

LAB 1

```
smartedge00 - VMware Workstation 17 Player (Non-commercial use only)
File Virtual Machine Help

CentOS Linux 7 (Core)
Kernel 3.10.0-862.el7.x86_64 on an x86_64

smartedge00 login: root
Password:
Last login: Mon Oct 3 18:38:19 from 192.168.241.1
[Oh My Zsh] Would you like to update? [Y/n]: n

root@smartedge00.company.es
OS: CentOS 7.5.1804 Core
Kernel: x86_64 Linux 3.10.0-862.el7.x86_64
Uptime: 3m
Packages: 796
Shell: zsh 5.0.2
CPU: 12th Gen Intel Core i5-12400F @ 4x 2.496GHz
GPU: VMware SUGA II Adapter
RAM: 510MiB / 7822MiB

..
.PLTJ.
<><><>
KKSSU' 4KKK LJ KKKL.'USSKK
KKU' 4KKKKK LJ KKKKAL 'UKK
U' ' 'UKKKK LJ KKKKU' ' 'U
.4MA.' 'UKK LJ KKKU' ' 4Mb.
. KKKKKA.' 'U LJ U' .4KKKKK .
.4D KKKKKKKA.' LJ '' 4KKKKKKK FA.
<QDD ++++++++ GFD>
'UD KKKKKKKK'.. LJ ..'KKKKKKKK FU
' UKKKKK'.. 4 LJ K. 'KKKKKU '
'UK'.. 4KK LJ KKA. 'KU'
A.. 4KKKK LJ KKKKA. . 4
KKA. 'KKKKK LJ KKKKK' .4KK
KKSSA. UKKK LJ KKKU .4SSKK
<><><><>
'MKKM'
''

smartedge00 :: - > _
```

To grab input, press Ctrl+G



```
smartedge00 - VMware Workstation 17 Player (Non-commercial use only)
File Virtual Machine Help

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' UKKKKK'.. 4 LJ K. 'KKKKKU '
'UK'.. 4KK LJ KKA. 'KU'
A.. 4KKKK LJ KKKKA. . 4
KKA. 'KKKKK LJ KKKKK' .4KK
KKSSA. UKKK LJ KKKU .4SSKK
<><><><>
'MKKM'
''

Shell: zsh 5.0.2
CPU: 12th Gen Intel Core i5-12400F @ 4x 2.496GHz
GPU: VMware SUGA II Adapter
RAM: 510MiB / 7822MiB

smartedge00 :: - > ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens160: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:0c:29:31:13:99 brd ff:ff:ff:ff:ff:ff
    inet 172.16.111.128/24 brd 172.16.111.255 scope global noprefixroute dynamic ens160
        valid_lft 1299sec preferred_lft 1299sec
    inet6 fe80::64d5:11d4:afad:a77d/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
3: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default
    link/ether 02:42:11:27:b8:00 brd ff:ff:ff:ff:ff:ff
    inet 172.17.0.1/16 brd 172.17.255.255 scope global docker0
        valid_lft forever preferred_lft forever
4: br-cd491412b46e: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default
    link/ether 02:42:42:31:96:5e brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.1/16 brd 192.168.255.255 scope global br-cd491412b46e
        valid_lft forever preferred_lft forever

smartedge00 :: - > _
```

To grab input, press Ctrl+G



En PUTTY

```
root@smartedge00: ~  
login as: root  
root@172.16.111.128's password:  
Last login: Tue Dec 26 21:50:59 2023  
  
root@smartedge00.company.es  
OS: CentOS 7.5.1804 Core  
Kernel: x86_64 Linux 3.10.0-862.el7.x86  
  
Uptime: 8m  
Packages: 796  
Shell: zsh 5.0.2  
CPU: 12th Gen Intel Core i5-12400F @ 4x  
GPU: VMware SVGA II Adapter  
RAM: 514MiB / 7822MiB  
  
64  
KKSSV' 4KKK LJ KKKL.'VSSKK  
KKV' 4KKKKK LJ KKKKAL 'VKK  
V' ' 'VKKKK LJ KKKKV' ' 'V  
.4MA.' 'VKK LJ KKV' '.4Mb.  
2.496GHz  
. KKKKKA.' 'V LJ V' '.4KKKKK .  
.4D KKKKKKKA.' ' LJ ' '.4KKKKKKK FA.  
<QDD ++++++ ++++++ GFD>  
'VD KKKKKKKK'.. LJ ..'KKKKKKKK FV  
' VKKKKK'.. .4 LJ K. .'KKKKKV '  
'VK'.. .4KK LJ KKA. .'KV'  
A. . .4KKKK LJ KKKKA. . .4  
KKA. 'KKKKK LJ KKKKK' .4KK  
KKSSA. VKKK LJ KKKV .4SSKK  
<><><><>  
'MKKM'  
' '  
smartedge00 :: ~ » ls -l  
total 20  
-rw----- 1 root root 1693 Jul 18 2018 anaconda-ks.cfg  
drwxr-xr-x. 2 root root 6 Jul 25 2018 Desktop  
drwxr-xr-x. 5 root root 82 Aug 22 2018 env  
-rw-r--r-- 1 root root 5034 Oct 3 2022 pom.xml  
-rwxr-xr-x. 1 root root 1441 Sep 14 2020 startStormCluster.sh  
-rw-r--r-- 1 root root 96 Dec 17 14:12 storm-script.bash  
drwxr-xr-x. 4 root root 44 Dec 17 16:01 workspace  
smartedge00 :: ~ » █
```

Arrancamos dockers

```
root@smartedge00: ~  
drwxr-xr-x. 2 root root 6 Oct 3 2022 workspace  
smartedge00 :: ~ » docker ps -aq  
77b6ed67a98c  
4481f8f056be  
e32ed9f3ed34  
09296a4f7a20  
67de7555d7f4  
3bb49b8799c6  
b611ef2afaa8  
a2cd44748722  
smartedge00 :: ~ » docker start $(docker ps -aq)  
77b6ed67a98c  
4481f8f056be  
e32ed9f3ed34  
09296a4f7a20  
67de7555d7f4  
3bb49b8799c6  
b611ef2afaa8  
a2cd44748722  
smartedge00 :: ~ » docker ps  
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS  
77b6ed67a98c        centos:centos7.5.1804  "/bin/bash"        5 years ago        Up 28 seconds      2181/tcp, 3772-3773/tcp, 6627/tcp, 8000/tcp, 8080/tcp  storm04  
4481f8f056be        centos:centos7.5.1804  "/bin/bash"        5 years ago        Up 26 seconds      2181/tcp, 3772-3773/tcp, 6627/tcp, 8000/tcp, 8080/tcp  storm03  
e32ed9f3ed34        centos:centos7.5.1804  "/bin/bash"        5 years ago        Up 26 seconds      2181/tcp, 3772-3773/tcp, 6627/tcp, 8000/tcp, 8080/tcp  storm02  
09296a4f7a20        centos:centos7.5.1804  "/bin/bash"        5 years ago        Up 26 seconds      2181/tcp, 3772-3773/tcp, 6627/tcp, 8000/tcp, 8080/tcp  storm01  
67de7555d7f4        centos:centos7.5.1804  "/bin/bash"        5 years ago        Up 25 seconds      2181/tcp, 3772-3773/tcp, 6627/tcp, 8000/tcp, 8080/tcp  storm00  
3bb49b8799c6        centos:centos7.5.1804  "/bin/bash"        5 years ago        Up 25 seconds      2181/tcp, 2888/tcp, 3888/tcp  zookeeper02  
b611ef2afaa8        centos:centos7.5.1804  "/bin/bash"        5 years ago        Up 25 seconds      2181/tcp, 2888/tcp, 3888/tcp  zookeeper01  
a2cd44748722        centos:centos7.5.1804  "/bin/bash"        5 years ago        Up 25 seconds      2181/tcp, 2888/tcp, 3888/tcp  zookeeper00  
smartedge00 :: ~ »
```

Establecemos port-forwarding

```
root@smartedge00: ~  
77b6ed67a98c  storm04      0.00%      1.969MiB / 7.639GiB  0.03%      2.46kB /  
0B  9.97MB / 0B  1  
4481f8f056be  storm03      0.00%      384KiB / 7.639GiB  0.00%      1.6kB / 0  
B  254kB / 0B  1  
e32ed9f3ed34  storm02      0.00%      380KiB / 7.639GiB  0.00%      1.29kB /  
0B  90.1kB / 0B  1  
09296a4f7a20  storm01      0.00%      384KiB / 7.639GiB  0.00%      1.02kB /  
0B  90.1kB / 0B  1  
67de7555d7f4  storm00      0.00%      432KiB / 7.639GiB  0.01%      1.02kB /  
0B  90.1kB / 0B  1  
3bb49b8799c6  zookeeper02  0.00%      384KiB / 7.639GiB  0.00%      1.02kB /  
0B  156kB / 0B  1  
b611ef2afaa8  zookeeper01  0.00%      380KiB / 7.639GiB  0.00%      1.02kB /  
0B  156kB / 0B  1  
a2cd44748722  zookeeper00  0.00%      376KiB / 7.639GiB  0.00%      833B / 0B  
123kB / 0B  1  
^C  
smartedge00 :: ~ » firewall-cmd --zone=public --add-forward-port=port=8080:proto  
=tcp:toaddr=192.168.0.5  
success  
smartedge00 :: ~ » firewall-cmd --info--zone=public  
usage: see firewall-cmd man page  
firewall-cmd: error: unrecognized arguments: --info--zone=public  
smartedge00 :: ~ » firewall-cmd --info-zone=public  
public (active)  
  target: default  
  icmp-block-inversion: no  
  interfaces: ens160  
  sources:  
  services: ssh dhcpv6-client  
  ports:  
  protocols:  
  masquerade: yes  
  forward-ports: port=8080:proto=tcp:toport=:toaddr=192.168.0.5  
  source-ports:  
  icmp-blocks:  
  rich rules:  
smartedge00 :: ~ »
```

root@smartedge00: ~

```
masquerade: yes
forward-ports: port=8080:proto=tcp:toport=:toaddr=192.168.0.5
source-ports:
icmp-blocks:
rich rules:
```

```
smartedge00 :: ~ » docker ps -q
```

```
77b6ed67a98c
4481f8f056be
e32ed9f3ed34
09296a4f7a20
67de7555d7f4
3bb49b8799c6
b611ef2afaa8
a2cd44748722
```

```
smartedge00 :: ~ » docker inspect a2cd44748722
```

```
[
  {
    "Id": "a2cd44748722077f050548e4ef0d14f8f19e3792866503e606adb2ed18ed3a8c",
    "Created": "2018-07-23T11:25:36.776477361Z",
    "Path": "/bin/bash",
    "Args": [],
    "State": {
      "Status": "running",
      "Running": true,
      "Paused": false,
      "Restarting": false,
      "OOMKilled": false,
      "Dead": false,
      "Pid": 8889,
      "ExitCode": 0,
      "Error": "",
      "StartedAt": "2023-12-16T23:10:01.098511981Z",
      "FinishedAt": "2022-10-03T15:28:30.014424378Z"
    },
    "Image": "sha256:49f7960eb7e4cb46f1a02c1f8174c6fac07ebf1eb6d8deffbc5c695f1c9edd5",
    "ResolvConfPath": "/var/lib/docker/containers/a2cd44748722077f050548e4ef"
```


root@smartedge00: ~

```
"SandboxKey": "/var/run/docker/netns/fa08e111bd3c",
"SecondaryIPAddresses": null,
"SecondaryIPv6Addresses": null,
"EndpointID": "",
"Gateway": "",
"GlobalIPv6Address": "",
"GlobalIPv6PrefixLen": 0,
"IPAddress": "",
"IPPrefixLen": 0,
"IPv6Gateway": "",
"MacAddress": "",
"Networks": {
  "br0": {
    "IPAMConfig": {
      "IPv4Address": "192.168.0.2"
    },
    "Links": null,
    "Aliases": [
      "a2cd44748722",
      "zookeeper00"
    ],
    "NetworkID": "cd491412b46e0775b6d7f2ac8c7d96249600497163e3c3
d6cfee5fcf0b6e8b6a",
    "EndpointID": "54589e47ead9f3e84d53f67b69f3b4d19ed9a5ef4a115
ea5890d10beb5ca9e2a",
    "Gateway": "192.168.0.1",
    "IPAddress": "192.168.0.2",
    "IPPrefixLen": 16,
    "IPv6Gateway": "",
    "GlobalIPv6Address": "",
    "GlobalIPv6PrefixLen": 0,
    "MacAddress": "02:42:c0:a8:00:02",
    "DriverOpts": null
  }
}
}
}
]
smartedge00 :~ >> █
```

root@smartedge00: ~

```
0B 156kB / 0B 1
b611ef2afaa8 zookeeper01 0.00% 380KiB / 7.639GiB 0.00% 1.02kB /
0B 156kB / 0B 1
a2cd44748722 zookeeper00 0.00% 376KiB / 7.639GiB 0.00% 833B / 0B
123kB / 0B 1
CONTAINER ID NAME CPU % MEM USAGE / LIMIT MEM % NET I/O
BLOCK I/O PIDS
77b6ed67a98c storm04 0.00% 1.969MiB / 7.639GiB 0.03% 2.46kB /
0B 9.97MB / 0B 1
4481f8f056be storm03 0.00% 384KiB / 7.639GiB 0.00% 1.6kB / 0
B 254kB / 0B 1
e32ed9f3ed34 storm02 0.00% 380KiB / 7.639GiB 0.00% 1.29kB /
0B 90.1kB / 0B 1
09296a4f7a20 storm01 0.00% 384KiB / 7.639GiB 0.00% 1.02kB /
0B 90.1kB / 0B 1
67de7555d7f4 storm00 0.00% 432KiB / 7.639GiB 0.01% 1.02kB /
0B 90.1kB / 0B 1
3bb49b8799c6 zookeeper02 0.00% 384KiB / 7.639GiB 0.00% 1.02kB /
0B 156kB / 0B 1
b611ef2afaa8 zookeeper01 0.00% 380KiB / 7.639GiB 0.00% 1.02kB /
0B 156kB / 0B 1
a2cd44748722 zookeeper00 0.00% 376KiB / 7.639GiB 0.00% 833B / 0B
123kB / 0B 1
```

