4b770cd/d0beefede6dfd7052c82417545e488a9c641c5113909a61aa3f453dbd4b770cd-json.log",
        "Name": "/D2",
        "RestartCount": 0,
        "Driver": "overlay2",
        "Platform": "linux",
        "MountLabel": "",
        "ProcessLabel": "",
        "AppArmorProfile": "docker-default",
        "ExecIDs": null,
        "HostConfig": {
            "Binds": null,
            "ContainerIDFile": "",
            "LogConfig": {
                "Type": "json-file",
                "Config": {}
            },
            "NetworkMode": "bridge1",
            "PortBindings": {
                "80/tcp": [
                    {
                        "HostIp": "",
                        "HostPort": "8081"
                    }
                ]
            },
            "RestartPolicy": {
                "Name": "no",
                "MaximumRetryCount": 0
            },
            "AutoRemove": false,
            "VolumeDriver": "",
            "VolumesFrom": null,
            "ConsoleSize": [
                41,
                166
            ],
            "CapAdd": null,
            "CapDrop": null,
            "CgroupnsMode": "host",
            "Dns": [],
            "DnsOptions": [],
            "DnsSearch": [],
            "ExtraHosts": null,
            "GroupAdd": null,
            "IpcMode": "private",
            "Cgroup": "",
            "Links": null,
            "OomScoreAdj": 0,
            "PidMode": "",
            "Privileged": false,
            "PublishAllPorts": false,
            "ReadonlyRootfs": false,
            "SecurityOpt": null,
            "UTSMode": "",
            "UsernsMode": "",
            "ShmSize": 67108864,
            "Runtime": "runc",
            "Isolation": "",
            "CpuShares": 0,
            "Memory": 0,
            "NanoCpus": 0,
            "CgroupParent": "",
            "BlkioWeight": 0,
            "BlkioWeightDevice": [],
            "BlkioDeviceReadBps": [],
            "BlkioDeviceWriteBps": [],
            "BlkioDeviceReadIOps": [],
            "BlkioDeviceWriteIOps": [],
            "CpuPeriod": 0,
            "CpuQuota": 0,
            "CpuRealtimePeriod": 0,
            "CpuRealtimeRuntime": 0,
            "CpusetCpus": "",
            "CpusetMems": "",
            "Devices": [],
            "DeviceCgroupRules": null,
            "DeviceRequests": null,
            "MemoryReservation": 0,
            "MemorySwap": 0,
            "MemorySwappiness": null,
            "OomKillDisable": false,
            "PidsLimit": null,
            "Ulimits": null,
            "CpuCount": 0,
            "CpuPercent": 0,
            "IOMaximumIOps": 0,
            "IOMaximumBandwidth": 0,
            "MaskedPaths": [
                "/proc/asound",
                "/proc/acpi",
                "/proc/kcore",
                "/proc/keys",
                "/proc/latency_stats",
                "/proc/timer_list",
                "/proc/timer_stats",
                "/proc/sched_debug",
                "/proc/scsi",
                "/sys/firmware"
            ],
            "ReadonlyPaths": [
                "/proc/bus",
                "/proc/fs",
                "/proc/irq",
                "/proc/sys",
                "/proc/sysrq-trigger"
            ]
```