^C

smartedge00 :: ~ » docker inspect 67de7555d7f4

130 ↵

```
[
  {
    "Id": "67de7555d7f4c4b3301670515ffc40ce6a39b1a2a3cfcfb208d88634cea13002",
    "Created": "2018-07-25T19:04:17.926180947Z",
    "Path": "/bin/bash",
    "Args": [],
    "State": {
      "Status": "running",
      "Running": true,
      "Paused": false,
      "Restarting": false,
      "OOMKilled": false,
      "Dead": false,
```

root@smartedge00: ~

```
"SandboxKey": "/var/run/docker/netns/1d264240d5ae",
"SecondaryIPAddresses": null,
"SecondaryIPv6Addresses": null,
"EndpointID": "",
"Gateway": "",
"GlobalIPv6Address": "",
"GlobalIPv6PrefixLen": 0,
"IPAddress": "",
"IPPrefixLen": 0,
"IPv6Gateway": "",
"MacAddress": "",
"Networks": {
  "br0": {
    "IPAMConfig": {
      "IPv4Address": "192.168.0.5"
    },
    "Links": null,
    "Aliases": [
      "67de7555d7f4",
      "storm00"
    ],
    "NetworkID": "cd491412b46e0775b6d7f2ac8c7d96249600497163e3c3
d6cfee5fcf0b6e8b6a",
    "EndpointID": "d2303511de6643358954390f9b93aeac5bc6372bb96e1
0976cd9f2c00a2495c9",
    "Gateway": "192.168.0.1",
    "IPAddress": "192.168.0.5",
    "IPPrefixLen": 16,
    "IPv6Gateway": "",
    "GlobalIPv6Address": "",
    "GlobalIPv6PrefixLen": 0,
    "MacAddress": "02:42:c0:a8:00:05",
    "DriverOpts": null
  }
}
}
]
smartedge00 :: ~ >> █
```


Arrancamos Zookeeper

Accedemos a los contenedores zookeeper00, zookeeper01, zookeeper02

```
root@smartedge00: ~  
smartedge00 :: ~ » docker exec -it zookeeper00 bash  
[root@zookeeper00 /]# cd $ZK_HOME  
[root@zookeeper00 apache-zookeeper-3.7.1]# bin/zkServer.sh start  
ZooKeeper JMX enabled by default  
Using config: /opt/apache-zookeeper-3.7.1/bin/../conf/zoo.cfg  
Starting zookeeper ... STARTED  
[root@zookeeper00 apache-zookeeper-3.7.1]# bin/zkServer.sh status  
ZooKeeper JMX enabled by default  
Using config: /opt/apache-zookeeper-3.7.1/bin/../conf/zoo.cfg  
Client port found: 2181. Client address: localhost. Client SSL: false.  
Error contacting service. It is probably not running.  
[root@zookeeper00 apache-zookeeper-3.7.1]# exit  
exit  
smartedge00 :: ~ » docker exec -it zookeeper01 bash  
[root@zookeeper01 /]# cd $ZK_HOME  
[root@zookeeper01 apache-zookeeper-3.7.1]# bin/zkServer.sh start  
ZooKeeper JMX enabled by default  
Using config: /opt/apache-zookeeper-3.7.1/bin/../conf/zoo.cfg  
Starting zookeeper ... STARTED  
[root@zookeeper01 apache-zookeeper-3.7.1]# exit  
exit  
smartedge00 :: ~ » docker exec -it zookeeper02 bash  
[root@zookeeper02 /]# cd ZK_HOME  
bash: cd: ZK_HOME: No such file or directory  
[root@zookeeper02 /]# cd $ZK_HOME  
[root@zookeeper02 apache-zookeeper-3.7.1]# bin/zkServer.sh start  
ZooKeeper JMX enabled by default  
Using config: /opt/apache-zookeeper-3.7.1/bin/../conf/zoo.cfg  
Starting zookeeper ... STARTED  
[root@zookeeper02 apache-zookeeper-3.7.1]# set -o vi  
[root@zookeeper02 apache-zookeeper-3.7.1]# bin/zkServer.sh status  
ZooKeeper JMX enabled by default  
Using config: /opt/apache-zookeeper-3.7.1/bin/../conf/zoo.cfg  
Client port found: 2181. Client address: localhost. Client SSL: false.  
Mode: follower  
[root@zookeeper02 apache-zookeeper-3.7.1]# exit  
exit  
smartedge00 :: ~ » █
```

```

smartedge00 :: ~ » docker exec -it zookeeper00 bash
[root@zookeeper00 /]# cd $ZK_HOME
[root@zookeeper00 apache-zookeeper-3.7.1]# bin/zkServer.sh status
ZooKeeper JMX enabled by default
Using config: /opt/apache-zookeeper-3.7.1/bin/../conf/zoo.cfg
Client port found: 2181. Client address: localhost. Client SSL: false.
Mode: follower
[root@zookeeper00 apache-zookeeper-3.7.1]# exit
exit
smartedge00 :: ~ » docker exec -it zookeeper01 bash
[root@zookeeper01 /]# cd $ZK_HOME
[root@zookeeper01 apache-zookeeper-3.7.1]# bin/zkServer.sh status
ZooKeeper JMX enabled by default
Using config: /opt/apache-zookeeper-3.7.1/bin/../conf/zoo.cfg
Client port found: 2181. Client address: localhost. Client SSL: false.
Mode: leader
[root@zookeeper01 apache-zookeeper-3.7.1]# █

```

```

@zookeeper00:/opt/apache-zookeeper-3.7.1
connection, connectionString=localhost:2181 sessionTimeout=30000 watcher=org.apache.zookeeper.ZooKeeperMain$MyWatcher@2ed0fbae
2023-12-17 00:05:58,211 [myid:] - INFO [main:X509Util@77] - Setting -D jdk.tls.rejectClientInitiatedRenegotiation=true to disable client-initiated TLS renegotiation
2023-12-17 00:05:58,214 [myid:] - INFO [main:ClientCnxnSocket@239] - jute.maxbuffer value is 1048575 Bytes
2023-12-17 00:05:58,219 [myid:] - INFO [main:ClientCnxn@1735] - zookeeper.request.timeout value is 0. feature enabled=false
Welcome to ZooKeeper!
2023-12-17 00:05:58,228 [myid:localhost:2181] - INFO [main-SendThread(localhost:2181):ClientCnxn$SendThread@1171] - Opening socket connection to server localhost/127.0.0.1:2181.
2023-12-17 00:05:58,228 [myid:localhost:2181] - INFO [main-SendThread(localhost:2181):ClientCnxn$SendThread@1173] - SASL config status: Will not attempt to authenticate using SASL (unknown error)
2023-12-17 00:05:58,232 [myid:localhost:2181] - INFO [main-SendThread(localhost:2181):ClientCnxn$SendThread@1005] - Socket connection established, initiating session, client: /127.0.0.1:52290, server: localhost/127.0.0.1:2181
2023-12-17 00:05:58,240 [myid:localhost:2181] - INFO [main-SendThread(localhost:2181):ClientCnxn$SendThread@1446] - Session establishment complete on server localhost/127.0.0.1:2181, session id = 0x90c8380001, negotiated timeout = 30000

WATCHER::

WatchedEvent state:SyncConnected type:None path:null
JLine support is enabled
[zk: localhost:2181(CONNECTED) 0] ls /storm
[assignments, backpressure, blobstore, blobstoremaxkeysequencenumber, credentials, errors, leader-lock, logconfigs, nimbuses, storm, storms, supervisors, workerbeats]
[zk: localhost:2181(CONNECTED) 1] ls /storm/storms
[]

```


root@smartedge00: ~

```
smartedge00 :~ » docker exec -it zookeeper00 bash
[root@zookeeper00 /]# cd $ZK_HOME
[root@zookeeper00 apache-zookeeper-3.7.1]# bin/zkServer.sh start
ZooKeeper JMX enabled by default
Using config: /opt/apache-zookeeper-3.7.1/bin/./conf/zoo.cfg
Starting zookeeper ... already running as process 46.
[root@zookeeper00 apache-zookeeper-3.7.1]# cat /var/zookeeper/myid
0
[root@zookeeper00 apache-zookeeper-3.7.1]# bin/zkCli.sh
Connecting to localhost:2181
2023-12-17 00:04:04,054 [myid:] - INFO [main:Environment@98] - Client environme
nt:zookeeper.version=3.7.1-a2fb57c55f8e59cdd76c34b357ad5181df1258d5, built on 20
22-05-07 06:45 UTC
2023-12-17 00:04:04,055 [myid:] - INFO [main:Environment@98] - Client environme
nt:host.name=zookeeper00
2023-12-17 00:04:04,055 [myid:] - INFO [main:Environment@98] - Client environme
nt:java.version=10.0.2
2023-12-17 00:04:04,055 [myid:] - INFO [main:Environment@98] - Client environme
nt:java.vendor=Oracle Corporation
2023-12-17 00:04:04,055 [myid:] - INFO [main:Environment@98] - Client environme
nt:java.home=/usr/java/jdk-10.0.2
2023-12-17 00:04:04,055 [myid:] - INFO [main:Environment@98] - Client environme
nt:java.class.path=/opt/apache-zookeeper-3.7.1/bin/./zookeeper-server/target/cl
asses:/opt/apache-zookeeper-3.7.1/bin/./build/classes:/opt/apache-zookeeper-3.7
.1/bin/./zookeeper-server/target/lib/*.jar:/opt/apache-zookeeper-3.7.1/bin/./b
uild/lib/*.jar:/opt/apache-zookeeper-3.7.1/bin/./lib/zookeeper-prometheus-metri
```

LAB 2

Parte 1

Arrancamos Storm

```
@storm00:/opt/apache-storm-2.4.0
smartedge00 :: ~ » docker exec -it storm00 bash
[root@storm00 /]# cd $STORM_HOME
[root@storm00 apache-storm-2.4.0]# bin/storm nimbus &
[1] 462
[root@storm00 apache-storm-2.4.0]# Running: /usr/java/latest/bin/java -server -D
daemon.name=nimbus -Dstorm.options= -Dstorm.home=/opt/apache-storm-2.4.0 -Dstorm.
.log.dir=/opt/apache-storm-2.4.0/logs -Djava.library.path=/usr/local/lib:/opt/lo
cal/lib:/usr/lib:/usr/lib64 -Dstorm.conf.file= -cp /opt/apache-storm-2.4.0/*:/op
t/apache-storm-2.4.0/lib/*:/opt/apache-storm-2.4.0/extlib/*:/opt/apache-storm-2.
4.0/extlib-daemon/*:/opt/apache-storm-2.4.0/conf -Xmx1024m -Djava.deserializatio
n.disabled=true -Dlogfile.name=nimbus.log -Dlog4j.configurationFile=/opt/apache-
storm-2.4.0/log4j2/cluster.xml org.apache.storm.daemon.nimbus.Nimbus

[1]+  Done                  bin/storm nimbus
[root@storm00 apache-storm-2.4.0]# bin/storm ui &
[1] 562
[root@storm00 apache-storm-2.4.0]# Running: /usr/java/latest/bin/java -server -D
daemon.name=ui -Dstorm.options= -Dstorm.home=/opt/apache-storm-2.4.0 -Dstorm.log
.dir=/opt/apache-storm-2.4.0/logs -Djava.library.path=/usr/local/lib:/opt/local/
lib:/usr/lib:/usr/lib64 -Dstorm.conf.file= -cp /opt/apache-storm-2.4.0/*:/opt/ap
ache-storm-2.4.0/lib/*:/opt/apache-storm-2.4.0/extlib/*:/opt/apache-storm-2.4.0/
extlib-daemon/*:/opt/apache-storm-2.4.0/lib-webapp/*:/opt/apache-storm-2.4.0/con
f -Xmx768m -Djava.deserialization.disabled=true -Dlogfile.name=ui.log -Dlog4j.co
nfigurationFile=/opt/apache-storm-2.4.0/log4j2/cluster.xml org.apache.storm.daem
on.ui.UIServer

[root@storm00 apache-storm-2.4.0]#
[root@storm00 apache-storm-2.4.0]#
```

```

@storm01:/opt/apache-storm-2.4.0
smartedge00 :: ~ » docker exec -it storm01 bash
[root@storm01 /]# cd $STORM_HOME
[root@storm01 apache-storm-2.4.0]# bin/storm nimbus &
[1] 29
[root@storm01 apache-storm-2.4.0]# Running: /usr/java/latest/bin/java -server -D
daemon.name=nimbus -Dstorm.options= -Dstorm.home=/opt/apache-storm-2.4.0 -Dstorm
.log.dir=/opt/apache-storm-2.4.0/logs -Djava.library.path=/usr/local/lib:/opt/lo
cal/lib:/usr/lib:/usr/lib64 -Dstorm.conf.file= -cp /opt/apache-storm-2.4.0/*:/op
t/apache-storm-2.4.0/lib/*:/opt/apache-storm-2.4.0/extlib/*:/opt/apache-storm-2.
4.0/extlib-daemon/*:/opt/apache-storm-2.4.0/conf -Xmx1024m -Djava.deserializatio
n.disabled=true -Dlogfile.name=nimbus.log -Dlog4j.configurationFile=/opt/apache-
storm-2.4.0/log4j2/cluster.xml org.apache.storm.daemon.nimbus.Nimbus

```

```

@storm03:/opt/apache-storm-2.4.0
exit
smartedge00 :: ~ » docker exec -it storm02 bash
[root@storm02 /]# cd $STORM_HOME
[root@storm02 apache-storm-2.4.0]# bin/storm supervisor &
[1] 30
[root@storm02 apache-storm-2.4.0]#
[root@storm02 apache-storm-2.4.0]#
[root@storm02 apache-storm-2.4.0]# Running: /usr/java/latest/bin/java -server -D
daemon.name=supervisor -Dstorm.options= -Dstorm.home=/opt/apache-storm-2.4.0 -Ds
torm.log.dir=/opt/apache-storm-2.4.0/logs -Djava.library.path=/usr/local/lib:/op
t/local/lib:/usr/lib:/usr/lib64 -Dstorm.conf.file= -cp /opt/apache-storm-2.4.0/*
:/opt/apache-storm-2.4.0/lib/*:/opt/apache-storm-2.4.0/extlib/*:/opt/apache-stor
m-2.4.0/extlib-daemon/*:/opt/apache-storm-2.4.0/conf -Xmx256m -Djava.deserializa
tion.disabled=true -Dlogfile.name=supervisor.log -Dlog4j.configurationFile=/opt/
apache-storm-2.4.0/log4j2/cluster.xml org.apache.storm.daemon.supervisor.Supervi
sor

[root@storm02 apache-storm-2.4.0]# exit
exit
smartedge00 :: ~ » docker exec -it storm03 bash
[root@storm03 /]# cd $STORM_HOME
[root@storm03 apache-storm-2.4.0]# bin/storm supervisor &
[1] 29
[root@storm03 apache-storm-2.4.0]# Running: /usr/java/latest/bin/java -server -D
daemon.name=supervisor -Dstorm.options= -Dstorm.home=/opt/apache-storm-2.4.0 -Ds
torm.log.dir=/opt/apache-storm-2.4.0/logs -Djava.library.path=/usr/local/lib:/op
t/local/lib:/usr/lib:/usr/lib64 -Dstorm.conf.file= -cp /opt/apache-storm-2.4.0/*
:/opt/apache-storm-2.4.0/lib/*:/opt/apache-storm-2.4.0/extlib/*:/opt/apache-stor
m-2.4.0/extlib-daemon/*:/opt/apache-storm-2.4.0/conf -Xmx256m -Djava.deserializa
tion.disabled=true -Dlogfile.name=supervisor.log -Dlog4j.configurationFile=/opt/
apache-storm-2.4.0/log4j2/cluster.xml org.apache.storm.daemon.supervisor.Supervi
sor

[root@storm03 apache-storm-2.4.0]# █

```



```
@storm04:/opt/apache-storm-2.4.0
exit
smartedge00 :: ~ » docker exec -it storm04 bash
[root@storm04 /]# cd $STORM_HOME
[root@storm04 apache-storm-2.4.0]# bin/storm supervisor &
[1] 29
[root@storm04 apache-storm-2.4.0]# Running: /usr/java/latest/bin/java -server -D
daemon.name=supervisor -Dstorm.options= -Dstorm.home=/opt/apache-storm-2.4.0 -Ds
storm.log.dir=/opt/apache-storm-2.4.0/logs -Djava.library.path=/usr/local/lib:/op
t/local/lib:/usr/lib:/usr/lib64 -Dstorm.conf.file= -cp /opt/apache-storm-2.4.0/*
:/opt/apache-storm-2.4.0/lib/*:/opt/apache-storm-2.4.0/extlib/*:/opt/apache-stor
m-2.4.0/extlib-daemon/*:/opt/apache-storm-2.4.0/conf -Xmx256m -Djava.deserializa
tion.disabled=true -Dlogfile.name=supervisor.log -Dlog4j.configurationFile=/opt/
apache-storm-2.4.0/log4j2/cluster.xml org.apache.storm.daemon.supervisor.Supervi
sor

[root@storm04 apache-storm-2.4.0]#
[root@storm04 apache-storm-2.4.0]#
[root@storm04 apache-storm-2.4.0]#
[root@storm04 apache-storm-2.4.0]#
[root@storm04 apache-storm-2.4.0]#
```

```
root@smartedge00: ~
CONTAINER ID   NAME      CPU %     MEM USAGE / LIMIT   MEM %     NET I/O
BLOCK I/O    PIDS
77b6ed67a98c   storm04   1.16%     193.4MiB / 7.639GiB  2.47%     50.8kB /
59.6kB 223MB / 41kB 33
4481f8f056be   storm03   1.06%     209.2MiB / 7.639GiB  2.68%     256kB / 3
25kB 214MB / 41kB 38
e32ed9f3ed34   storm02   2.40%     201.8MiB / 7.639GiB  2.58%     157kB / 1
97kB 213MB / 41kB 33
09296a4f7a20   storm01   0.61%     336.1MiB / 7.639GiB  4.30%     81.4MB /
898kB 240MB / 201kB 131
67de7555d7f4   storm00   2.49%     575.1MiB / 7.639GiB  7.35%     2.75MB /
82.6MB 471MB / 375kB 156
3bb49b8799c6   zookeeper02 1.28%     143.4MiB / 7.639GiB  1.83%     1.62MB /
1.49MB 138MB / 3.91MB 63
b611ef2afaa8   zookeeper01 0.57%     116.2MiB / 7.639GiB  1.49%     1.08MB /
1.61MB 138MB / 4.04MB 71
a2cd44748722   zookeeper00 4.97%     213.9MiB / 7.639GiB  2.74%     1.42MB /
1.47MB 275MB / 3.94MB 63
^C
smartedge00 :: ~ » 130
```

Podemos ver la consola gráfica desde el navegador en el sistema host
http://172.16.111.128:8080

The screenshot displays the Storm UI web interface in a browser window. The address bar shows the URL `http://172.16.111.128:8080`. The interface includes a sidebar with navigation icons and a main content area with three summary sections.

Storm UI

Cluster Summary

Version	Supervisors	Used slots	Free slots	Total slots	Executors	Tasks
2.4.0	3	0	12	12	0	0

Nimbus Summary

Search:

Host	Port	Status	Version	Uptime
storm00	6627	Leader	2.4.0	24m 27s
storm01	6627	Not a Leader	2.4.0	16m 23s

Showing 1 to 2 of 2 entries

Owner Summary

Search:

Owner	Total Topologies	Total Executors	Total Workers	Memory Usage (MB)
No data available in table				

Showing 0 to 0 of 0 entries

WorkspacesStorm UI

172.16.111.128:8080

Search Bing

Showing 0 to 0 of 0 entries

Supervisor Summary

Search:

Host	Id	Uptime	Slots	Used slots	Avail slots	Used Mem (MB)	Version	Blacklisted
storm02 (log)	ce118ab1-042c-4b67-b581-e28bdc0a6fba	9m 26s	4	0	4	0	2.4.0	false
storm03 (log)	91c777da-4be9-46d0-a366-bb729d7d897a	7m 37s	4	0	4	0	2.4.0	false
storm04 (log)	02c58f36-6bc5-4837-95d5-a8f61f0d7d68	6m 5s	4	0	4	0	2.4.0	false

Showing 1 to 3 of 3 entries

Nimbus Configuration

Show 20 entries

Search:

Key	Value
blacklist.scheduler.assume.supervisor.bad.based.on.bad.slot	true
blacklist.scheduler.reporter	"org.apache.storm.scheduler.blacklist.reporters.LogReporter"
blacklist.scheduler.resume.time.secs	1800
blacklist.scheduler.strategy	"org.apache.storm.scheduler.blacklist.strategies.DefaultBlacklistStrategy"

Reset

100 %

01:51 AM

```
root@smartedge00: ~
smartedge00 :: ~ » docker exec -it storm04 bash
[root@storm04 /]# cd $STORM_HOME
[root@storm04 apache-storm-2.4.0]# jps
162 Jps
29 Supervisor
[root@storm04 apache-storm-2.4.0]# kill -9 29
[root@storm04 apache-storm-2.4.0]# jps
177 Jps
[root@storm04 apache-storm-2.4.0]# exit
exit
smartedge00 :: ~ » docker exec -it storm03 bash
[root@storm03 /]# cd $STORM_HOME
[root@storm03 apache-storm-2.4.0]# jps
168 Jps
29 Supervisor
[root@storm03 apache-storm-2.4.0]# kill -9 29
[root@storm03 apache-storm-2.4.0]# exit
exit
smartedge00 :: ~ » docker exec -it storm02 bash
[root@storm02 /]# jps
163 Jps
30 Supervisor
[root@storm02 /]# kill -9 30
[root@storm02 /]#
[root@storm02 /]#
[root@storm02 /]# exit
exit
smartedge00 :: ~ » docker exec -it storm01 bash
[root@storm01 /]# jps
283 Jps
29 Nimbus
[root@storm01 /]# docker ps -q
bash: docker: command not found
[root@storm01 /]# exit
exit
smartedge00 :: ~ » docker ps -q
77b6ed67a98c
4481f8f056be
e32ed9f3ed34
09296a4f7a20
67de7555d7f4
3bb49b8799c6
b611ef2afaa8
a2cd44748722
smartedge00 :: ~ » docker ps
CONTAINER ID    IMAGE                                COMMAND          CREATED          STATUS
PORTS
77b6ed67a98c    centos:centos7.5.1804              "/bin/bash"     5 years ago     Up 2 hours
2181/tcp, 3772-3773/tcp, 6627/tcp, 8000/tcp, 8080/tcp    storm04
```



```
root@smartedge00: ~
smartedge00 :: ~ » ./startStormCluster.sh
##### Setting port-forwarding
success
public (active)
  target: default
  icmp-block-inversion: no
  interfaces: ens160
  sources:
  services: ssh dhcpv6-client
  ports:
  protocols:
  masquerade: yes
  forward-ports: port=8080:proto=tcp:toport=:toaddr=192.168.0.5
  source-ports:
  icmp-blocks:
  rich rules:

##### Starting zookeeper00 as QuorumPeerMain
QuorumPeerMain
101 Jps
72 QuorumPeerMain
##### Starting zookeeper01 as QuorumPeerMain
QuorumPeerMain
58 Jps
94 Jps
130 -- main class information unavailable
133 Jps
130 QuorumPeerMain
186 Jps
##### Starting zookeeper02 as QuorumPeerMain
QuorumPeerMain
100 Jps
73 QuorumPeerMain
##### Starting storm00 as Nimbus
```

```
vim storm-script.bash
smartedge00 :: ~ » vim storm-script.bash
smartedge00 :: ~ » vim storm-script.bash
#!/bin/bash
for i in 0 1 2 3 4
do
echo "Comprobando storm0$i"
docker exec -it storm0$i jps
done
```