```
            "ReadonlyPaths": [
                "/proc/bus",
                "/proc/fs",
                "/proc/irq",
                "/proc/sys",
                "/proc/sysrq-trigger"
            ]
        },
        "GraphDriver": {
            "Data": {
                "LowerDir": "/var/lib/docker/overlay2/14122f11729f0e49dcbaf715c3548765d32e210aaecbb584e666445eaf2cfaae-init/diff:/var/lib/docker/overlay2/ea22a6717c50101c2000
fdd222add/diff:/var/lib/docker/overlay2/c26537cabcfc2d66b34f4876ed855450fdbf94787e13fad90ddf1cc5f0bd9e14/diff:/var/lib/docker/overlay2/4bc9237721b9e3a6f43311d60f9350f5093588f
                "MergedDir": "/var/lib/docker/overlay2/14122f11729f0e49dcbaf715c3548765d32e210aaecbb584e666445eaf2cfaae/merged",
                "UpperDir": "/var/lib/docker/overlay2/14122f11729f0e49dcbaf715c3548765d32e210aaecbb584e666445eaf2cfaae/diff",
                "WorkDir": "/var/lib/docker/overlay2/14122f11729f0e49dcbaf715c3548765d32e210aaecbb584e666445eaf2cfaae/work"
            },
            "Name": "overlay2"
        },
        "Mounts": [],
        "Config": {
            "Hostname": "d0beefede6df",
            "Domainname": "",
            "User": "",
            "AttachStdin": false,
            "AttachStdout": false,
            "AttachStderr": false,
            "ExposedPorts": {
                "80/tcp": {}
            },
            "Tty": false,
            "OpenStdin": false,
            "StdinOnce": false,
            "Env": [
                "PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin",
                "NGINX_VERSION=1.25.4",
                "NJS_VERSION=0.8.3",
                "PKG_RELEASE=1~bookworm"
            ],
            "Cmd": [
                "nginx",
                "-g",
                "daemon off;"
            ],
            "Image": "nginx",
            "Volumes": null,
            "WorkingDir": "",
            "Entrypoint": [
                "/docker-entrypoint.sh"
            ],
            "OnBuild": null,
            "Labels": {
                "maintainer": "NGINX Docker Maintainers <docker-maint@nginx.com>"
            },
            "StopSignal": "SIGQUIT"
        },
        "NetworkSettings": {
            "Bridge": "",
            "SandboxID": "36f4df131deab69dba76789dab5d8752f0c19eced09c9c2cd576eb01dec5b302",
            "HairpinMode": false,
            "LinkLocalIPv6Address": "",
            "LinkLocalIPv6PrefixLen": 0,
            "Ports": {
                "80/tcp": [
                    {
                        "HostIp": "0.0.0.0",
                        "HostPort": "8081"
                    },
                    {
                        "HostIp": "::",
                        "HostPort": "8081"
                    }
                ]
            },
            "SandboxKey": "/var/run/docker/netns/36f4df131dea",
            "SecondaryIPAddresses": null,
            "SecondaryIPv6Addresses": null,
            "EndpointID": "",
            "Gateway": "",
            "GlobalIPv6Address": "",
            "GlobalIPv6PrefixLen": 0,
            "IPAddress": "",
            "IPPrefixLen": 0,
            "IPv6Gateway": "",
            "MacAddress": "",
            "Networks": {
                "bridge1": {
                    "IPAMConfig": null,
                    "Links": null,
                    "Aliases": [
                        "d0beefede6df"
                    ],
                    "NetworkID": "25cf9f820d671b3a6151a831177972b3b1b186f17559fca1038f9828ac3bdad4",
                    "EndpointID": "ed710c48d3a7d437886e9a3f0164414920f454ac0bb5e32915b00649a9bb6681",
                    "Gateway": "172.20.0.1",
                    "IPAddress": "172.20.0.3",
                    "IPPrefixLen": 16,
                    "IPv6Gateway": "",
                    "GlobalIPv6Address": "",
                    "GlobalIPv6PrefixLen": 0,
                    "MacAddress": "02:42:ac:14:00:03",
                    "DriverOpts": null
                }
            }
        }
    }
]
```


```
Tablica routingu na hoście macierzystym:
default via 10.0.10.1 dev enp0s3 proto dhcp metric 100
10.0.10.0/24 dev enp0s3 proto kernel scope link src 10.0.10.4 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
172.17.0.0/16 dev docker0 proto kernel scope link src 172.17.0.1
172.20.0.0/16 dev br-25cf9f820d67 proto kernel scope link src 172.20.0.1
172.21.0.0/16 dev br-2bad3c5eaeb5 proto kernel scope link src 172.21.0.1
```

```
Konfiguracja iptables:
Chain INPUT (policy ACCEPT)
target     prot opt source               destination
ACCEPT     all  --  anywhere             anywhere

Chain FORWARD (policy DROP)
target     prot opt source               destination
DOCKER-USER  all  --  anywhere             anywhere
DOCKER-ISOLATION-STAGE-1  all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere             ctstate RELATED,ESTABLISHED
DOCKER     all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere             ctstate RELATED,ESTABLISHED
DOCKER     all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere             ctstate RELATED,ESTABLISHED
DOCKER     all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere
ACCEPT     all  --  anywhere             anywhere

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
ACCEPT     all  --  anywhere             anywhere

Chain DOCKER (3 references)
target     prot opt source               destination

Chain DOCKER-ISOLATION-STAGE-1 (1 references)
target     prot opt source               destination
DOCKER-ISOLATION-STAGE-2  all  --  anywhere             anywhere
DOCKER-ISOLATION-STAGE-2  all  --  anywhere             anywhere
DOCKER-ISOLATION-STAGE-2  all  --  anywhere             anywhere
RETURN     all  --  anywhere             anywhere

Chain DOCKER-ISOLATION-STAGE-2 (3 references)
target     prot opt source               destination
DROP       all  --  anywhere             anywhere
DROP       all  --  anywhere             anywhere
DROP       all  --  anywhere             anywhere
RETURN     all  --  anywhere             anywhere

Chain DOCKER-USER (1 references)
target     prot opt source               destination
RETURN     all  --  anywhere             anywhere
```

Wnioski:

Konfigurowanie sieci w kontenerach Docker doje dostęp do szerokiej palety zastosować. Wirtualna się umożliwia bezpieczną komunikację pomiędzy kontenerami, a elastyczność sieci w Docker daje dowolność konfiguracji i zarządzania siecią.

Odpowiedzi na pytanie z zadania:

Kontenery D2 i S1 mają bezpośredni dostęp do interfejsu hosta macierzystego. Polecenie, które można użyć do konfiguracji puli adresów dla podsieci na moście bridge2:

docker network create --subnet 172.18.0.0/16 --gateway 172.18.0.1 bridge2

Kontenery D2 i S1 mogą wykorzystać DHCP w segmencie sieci, jeśli serwer DHCP jest dostępny. Wymaga to odpowiedniej konfiguracji w pliku konfiguracyjnym Docker daemon lub ręcznej konfiguracji w kontenerach. Polecenie aby skonfigurować sieć dla konkretnego kontenera:

docker run --network="bridge" --name=D2