Creamos el proyecto storm-first con maven

```
root@smartedge00: ~/workspace
smartedge00 :: ~ » cd /root/workspace
smartedge00 :: ~/workspace » mvn archetype:generate -DgroupId=com.storm.learn -DartifactId=storm-first -DarchetypeArtifactId=maven-archetype-quickstart -DarchetypeVersion=1.3
[INFO] Scanning for projects...
[INFO]
[INFO] -----< org.apache.maven:standalone-pom >-----
[INFO] Building Maven Stub Project (No POM) 1
[INFO] -----[ pom ]-----
[INFO]
[INFO] >>> maven-archetype-plugin:3.0.1:generate (default-cli) > generate-sources @ standalone-pom
[INFO]
[INFO] <<< maven-archetype-plugin:3.0.1:generate (default-cli) < generate-sources @ standalone-pom
[INFO]
[INFO] --- maven-archetype-plugin:3.0.1:generate (default-cli) @ standalone-pom ---
[INFO] Generating project in Interactive mode
[INFO] Using property: groupId = com.storm.learn
[INFO] Using property: artifactId = storm-first
Define value for property 'version' 1.0-SNAPSHOT: :
[INFO] Using property: package = com.storm.learn
Confirm properties configuration:
groupId: com.storm.learn
artifactId: storm-first
version: 1.0-SNAPSHOT
package: com.storm.learn
Y: :
[INFO] -----
[INFO] Using following parameters for creating project from Archetype: maven-archetype-quickstart
[INFO] -----
```

Removemos el fichero ejemplo "App.java"

```
root@smartedge00: ~/workspace
[INFO] -----
smartedge00 :: ~/workspace » rm storm-first/src/main/java/com/storm/learn/App.java
smartedge00 :: ~/workspace »
```

```
root@smartedge00: ~/workspace/storm-first
smartedge00 :: ~/workspace » cd /root/workspace/storm-first
smartedge00 :: ~/workspace/storm-first » mvn compile exec:java -Dexec.classpathScope=compile -Dexec.mainClass=com.storm.learn.FirstStormTopology
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.storm.learn:storm-first >-----
[INFO] Building storm-first 1.0-SNAPSHOT
[INFO] -----[ jar ]-----
Downloading from apache.snapshots: https://repository.apache.org/snapshots/net/minidev/json-smart/maven-metadata.xml
Downloading from clojars: https://clojars.org/repo/net/minidev/json-smart/maven-metadata.xml
Downloading from apache.snapshots: https://repository.apache.org/content/repositories/snapshots/net/minidev/json-smart/maven-metadata.xml
Downloading from central: https://repo.maven.apache.org/maven2/net/minidev/json-smart/maven-metadata.xml
```

```

root@smartedge00: ~/workspace/storm-first/src/main/java/com/storm/learn
smartedge00 :: com/storm/learn » cd /root/workspace/storm-first
smartedge00 :: ~/workspace/storm-first » cd src/main/java/com/storm/learn
smartedge00 :: com/storm/learn » ls
FirstBolt.java  FirstStormTopology.java
smartedge00 :: com/storm/learn » cat FirstStormTopology
cat: FirstStormTopology: No such file or directory
smartedge00 :: com/storm/learn » cat FirstStormTopology.java
package com.storm.learn;

import com.storm.learn.FirstBolt;
import org.apache.storm.Config;
import org.apache.storm.LocalCluster;
import org.apache.storm.starter.spout.RandomIntegerSpout;
import org.apache.storm.topology.TopologyBuilder;

public class FirstStormTopology{
    public static void main(String[] args){
        //Create an instance of TopologyBuilder class
        TopologyBuilder builder = new TopologyBuilder();
        // Set the Spout class
        builder.setSpout("FirstSpout", new RandomIntegerSpout(), 2);
        // Set the bolt class
        builder.setBolt("FirstBolt", new FirstBolt(), 4).shuffleGrouping("FirstSpout");
        Config conf = new Config();
        try{
            // Create an instance of LocalCluster class for executing topology in local mode
            LocalCluster cluster = new LocalCluster();
            // FirstStormTopology is the name of submitted topology
            cluster.submitTopology("FirstStormTopology", conf, builder.createTopology());

```

Parte 2

```

root@smartedge00: ~/workspace/storm-first/src/main/java/com/storm/learn
smartedge00 :: com/storm/learn » cp ~/workspace/storm_first/FirstStormClusterTopology.java ~/workspace/sto
rm-first/src/main/java/com/storm/learn
smartedge00 :: com/storm/learn » ls
FirstBolt.java  FirstStormClusterTopology.java
smartedge00 :: com/storm/learn » █

```

```

root@smartedge00: ~/workspace/storm-first
smartedge00 :: ~/workspace/storm-first » mvn clean install
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.storm.learn:storm-first >-----
[INFO] Building storm-first 1.0-SNAPSHOT
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- maven-clean-plugin:3.0.0:clean (default-clean) @ storm-first ---
[INFO] Deleting /root/workspace/storm-first/target
[INFO]
[INFO] --- maven-resources-plugin:3.0.2:resources (default-resources) @ storm-first ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /root/workspace/storm-first/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.7.0:compile (default-compile) @ storm-first ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 2 source files to /root/workspace/storm-first/target/classes

```


Copiamos el fichero de la topología 1.0-SNAPSHOT.jar en storm00, donde se encuentra el máster (Nimbus) y ejecutamos la nueva topología

```
@storm00:/opt/apache-storm-2.4.0
smartedge00 :: ~/workspace/storm-first » docker cp target/storm-first-1.0-SNAPSHOT.jar storm00:/tmp
smartedge00 :: ~/workspace/storm-first » docker exec -it storm00 bash
[root@storm00 /]# cd $STORM_HOME
[root@storm00 apache-storm-2.4.0]# bin/storm jar /tmp/storm-first-1.0-SNAPSHOT.jar com.storm.learn.FirstStormClusterTopology FirstStormClusterTopology
Running: /usr/java/latest/bin/java -client -Ddaemon.name= -Dstorm.options= -Dstorm.home=/opt/apache-storm-2.4.0 -Dstorm.log.dir=/opt/apache-storm-2.4.0/logs -Djava.library.path=/usr/local/lib:/opt/local/lib:/usr/lib:/usr/lib64 -Dstorm.conf.file= -cp /opt/apache-storm-2.4.0/*:/opt/apache-storm-2.4.0/lib-worker/*:/opt/apache-storm-2.4.0/extlib/*:/tmp/storm-first-1.0-SNAPSHOT.jar:/opt/apache-storm-2.4.0/conf:/opt/apache-storm-2.4.0/bin: -Dstorm.jar=/tmp/storm-first-1.0-SNAPSHOT.jar -Dstorm.dependency.jars= -Dstorm.dependency.artifacts={} com.storm.learn.FirstStormClusterTopology FirstStormClusterTopology
22:40:55.395 [main] INFO o.a.s.StormSubmitter - Generated ZooKeeper secret payload for MD5-digest: -6826306900448865099:-6460755273829250518
22:40:55.475 [main] INFO o.a.s.u.NimbusClient - Found leader nimbus : storm00:6627
22:40:55.478 [main] INFO o.a.s.s.a.ClientAuthUtils - Got AutoCreds []
22:40:55.510 [main] INFO o.a.s.StormSubmitter - Uploading dependencies - jars...
22:40:55.514 [main] INFO o.a.s.StormSubmitter - Uploading dependencies - artifacts...
```

Una imagen que represente el clúster de Storm utilizado en los laboratorios: (3 puntos)
Comprobamos que se ha desplegado correctamente la topología accediendo a la UI de Storm.

Not Secure 172.16.111.128 8080

HostPortStatusVersionUptime

storm00	6627	Not a Leader	2.4.0	1h 34m 34s
storm01	6627	Leader	2.4.0	1h 34m 10s

Showing 1 to 2 of 2 entries

Owner Summary

Search:

Owner	Total Topologies	Total Executors	Total Workers	Memory Usage (MB)
root	1	9	3	1152

Showing 1 to 1 of 1 entries

Topology Summary

Search:

Name	Owner	Status	Uptime	Num workers	Num executors	Num tasks	Replication count	Assigned Mem (MB)	Assigned Generic Resources	Scheduler Info	Topology Version	Storm Version
FirstStormClusterTopology	root	ACTIVE	40s	3	9	9	2	1,152	NaN			2.4.0

Showing 1 to 1 of 1 entries

Supervisor Summary

Search:

Host	Id	Uptime	Slots	Used slots	Avail slots	Used Mem (MB)	Version	Blacklisted
storm02 (log)	ce118ab1-042c-4b67-b581-e28bdc0a6fba	1h 33m 20s	4	0	4	0	2.4.0	false
storm03 (log)	91c777da-4be9-46d0-a366-bb729d7d897a	1h 32m 56s	4	0	4	0	2.4.0	false
storm04 (log)	02c58f36-6bc5-4837-95d5-a8f61f0d7d68	1h 32m 32s	4	0	4	0	2.4.0	false

Window	Emitted	Transferred	Complete latency (ms)	Acked	Failed
10m 0s	760	760	32.542	960	0
3h 0m 0s	760	760	32.542	960	0
1d 0h 0m 0s	760	760	32.542	960	0
All time	760	760	32.542	960	0

Search: <input type="text"/>											
Id	Executors	Tasks	Emitted	Transferred	Complete latency (ms)	Acked	Failed	Error Host	Error Port	Last error	Error Time
FirstSpout	2	2	760	760	32.542	960	0				

Bolts (All time)

Search: <input type="text"/>														
Id	Executors	Tasks	Emitted	Transferred	Capacity (last 10m)	Execute latency (ms)	Executed	Process latency (ms)	Acked	Failed	Error Host	Error Port	Last error	Error Time
BlueBolt	4	4	0	0	0.216	18.625	960	42.829	980	0				

Worker Resources

Search: [Toggle Components](#)

[Not Secure](#) 172.16.111.128 8080/topology.html 🔍 Search Bing

ID	Executors	Tasks	Emitted	Transferred	(last 10m)	(ms)	Executed	(ms)	Acked	Failed	Host	Port	error	Time
FirstBolt	4	4	0	0	0.213	23.316	13,240	31.894	13,240	0				

Showing 1 to 1 of 1 entries

Worker Resources

Search: Toggle Components

Host	Supervisor Id	Port	Uptime	Num executors	Assigned Mem (MB)	Components
storm02	ce118ab1-042c-4b67-b581-e28bcd0a6fba	6700	13m 16s	3	384	2 components
storm03	91c777da-4be9-46d0-a366-bb729d7d897a	6700	13m 14s	3	384	2 components
storm04	02c58f36-6bc5-4837-95d5-a8f61fd7d68	6700	13m 11s	3	384	1 component

Showing 1 to 3 of 3 entries

Topology Visualization

Show Visualization Open Visualization

Topology Configuration

Show entries Search:

Key	Value
blacklist.scheduler.assume.supervisor.bad.based.on.bad.slot	true
blacklist.scheduler.reporter	"org.apache.storm.scheduler.blacklist.reporters.LogReporter"
blacklist.scheduler.resume.time.secs	1800
blacklist.scheduler.strategy	"org.apache.storm.scheduler.blacklist.strategies.DefaultBlacklistStrategy"
blacklist.scheduler.tolerance.count	3
blacklist.scheduler.tolerance.time.secs	300

ENTREGA PARA LAB2

```
@storm02:/opt/apache-storm-2.4.0/logs/workers-artifacts/FirstStormClusterTopology-1-1703630456/6700
smartedge00 :: ~/workspace/storm-first » docker exec -it storm02 bash
[root@storm02 /]# cd $STORM_HOME
[root@storm02 apache-storm-2.4.0]# cd /opt/apache-storm-2.4.0/logs/
access-supervisor.log      supervisor.log      workers-artifacts/
access-web-supervisor.log  supervisor.log.metrics
[root@storm02 apache-storm-2.4.0]# cd /opt/apache-storm-2.4.0/logs/workers-artifacts/
[root@storm02 workers-artifacts]# ls
FirstStormClusterTopology-1-1703630456
[root@storm02 workers-artifacts]# cd FirstStormClusterTopology-1-1703630456/6700
[root@storm02 6700]# tail -f worker.log
2023-12-26 23:41:51.857 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 754
2023-12-26 23:41:51.957 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 73
2023-12-26 23:41:52.057 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 250
2023-12-26 23:41:52.157 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 883
2023-12-26 23:41:52.257 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 520
2023-12-26 23:41:52.357 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 214
2023-12-26 23:41:52.458 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 147
2023-12-26 23:41:52.558 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 772
2023-12-26 23:41:52.658 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 574
2023-12-26 23:41:52.758 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 484
2023-12-26 23:41:52.858 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 345
2023-12-26 23:41:52.958 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 317
2023-12-26 23:41:53.058 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 295
2023-12-26 23:41:53.159 c.s.l.FirstBolt Thread-17-FirstBolt-executor[3, 3] [INFO] ##### Random value : 168
```

```
@storm03:/opt/apache-storm-2.4.0/logs/workers-artifacts/FirstStormClusterTopology-1-1703630456/6700
exit
smartedge00 :: ~/workspace/storm-first » docker exec -it storm03 bash
[root@storm03 /]# cd $STORM_HOME
[root@storm03 apache-storm-2.4.0]# cd /opt/apache-storm-2.4.0/logs/workers-artifacts/
[root@storm03 workers-artifacts]# ls
FirstStormClusterTopology-1-1703630456
[root@storm03 workers-artifacts]# cd FirstStormClusterTopology-1-1703630456/6700
[root@storm03 6700]# tail -f worker.log
2023-12-26 23:44:21.325 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 469
2023-12-26 23:44:21.425 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 352
2023-12-26 23:44:21.525 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 767
2023-12-26 23:44:21.625 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 111
2023-12-26 23:44:21.725 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 431
2023-12-26 23:44:21.825 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 739
2023-12-26 23:44:21.925 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 139
2023-12-26 23:44:22.026 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 35
2023-12-26 23:44:22.126 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 68
2023-12-26 23:44:22.226 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 153
2023-12-26 23:44:22.326 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 815
2023-12-26 23:44:22.426 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 619
2023-12-26 23:44:22.526 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 674
2023-12-26 23:44:22.626 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 731
2023-12-26 23:44:22.726 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 411
2023-12-26 23:44:22.827 c.s.l.FirstBolt Thread-17-FirstBolt-executor[2, 2] [INFO] ##### Random value : 933
```

```
smartedge00 :: ~/workspace/storm-first » docker exec -it storm04 bash
[root@storm04 /]# cd $STORM_HOME
[root@storm04 apache-storm-2.4.0]# cd /opt/apache-storm-2.4.0/logs/workers-artifacts/
[root@storm04 workers-artifacts]# ls
FirstStormClusterTopology-1-1703630456
[root@storm04 workers-artifacts]# cd FirstStormClusterTopology-1-1703630456/6700
[root@storm04 6700]# tail -f worker.log
2023-12-26 22:43:05.030 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [INFO] storm.cgroup.hierarchy.dir is not set or does not exist. checking storm.oci.cgroup.root
2023-12-26 22:43:05.030 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [INFO] storm.oci.cgroup.root is not set or does not exist
2023-12-26 22:43:05.030 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [WARN] CGroupMemoryUsage is disabled
2023-12-26 22:43:05.031 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [INFO] storm.cgroup.hierarchy.dir is not set or does not exist. checking storm.oci.cgroup.root
2023-12-26 22:43:05.031 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [INFO] storm.oci.cgroup.root is not set or does not exist
2023-12-26 22:43:05.031 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [WARN] CGroupCpu is disabled
2023-12-26 22:43:05.032 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [INFO] storm.cgroup.hierarchy.dir is not set or does not exist. checking storm.oci.cgroup.root
2023-12-26 22:43:05.032 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [INFO] storm.oci.cgroup.root is not set or does not exist
2023-12-26 22:43:05.034 o.a.s.m.c.CGroupMetricsBase Thread-15-__system-executor[-1, -1] [WARN] CGroupCpuGuarant
```

Capturas de pantalla de las topologías desplegadas en el laboratorio 2 (2 puntos):

Storm UI

Cluster Summary

Version	Supervisors	Used slots	Free slots	Total slots	Executors	Tasks
2.4.0	3	3	9	12	9	9

Nimbus Summary

Search:

Host	Port	Status	Version	Uptime
storm00	6627	Not a Leader	2.4.0	2h 46m 8s
storm01	6627	Leader	2.4.0	2h 45m 44s

Showing 1 to 2 of 2 entries

Owner Summary

Search:

Owner	Total Topologies	Total Executors	Total Workers	Memory Usage (MB)
root	1	9	3	1152

Showing 1 to 1 of 1 entries

Topology Summary

Search:

Name	Owner	Status	Uptime	Num workers	Num executors	Num tasks	Replication count	Assigned Mem (MB)	Assigned Generic Resources	Scheduler Info	Topology Version	Storm Version
FirstStormClusterTopology	root	ACTIVE	1h 12m 13s	3	9	9	2	1,152	NaN			2.4.0

root

1

9

3

1152

Showing 1 to 1 of 1 entries

Topology Summary

Search:

Name	Owner	Status	Uptime	Num workers	Num executors	Num tasks	Replication count	Assigned Mem (MB)	Assigned Generic Resources	Scheduler Info	Topology Version	Storm Version
FirstStormClusterTopology	root	ACTIVE	1h 12m 13s	3	9	9	2	1,152	NaN			2.4.0

Showing 1 to 1 of 1 entries

Supervisor Summary

Search:

Host	Id	Uptime	Slots	Used slots	Avail slots	Used Mem (MB)	Version	Blacklisted
storm02 (log)	ce118ab1-042c-4b67-b581-e28bdc0a6fba	2h 45m 15s	4	1	3	0	2.4.0	false
storm03 (log)	91c777da-4be9-46d0-a366-bb729d7d897a	2h 44m 48s	4	1	3	0	2.4.0	false
storm04 (log)	02c58f36-6bc5-4837-95d5-a8f61f0d7d68	2h 44m 22s	4	1	3	0	2.4.0	false

Showing 1 to 3 of 3 entries

Nimbus Configuration

Show

20

 entries

Search:

Key	Value
blacklist.scheduler.assume.supervisor.bad.based.on.bad.slot	true
blacklist.scheduler.reporter	"org.apache.storm.scheduler.blacklist.reporters.LogReporter"
blacklist.scheduler.resume.time.secs	1800
blacklist.scheduler.strategy	"org.apache.storm.scheduler.blacklist.strategies.DefaultBlacklistStrategy"
blacklist.scheduler.tolerance.count	3
blacklist.scheduler.tolerance.time.secs	300

Reset 100% 12:54 AM

Storm UI

Search FirstStormClusterTopology-1-1703630456: Search Search Archived Logs: ☐

Topology summary

Name	Id	Owner	Status	Uptime	Num workers	Num executors	Num tasks	Replication count	Assigned Mem (MB)	Scheduler Info	Topology Version	Storm Version
FirstStormClusterTopology	FirstStormClusterTopology-1-1703630456	root	ACTIVE	1h 13m 38s	3	9	9	2	0			2.4.0

Topology actions

Activate Deactivate Rebalance Kill Debug Stop Debug Change Log Level

Topology stats

Window	Emitted	Transferred	Complete latency (ms)	Acked	Failed
10m 0s	46,170	46,170	19.687	11,557	0
3h 0m 0s	318,060	318,060	43.210	79,520	0
1d 0h 0m 0s	318,060	318,060	43.210	79,520	0
All time	318,060	318,060	43.210	79,520	0

Spouts (All time)

Search:

Id	Executors	Tasks	Emitted	Transferred	Complete latency (ms)	Acked	Failed	Error Host	Error Port	Last error	Error Time
FirstSpout	2	2	159,040	159,040	43.210	79,520	0				

Showing 1 to 1 of 1 entries

Bolts (All time)

Search:

100 % 12:54 AM

[illegible]

172.16.111.128:8080/component.html

FirstSpout default 13.311 80,640 14.674 80,640 0

Showing 1 to 1 of 1 entries

Output stats (All time)

Search:

Stream	Emitted	Transferred
_ack_ack	80,640	80,640

Showing 1 to 1 of 1 entries

Profiling and Debugging

Use the following controls to profile and debug the components on this page.

Status / Timeout (Minutes) Actions JStack Restart Worker Heap

Executors (All time)

Search:

ID	Uptime	Host	Port	Debug	Emitted	Transferred	Capacity (last 10m)	Execute latency (ms)	Executed	Process latency (ms)	Acked	Failed
[1-1]	1h 12m 27s	storm04	6700	<input type="checkbox"/> files	0	0	0.000	0.000	0	0.000	0	0
[2-2]	1h 12m 32s	storm03	6700	<input type="checkbox"/> files	40,300	40,300	0.087	13.560	40,300	12.854	40,300	0
[3-3]	1h 12m 31s	storm02	6700	<input type="checkbox"/> files	40,340	40,340	0.063	13.062	40,340	16.492	40,340	0
[4-4]	1h 12m 27s	storm04	6700	<input type="checkbox"/> files	0	0	0.000	0.000	0	0.000	0	0

Showing 1 to 4 of 4 entries

Errors

Search:

Time	Error Host	Error Port	Error
No data available in table			

Showing 0 to 0 of 0 entries

Page rendered at: Wed Dec 27 2023 00:55:49 GMT+0100 (Central European Standard Time)

SalidaLab2.[zip/tgz] (0.5 puntos)

Debe contener el fichero worker.log de la topología desplegada en el laboratorio 2.

```
root@smartedge00: /tmp
smartedge00 :: ~/workspace/storm-first » docker cp storm03:/opt/apache-storm-2.4.0/logs/workers-artifacts/FirstStormClusterTopology-1-1703630456/6700/worker.log /tmp/FirstStormClusterTopologyStorm03.txt

root@smartedge00: ~
smartedge00 :: ~ » docker cp storm02:/opt/apache-storm-2.4.0/logs/workers-artifacts/FirstStormClusterTopology-1-1703630456/6700/worker.log /tmp/FirstStormClusterTopologyStorm02.txt
smartedge00 :: ~ » docker cp storm04:/opt/apache-storm-2.4.0/logs/workers-artifacts/FirstStormClusterTopology-1-1703630456/6700/worker.log /tmp/FirstStormClusterTopologyStorm04.txt
smartedge00 :: ~ »
```

Adjunto a esta práctica el ficheros worker.log correspondiente al que he llamado
“FirstStormClusterTopologyStorm02.txt” “FirstStormClusterTopologyStorm03.txt” y
“FirstStormClusterTopologyStorm04.txt”

```
root@smartedge00: /tmp
smartedge00 :: ~ » cd ..
smartedge00 :: / » cd /tmp
smartedge00 :: /tmp » ls -l
total 12352
drwxr-xr-x. 3 root root      24 Dec 26 22:31 0a06b06d-6704-4bd4-ala1-6ef1c6ec41ca
drwxr-xr-x. 4 root root      33 Dec 26 22:31 0c1bcf45-19aa-43ab-bdf5-418da504e99d
drwxr-xr-x. 4 root root      37 Dec 26 22:31 0e59cbe1-0b67-409a-9ad9-c42e7dbd5fdf
drwxr-xr-x. 5 root root      60 Dec 26 22:31 d6fd33ac-2a1a-4fc9-8597-b787b2244d27
drwxr-xr-x. 3 root root      23 Dec 26 22:31 e1449235-7675-4ce3-8041-3b6c3024db94
-rw-r--r--. 1 root root 6552813 Dec 27 01:27 FirstStormClusterTopologyStorm02.txt
-rw-r--r--. 1 root root 5999508 Dec 27 01:18 FirstStormClusterTopologyStorm03.txt
-rw-r--r--. 1 root root   90608 Dec 26 23:43 FirstStormClusterTopologyStorm04.txt
drwxr-xr-x. 2 root root       6 Dec 26 23:19 hsperfdata_root
drwx-----. 3 root root      17 Dec 26 21:50 systemd-private-4151294553794fd5bc547a2a9f33e4e4-chronyd.service-9
AUbOR
smartedge00 :: /tmp » █
```

LAB 3

```
root@smartedge00: ~  
smartedge00 :: ~ » docker pull sequenceiq/hadoop-docker  
Using default tag: latest  
latest: Pulling from sequenceiq/hadoop-docker  
Image docker.io/sequenceiq/hadoop-docker:latest uses outdated schema1 manifest f  
ormat. Please upgrade to a schema2 image for better future compatibility. More i  
nformation at https://docs.docker.com/registry/spec/deprecated-schema-v1/  
b253335dcf03: Pulling fs layer
```

```
root@smartedge00: ~  
smartedge00 :: ~ » docker run -itd -p 9000:9000 --network=br0 --name hadoop sequ  
enceiq/hadoop-docker  
cf3e1e929e6bf6f656ebf23a1b45123dd27d926768ed2823e20822f6ed9c9848  
smartedge00 :: ~ » docker ps  
CONTAINER ID    IMAGE                                COMMAND                  CREATED  
STATUS          PORTS                               NAMES  
cf3e1e929e6b    sequenceiq/hadoop-docker            "/etc/bootstrap.sh -d"  38 seconds ago  
Up 36 seconds   2122/tcp, 8030-8033/tcp, 8040/tcp, 8042/tcp, 8088/tcp, 19888  
/tcp, 49707/tcp, 50010/tcp, 50020/tcp, 50070/tcp, 50075/tcp, 50090/tcp, 0.0.0.0:  
9000->9000/tcp, :::9000->9000/tcp    hadoop  
77b6ed67a98c    centos:centos7.5.1804              "/bin/bash"             5 years ago  
Up 2 hours      2181/tcp, 3772-3773/tcp, 6627/tcp, 8000/tcp, 8080/tcp  
storm04  
4481f8f056be    centos:centos7.5.1804              "/bin/bash"             5 years ago  
Up 2 hours      2181/tcp, 3772-3773/tcp, 6627/tcp, 8000/tcp, 8080/tcp  
storm03  
e32ed9f3ed34    centos:centos7.5.1804              "/bin/bash"             5 years ago
```

```
docker exec -it hadoop bash  
smartedge00 :: ~ » docker exec -it hadoop bash  
bash-4.1# cd $HADOOP_PREFIX  
bash-4.1# bin/hdfs dfs -ls /  
Found 1 items  
drwxr-xr-x    - root supergroup          0 2015-07-22 11:17 /user  
bash-4.1#
```



```
docker exec -it hadoop bash

bash-4.1# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
21: eth0@if22: <BROADCAST,MULTICAST,UP,LOWER_UP,M-DOWN> mtu 1500 qdisc noqueue state UP
    link/ether 02:42:c0:a8:00:0a brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.10/16 brd 192.168.255.255 scope global eth0
        valid_lft forever preferred_lft forever
bash-4.1#
```

```
root@smartedge00: ~

smartedge00 :: ~ » docker inspect hadoop | grep IPAddress
"SecondaryIPAddresses": null,
  "IPAddress": "",
  "IPAddress": "192.168.0.10",
smartedge00 :: ~ »
```

```
root@smartedge00: ~/workspace

smartedge00 :: ~/workspace » mvn archetype:generate -DgroupId=com.storm.learn -DartifactId=storm-hadoop -DarchetypeArtifactId=maven-archetype-quickstart -DarchetypeVersion=1.3
[INFO] Scanning for projects...
[INFO] -----< org.apache.maven:standalone-pom >-----
[INFO] Building Maven Stub Project (No POM) 1
[INFO] -----[ pom ]-----
[INFO] >>> maven-archetype-plugin:3.0.1:generate (default-cli) > generate-sources @ standalone-pom
>>>
[INFO] <<< maven-archetype-plugin:3.0.1:generate (default-cli) < generate-sources @ standalone-pom
<<<
[INFO]
[INFO] --- maven-archetype-plugin:3.0.1:generate (default-cli) @ standalone-pom ---
[INFO] Generating project in Interactive mode
[INFO] Using property: groupId = com.storm.learn
[INFO] Using property: artifactId = storm-hadoop
```

root@smartedge00: ~/workspace/storm-hadoop

```
smartedge00 :: ~/workspace » cp /root/pom.xml /root/workspace/storm-hadoop/pom.xml
smartedge00 :: ~/workspace » cd /root/workspace/storm-hadoop
smartedge00 :: ~/workspace/storm-hadoop » mvn clean install
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.storm.learn:storm-first >-----
[INFO] Building storm-first 1.0-SNAPSHOT
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- maven-clean-plugin:3.0.0:clean (default-clean) @ storm-first ---
[INFO]
[INFO] --- maven-resources-plugin:3.0.2:resources (default-resources) @ storm-first ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /root/workspace/storm-hadoop/src/main/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.7.0:compile (default-compile) @ storm-first ---
[INFO] Changes detected - recompiling the module!
[INFO] Compiling 1 source file to /root/workspace/storm-hadoop/target/classes
[INFO]
```

LAB 4

Aprovisionamos Apache Flink

```
root@smartedge00: ~/workspace

smartedge00 :: ~/workspace » cd ..
smartedge00 :: ~ » docker pull flink
Using default tag: latest
latest: Pulling from library/flink
3dd181f9be59: Pull complete
6d733e6219d9: Pull complete
41f868d375a0: Pull complete
7e0b41871d28: Pull complete
abba5c11ffee: Pull complete
5e02db78a409: Pull complete
f2e40c8f7831: Pull complete
1a3b86e63dde: Pull complete
8ee54761d2bb: Pull complete
90c6f905b7b8: Pull complete
c3f99efbb113: Pull complete
Digest: sha256:a65c761f915e828acea70c4a10da32abe79278f5ef6840395712486be7b5ccb7
Status: Downloaded newer image for flink:latest
docker.io/library/flink:latest
smartedge00 :: ~ » cd workspace
smartedge00 :: ~/workspace » export FLINK_PROPERTIES="jobmanager.rpc.address: jo
bmanager"
smartedge00 :: ~/workspace » docker network create flink-network
c1f3eef7e367f2984f8b4d65a735158e01ecde6ec6e3fdad4ea5e808707f7415
smartedge00 :: ~/workspace » docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
cd491412b46e        br0                 bridge              local
f8fa1911845b        bridge             bridge              local
c1f3eef7e367        flink-network       bridge              local
59225ab152e7        host               host                local
e5f3d2460904        none               null                local
smartedge00 :: ~/workspace »
```

Ejecutar en dos terminales o ventanas divididas

```
root@smartedge00: ~/workspace
smartedge00 :: ~/workspace » docker run -d --rm --name=jobmanager --network flink-network --publish 8081:8081 --env FLINK_PROPERTIES="${FLINK_PROPERTIES}" flink:latest jobmanager
8f6069d28d735b02c1e3f5e4548bfb8884f8d54e4c9dd580ea89c25451004ae4
smartedge00 :: ~/workspace »

docker run --rm --name=taskmanager --network flink-network --env Flink:lates
smartedge00 :: ~ » export FLINK_PROPERTIES="jobmanager.rpc.address: jobmanager"
smartedge00 :: ~ » docker run --rm --name=taskmanager --network flink-network --env FLINK_PROPERTIES="${FLINK_PROPERTIES}" flink:latest taskmanager
Starting Task Manager
Starting taskexecutor as a console application on host 9924b375884b.
WARNING: Unknown module: jdk.compiler specified to --add-exports
WARNING: Unknown module: jdk.compiler specified to --add-exports
WARNING: Unknown module: jdk.compiler specified to --add-exports
WARNING: Unknown module: jdk.compiler specified to --add-exports
WARNING: Unknown module: jdk.compiler specified to --add-exports
2023-12-31 18:10:38,382 INFO  org.apache.flink.runtime.taskexecutor.TaskManagerRunner [] - -----
2023-12-31 18:10:38,383 INFO  org.apache.flink.runtime.taskexecutor.TaskManagerRunner [] - Preconfiguration:
2023-12-31 18:10:38,383 INFO  org.apache.flink.runtime.taskexecutor.TaskManagerRunner [] -
RESOURCE_PARAMS extraction logs:
jvm_params: -Xmx536870902 -Xms536870902 -XX:MaxDirectMemorySize=268435458 -XX:MaxMetaspaceSize=268435456
dynamic_configs: -D taskmanager.memory.network.min=134217730b -D taskmanager.cpu.cores=1.0 -D taskmanager.memory.task.off-heap.size=0b -D taskmanager.memory.jvm
```


Configuramos firewall para poder acceder desde la máquina anfitriona

```
root@smartedge00: ~/workspace
smartedge00 : ~/workspace » docker run -d --rm --name=jobmanager --network flink-network --publish 8081:8081 --env FLINK_PROPERTIES="s{FLINK_PROPERTIES}" flink:latest jobmanager
8f6069d28d735b02c1e3f5e4548bf8884f8d54e4c9dd580ea89c25451004ae4
smartedge00 : ~/workspace » docker inspect -f '{{range.NetworkSettings.Networks}}{{.IPAddress}}{{end}}' jobmanager
172.18.0.2
smartedge00 : ~/workspace » firewall-cmd --zone=public --add-forward-port=port=8081:proto=tcp:toaddr=172.18.0.2
success
smartedge00 : ~/workspace » firewall-cmd --info-zone=public
public (active)
  target: default
  icmp-block-inversion: no
  interfaces: ens160
  sources:
  services: ssh dhcpv6-client
  ports:
  protocols:
  masquerade: yes
  forward-ports: port=8080:proto=tcp:toport=:toaddr=192.168.0.5
               port=8081:proto=tcp:toport=:toaddr=172.18.0.2
  source-ports:
  icmp-blocks:
  rich rules:

smartedge00 : ~/workspace »
```

```
docker run --rm --name=taskmanager --network flink-network --env flink:lates
ver [] - Transport type 'auto': using EPOLL.
2023-12-31 18:10:39,715 INFO org.apache.flink.runtime.io.network.netty.NettySer
ver [] - Successful initialization (took 27 ms). Listening on SocketAddre
ss /0.0.0.0:40285.
2023-12-31 18:10:39,716 INFO org.apache.flink.runtime.taskexecutor.KvStateServi
ce [] - Starting the kvState service and its components.
2023-12-31 18:10:39,763 INFO org.apache.flink.runtime.rpc.pekko.PekkoRpcService
[] - Starting RPC endpoint for org.apache.flink.runtime.taskexecutor.
TaskExecutor at pekko://flink/user/rpc/taskmanager_0 .
2023-12-31 18:10:39,774 INFO org.apache.flink.runtime.taskexecutor.DefaultJobLe
aderService [] - Start job leader service.
2023-12-31 18:10:39,778 INFO org.apache.flink.runtime.filecache.FileCache
[] - User file cache uses directory /tmp/flink-dist-cache-365b8470-20
17-40b7-a197-df5e4f03f850
2023-12-31 18:10:39,780 INFO org.apache.flink.runtime.taskexecutor.TaskExecutor
[] - Connecting to ResourceManager pekko.tcp://flink@jobmanager:6123/
user/rpc/resourcemanager_*(00000000000000000000000000000000).
2023-12-31 18:10:39,936 INFO org.apache.flink.runtime.taskexecutor.TaskExecutor
[] - Resolved ResourceManager address, beginning registration
2023-12-31 18:10:39,994 INFO org.apache.flink.runtime.taskexecutor.TaskExecutor
[] - Successful registration at resource manager pekko.tcp://flink@jo
bmanager:6123/user/rpc/resourcemanager_+ under registration id ebab91ce700d795e4
0d049820f05352c.
```

Ejecutamos ejemplos

```
root@8f6069d28d73: /opt/flink
forward-ports: port=8080:proto=tcp:toport=:toaddr=192.168.0.5
               port=8081:proto=tcp:toport=:toaddr=172.18.0.2
source-ports:
icmp-blocks:
rich rules:

smartedge00 : ~/workspace » docker exec -it jobmanager /bin/bash
root@8f6069d28d73:/opt/flink# ./bin/flink run examples/streaming/TopSpeedWindowi
ng.jar
WARNING: Unknown module: jdk.compiler specified to --add-exports
WARNING: Unknown module: jdk.compiler specified to --add-exports
WARNING: Unknown module: jdk.compiler specified to --add-exports
WARNING: Unknown module: jdk.compiler specified to --add-exports
WARNING: Unknown module: jdk.compiler specified to --add-exports
Executing example with default input data.
Use --input to specify file input.
Printing result to stdout. Use --output to specify output path.
Job has been submitted with JobID b5869d963145dd6d9af58fcc189df766
```

```
docker run --rm --name=taskmanager --network flink-network --env flink:lates
(1,70,3344,569444444443,1704046596756)
(0,75,1631,6666666666672,1704046600256)
(1,70,3344,569444444443,1704046596756)
(0,75,1631,6666666666672,1704046600256)
(1,70,3344,569444444443,1704046596756)
(0,75,1631,6666666666672,1704046600256)
(1,70,3344,569444444443,1704046596756)
(0,75,1631,6666666666672,1704046600256)
(1,70,3344,569444444443,1704046596756)
(0,75,1631,6666666666672,1704046600256)
(1,70,3344,569444444443,1704046596756)
(0,80,2286,9722222222235,1704046603656)
(0,85,2334,1944444444457,1704046603856)
(1,70,3344,569444444443,1704046596756)
(0,90,2475,8472222222235,1704046604457)
(1,70,3344,569444444443,1704046596756)
(0,90,2475,8472222222235,1704046604457)
(0,95,2625,8333333333344,1704046605057)
```

Podemos ver la consola gráfica desde el navegador en el sistema host
http://172.16.111.128:8081

Apache Flink Dashboard

Version: 1.18.0 Commit: a5548cc @ 2023-10-18T22:09:35+02:00 Message: 0

Overview

Jobs

- Running Jobs
- Completed Jobs
- Task Managers
- Job Manager
- Submit New Job

Available Task Slots

0

Total Task Slots 0 Task Managers 0

Running Jobs

0

Finished 0 Canceled 0 Failed 1

Running Job List

Job Name	Start Time	Duration	End Time	Tasks	Status
No Data					

Completed Job List

Job Name	Start Time	Duration	End Time	Tasks	Status
CarTopSpeedWindowingExample	2023-12-31 19:16:16	1m 5s	2023-12-31 19:17:22	2 1 1	FAILED

Apache Flink Dashboard

Version: 1.18.0 Commit: a5548cc @ 2023-10-18T22:09:35+02:00 Message: 0

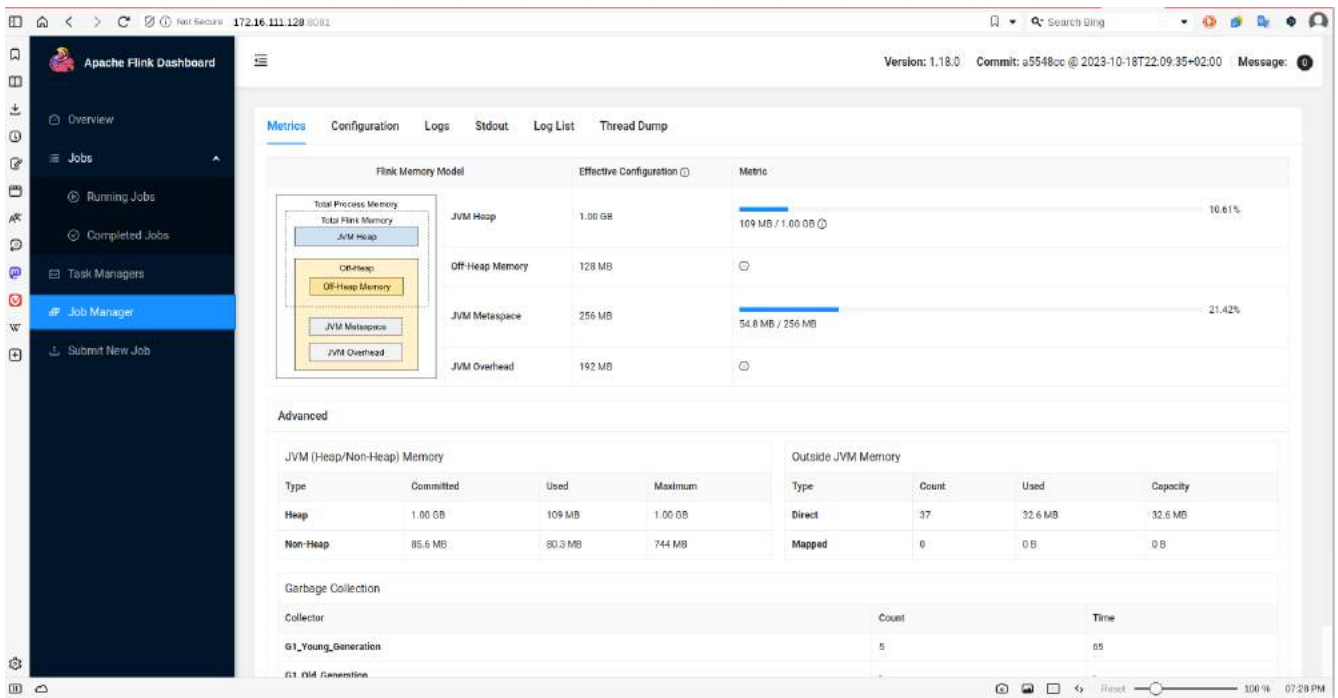
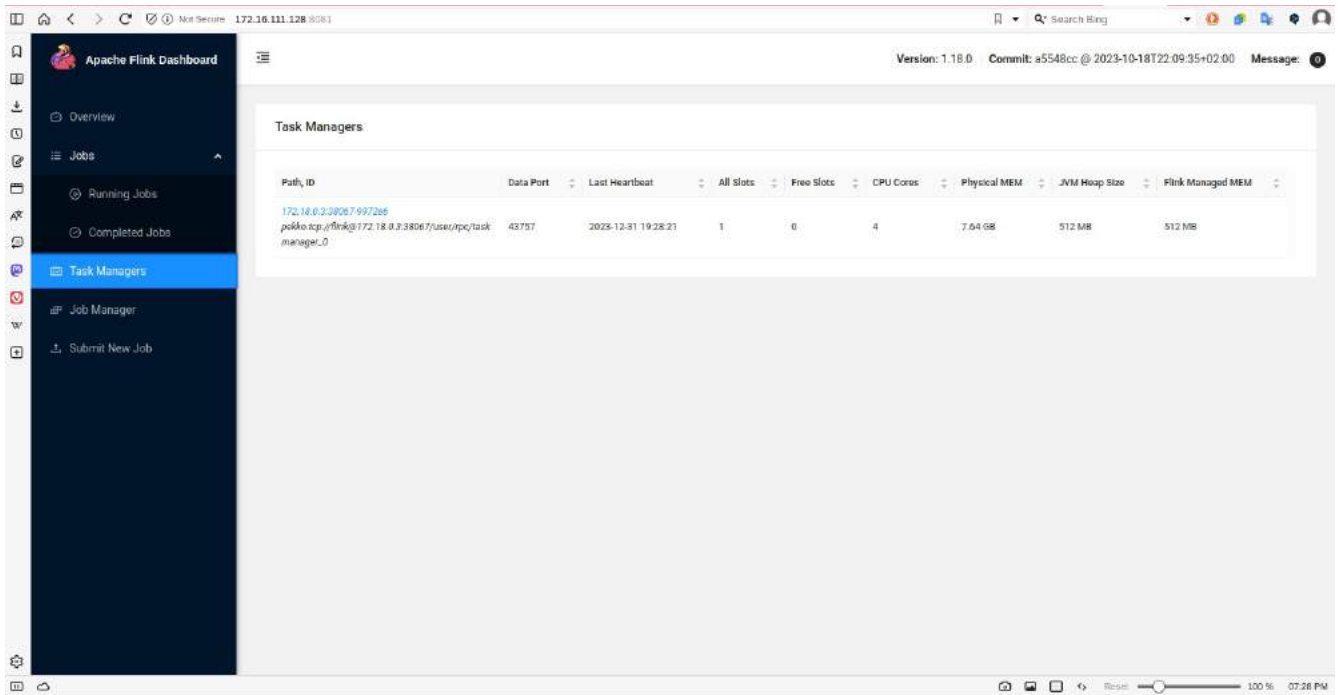
Overview

Jobs

- Running Jobs
- Completed Jobs
- Task Managers
- Job Manager
- Submit New Job

Running Jobs

Job Name	Start Time	Duration	End Time	Tasks	Status
CarTopSpeedWindowingExample	2023-12-31 19:27:33	20s	-	2 2	RUNNING



Apache Flink Dashboard

Overview

Jobs

Running Jobs

Completed Jobs

Task Managers

Job Manager

Submit New Job

Version: 1.18.0

Commit: a5548cc @ 2023-10-18T22:09:35+02:00

Message:

Available Task Slots

0

Total Task Slots 1 Task Managers 1

Running Jobs

1

Finished 0 Canceled 0 Failed 3

Running Job List

Job Name	Start Time	Duration	End Time	Tasks	Status
CarTopSpeedWindowingExample	2023-12-31 19:27:33	1m 18s	-	2 / 2	RUNNING

Completed Job List

Job Name	Start Time	Duration	End Time	Tasks	Status
CarTopSpeedWindowingExample	2023-12-31 19:24:42	102ms	2023-12-31 19:24:42	2 / 1 / 1	FAILED
CarTopSpeedWindowingExample	2023-12-31 19:16:16	1m 5s	2023-12-31 19:17:22	2 / 1 / 1	FAILED
CarTopSpeedWindowingExample	2023-12-31 19:23:24	97ms	2023-12-31 19:23:24	2 / 1 / 1	FAILED

Apache Flink Dashboard

Overview

Jobs

Running Jobs

Completed Jobs

Task Managers

Job Manager

Submit New Job

Version: 1.18.0

Commit: a5548cc @ 2023-10-18T22:09:35+02:00

Message:

CarTopSpeedWindowingExample

Cancel Job

Job ID	g7793642c293f03ad05445b6b8fcd3b0	Job State	RUNNING 2	Actions	Job Manager Log
Start Time	2023-12-31 19:27:33	Duration	2m 43s		

Overview

Exceptions

TimeLine

Checkpoints

Configuration

Source: Car data generator source -> Timestamps/Watermarks

GlobalWindows -> Sink: Print to Std. Out

Parallelism: 1

Backpressure (max): 0%

Rate (max): 54%

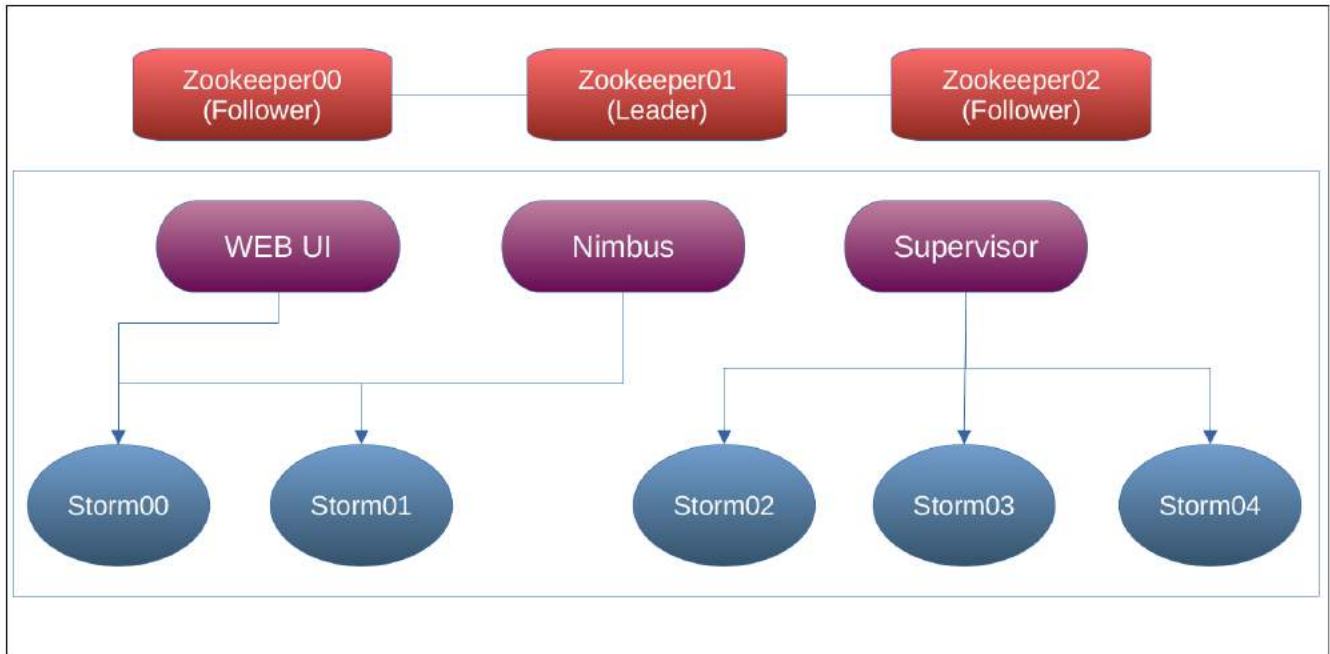
Low Watermark: 173454746755

Name	Status	Bytes Received	Records Received	Bytes Sent	Records Sent	Parallelism	Start Time	Duration	Tasks
Source: Car data generator source -> Timestamps/Watermarks	RUNNING	0 B	0	32.0 KB	1,467	1	2023-12-31 19:27:33	2m 43s	1
GlobalWindow -> Sink: Print to Std. Out	RUNNING	61.5 KB	1,467	0 B	0	1	2023-12-31 19:27:33	2m 43s	1

Consola de taskmanager

```
docker run --rm --name=taskmanager --network flink-network --env flink:lates
(1,90,360.9861111111111,1704046579519)
(0,50,113.9999999999999,1704046578619)
(1,90,360.9861111111111,1704046579519)
(1,90,360.9861111111111,1704046579519)
(0,50,113.9999999999999,1704046578619)
(1,90,360.9861111111111,1704046579519)
(1,95,688.7916666666665,1704046580920)
(0,50,113.9999999999999,1704046578619)
(1,95,688.7916666666665,1704046580920)
(1,95,688.7916666666665,1704046580920)
(1,95,688.7916666666665,1704046580920)
(1,95,688.7916666666665,1704046580920)
(1,95,688.7916666666665,1704046580920)
(1,95,688.7916666666665,1704046580920)
(1,95,688.7916666666665,1704046580920)
(0,50,113.9999999999999,1704046578619)
(1,95,688.7916666666665,1704046580920)
(1,95,688.7916666666665,1704046580920)
(0,35,322.2361111111111,1704046580420)
(1,95,688.7916666666665,1704046580920)
(0,35,322.2361111111111,1704046580420)
(0,35,806.2638888888888,1704046590261)
(1,85,1377.6944444444441,1704046584120)
```

Una imagen que represente el clúster de Storm utilizado en los laboratorios



Entregables

1. 1. ¿Qué es una topología, un Spout y un Bolt en Apache Storm?

En Apache Storm, una topología es un flujo de procesos formado por una serie de Bolts y Spouts. Las topologías se utilizan para manejar flujos de datos instantáneos y en constante cambio.

Un Bolt es la unidad de procesamiento de una topología. Los bolts se utilizan para recibir y procesar datos y generar otros nuevos. Los Bolts pueden recibir datos de uno o varios Spouts y enviarlos a otros Bolts o a fuentes externas.

Un Spout es la fuente de datos en una topología. Los Spouts reciben datos del mundo exterior y los envían a los Bolts. Los Spouts pueden recibir diferentes tipos de datos, como datos de sensores, datos de redes sociales, datos de tráfico web, etc.

Para crear una topología en Apache Storm, primero necesitamos extender las clases Bolt y Spout. Después, necesitamos definir las funciones de Bolts y Spouts.

2. ¿Qué tipos de procesamiento puedo ejecutar con Apache Storm en relación con la entrega de mensajes? ¿Puedes proporcionar una breve descripción y un caso de uso para cada uno de ellos?

Apache Storm es un sistema de procesamiento de datos en tiempo real que permite garantizar el procesamiento de diversos eventos en tiempo real, como analizar flujos de datos en tiempo real, realizar tareas de aprendizaje automático y organizar cálculos continuos. En términos de entrega de mensajes, Apache Storm puede procesar nuevos flujos de datos o actualizaciones de bases de datos en tiempo real, realizar peticiones continuas y procesar flujos continuos, transfiriendo los resultados del procesamiento al cliente en tiempo real. Además, una tormenta puede usarse para proporcionar concurrencia en la ejecución de consultas intensivas en recursos. Algunos tipos de procesamiento que pueden ejecutarse con Apache Storm en relación con la entrega de mensajes:

Best effort processing: Este es el modo de procesamiento por defecto en Apache Storm. No ofrece garantías de que un mensaje vaya a ser procesado, pero es el modo de procesamiento más rápido y eficiente.

Este modo es útil cuando la velocidad de procesamiento es más importante que la precisión del mensaje, como cuando se procesan datos no críticos.

At least once processing: Este modo garantiza que cada mensaje se procesará al menos una vez, pero puede procesarse varias veces.

Este modo es útil cuando es aceptable que los mensajes se procesen dos veces, como cuando se procesan datos que no son críticos pero que deben procesarse con precisión.

Exactly once processing: Este modo garantiza que cada mensaje se procesará exactamente una vez, asegurando que no haya duplicados.

Este modo es útil cuando es crítico evitar el procesamiento duplicado de mensajes, como cuando se procesan transacciones financieras u otros datos críticos.

3. ¿Una tarea ejecuta executors o un executor ejecuta tareas?

Los executors son los responsables de ejecutar las tareas.

En Apache Storm, un proceso worker ejecuta un subconjunto de una topología. Un worker process pertenece a una topología específica y puede ejecutar uno o más executors para uno o más componentes (spouts o bolts) de esta topología. Un executor es un hilo generado por un worker process. Puede ejecutar una o más tareas para el mismo componente (spouts o bolts). Una tarea realiza el procesamiento real de los datos: cada spouts o bolts que implementamos en código ejecuta tantas tareas en todo el clúster. Por lo tanto, un executor ejecuta tareas en Apache Storm.

4. ¿Qué comando debo ejecutar para cambiar el paralelismo de una topología en funcionamiento?

Para cambiar el paralelismo de una topología en ejecución en Apache Storm, podemos utilizar el comando rebalance del cliente de línea de comandos storm.

```
$ storm rebalance <topology-name> -n <new-number-of-workers> -e <component-id>:<new-number-of-executors>
```

```
$ storm rebalance mytopology -n 5 -e blue-spout=3 -e yellow-bolt=10
```

mytopology : Es el nombre de la topología que deseamos rebalance.

-n 5: Esta opción establece el número de workers en 5.

-e blue-spout=3: Esta opción establece el número de executors para el componente blue-spout en 3.

-e yellow-bolt=10: Esta opción establece el número de executors para el componente yellow-bolt en 10.

Así, el comando que hemos proporcionado cambiaría el paralelismo de la topología mytopology para utilizar 5 workers, 3 executors para el componente blue-spout y 10 executors para el componente yellow-bolt.

5. Si uno de los nodos que forman mi clúster de Apache Storm es de alto rendimiento (ej GPU), ¿qué planificador debería utilizar para extraer todo su valor y optimizar los recursos?

Para utilizar eficazmente un nodo de alto rendimiento (por ejemplo, una GPU) en nuestro clúster Apache Storm, empleamos el ResourceAwareScheduler.

Este algoritmo de planificación prioriza las tareas específicas de los recursos, asignándolas al nodo con las capacidades más adecuadas. Garantiza que las tareas se asignen al nodo equipado para gestionar sus requisitos de recursos, maximizando la utilización del nodo de alto rendimiento y evitando al mismo tiempo que otros nodos se sobrecarguen.

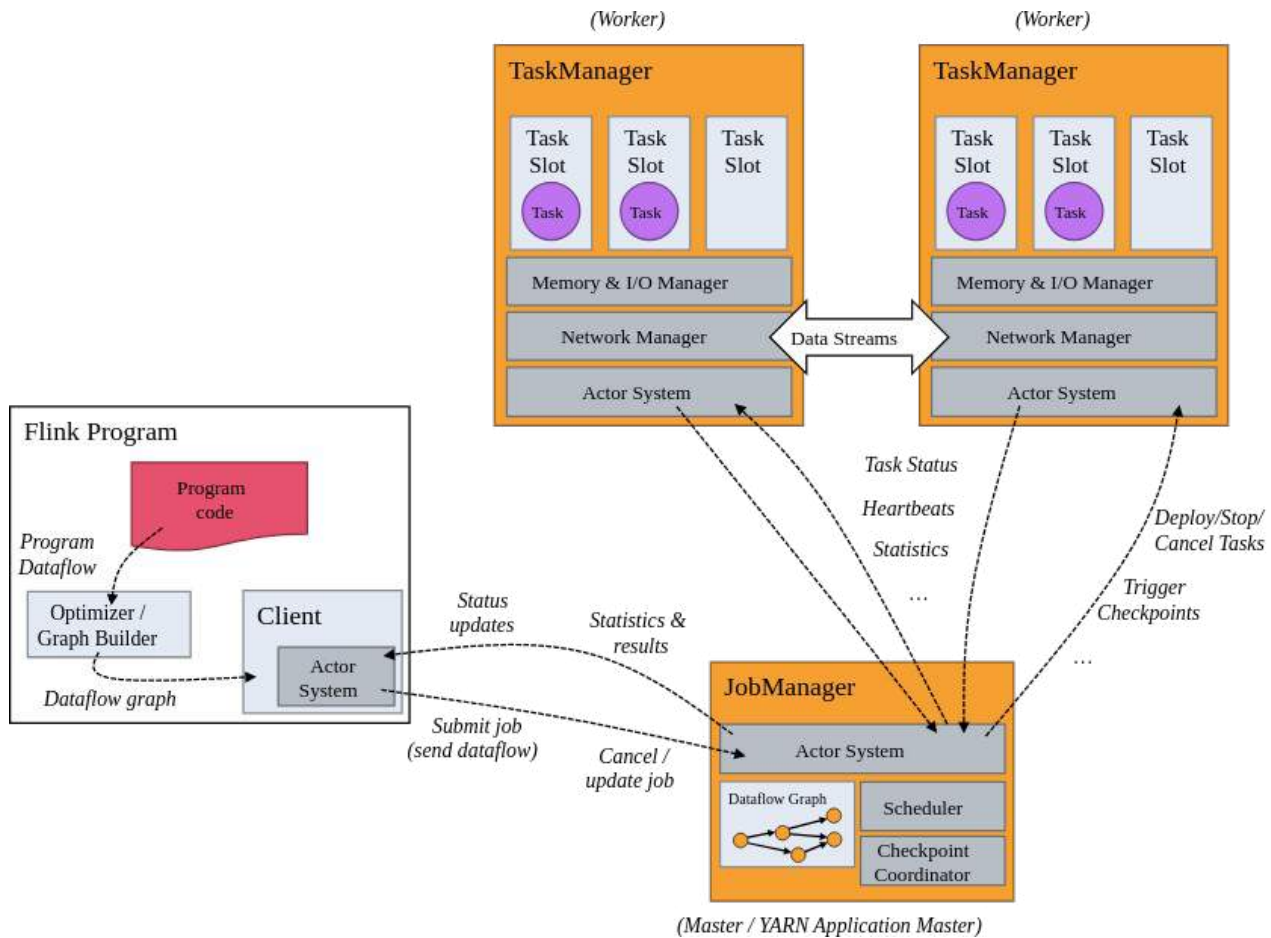
Maximiza la utilización de los recursos: El ResourceAwareScheduler garantiza que las tareas se asignen a nodos que dispongan de los recursos necesarios para ejecutarse de forma eficiente. Esto ayuda a maximizar la utilización del nodo de alto rendimiento con capacidades de GPU, ya que las tareas que pueden beneficiarse de sus capacidades se asignan a este nodo.

Evita la sobrecarga: El ResourceAwareScheduler también evita la sobrecarga de un solo nodo. Esto ayuda a garantizar que el clúster funcione de forma fluida y eficiente, y que ningún nodo se vea obligado a trabajar por encima de su capacidad.

Simplifica la configuración: ResourceAwareScheduler es relativamente fácil de configurar. Basta con especificar los recursos necesarios para cada tarea, como el uso mínimo y máximo de memoria y GPU. El programador asignará las tareas a los nodos en función de estos requisitos.

En resumen, ResourceAwareScheduler es la mejor opción para optimizar la utilización de recursos y extraer todo el valor de un nodo de alto rendimiento con capacidades de GPU en nuestro cluster de Apache Storm. Es una forma sencilla y eficaz de garantizar que nuestro cluster funcione de forma fluida y eficiente, y que todos nuestros recursos se utilicen al máximo de su potencial.

6. Describe la arquitectura de ejecución de trabajos en Apache Flink.



La arquitectura de ejecución de trabajos de Apache Flink está diseñada para el procesamiento de datos distribuidos con requisitos de alto rendimiento, baja latencia y para ser altamente escalable y tolerante a fallos.

Puede gestionar trabajos de procesamiento de datos a gran escala y recuperarse de fallos sin perder datos.

La arquitectura de ejecución de trabajos consta de varios componentes:

JobManager: El JobManager es el nodo master de un cluster Flink. Es responsable de coordinar la ejecución de los trabajos Flink. Sólo hay un JobManager en un cluster Flink. El JobManager realiza la coordinación de los trabajos, la planificación y la recuperación de tareas en caso de fallos. También gestiona el despliegue y la coordinación de los TaskManagers.

Task Managers: Los Task Managers son los nodos de worker de un clúster Flink. Se encargan de ejecutar las tareas y de mantener el estado del flujo de datos. Los Task Managers se ejecutan en los nodos workers del clúster y se comunican con el Job Manager para recibir instrucciones e informar de su progreso.

Job Client: Job Client es la aplicación que envía trabajos al clúster Flink. Se encarga de comunicarse con el gestor de trabajos y de monitorizar el progreso del trabajo.

La arquitectura de ejecución de trabajos de Flink funciona de la siguiente manera:

1. La aplicación envía un trabajo a Job Client.
2. Job Client envía la tarea a Job Manager.
3. Job Manager analiza el trabajo y determina las tareas que deben ejecutarse.
4. Job Manager asigna las tareas a Task Managers del clúster.
5. Task Managers ejecutan las tareas y envían los resultados a Job Manager.
6. Job Manager comprueba los resultados y decide si el trabajo se ha completado correctamente.

Si falla un Task Manager, el Job Manager reiniciará la tarea que ha fallado en otro Task Manager del clúster. Si falla el Job Manager, el Job Client puede volver a enviar la tarea al clúster.

Los mecanismos de tolerancia a fallos de Flink garantizan que los trabajos puedan seguir ejecutándose aunque fallen algunos de los Task Managers.

Los mecanismos de escalabilidad de Flink permiten ampliar o reducir fácilmente el clúster para gestionar cargas de trabajo cambiantes.

Estas características hacen de Flink una herramienta potente y fiable para aplicaciones de procesamiento de flujos.