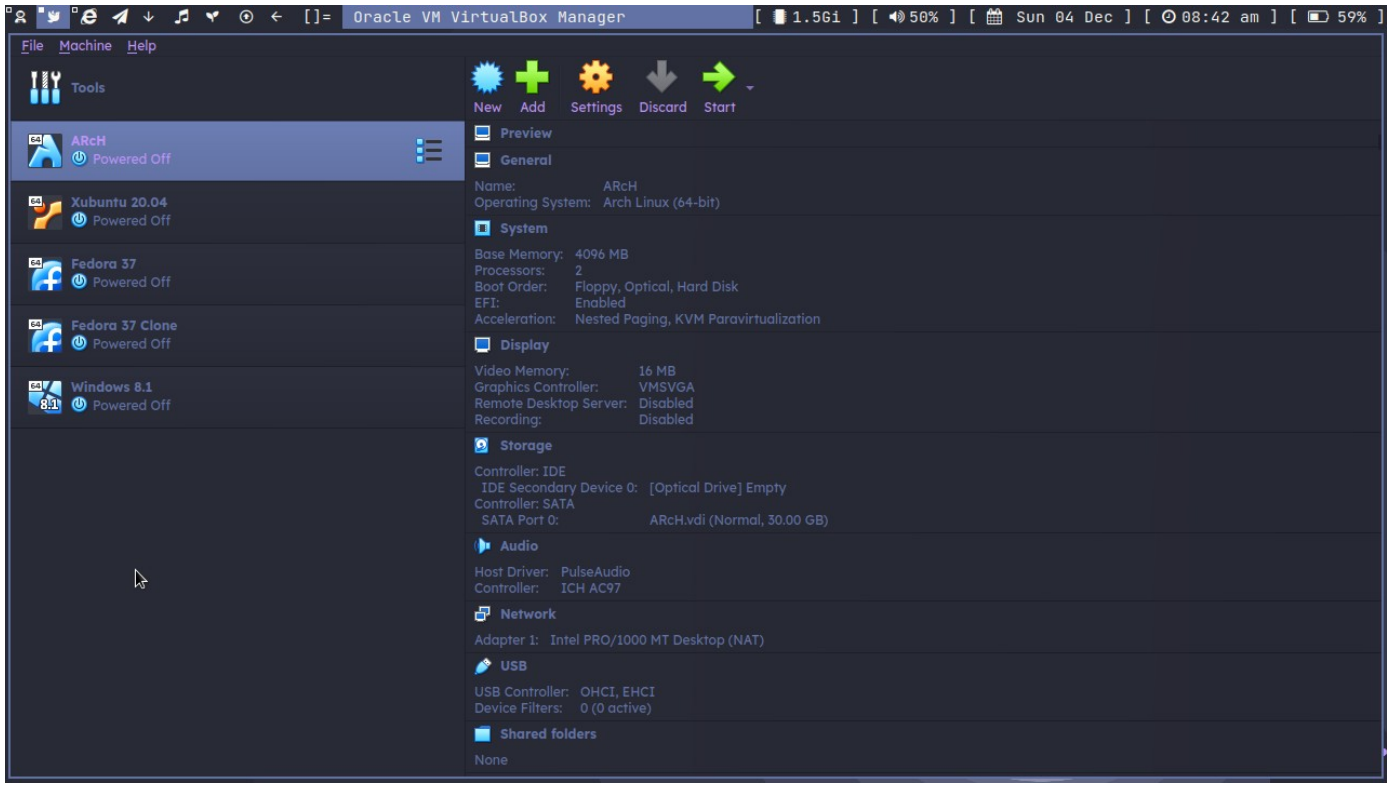
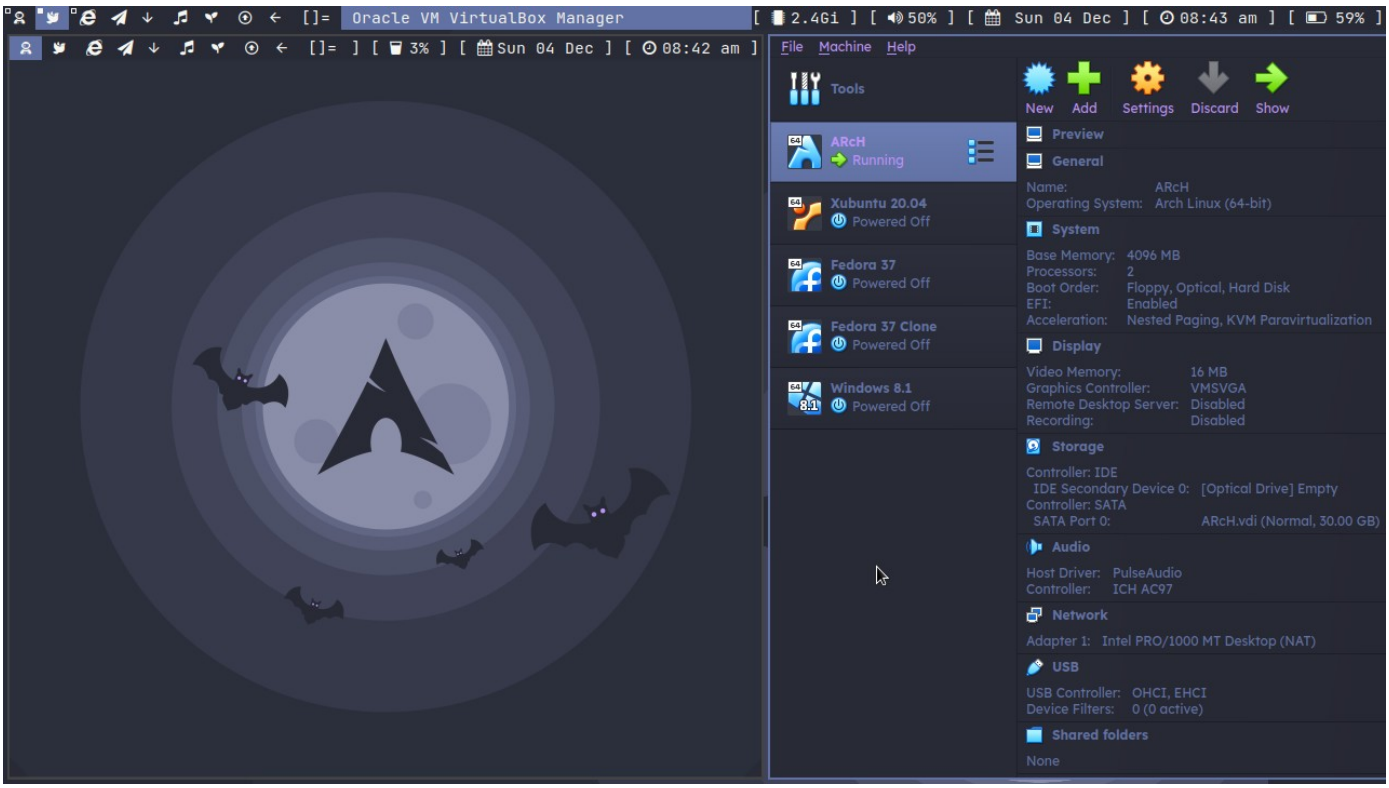
Output:


Oracle VM VirtualBox Manager
[ 1.5Gi ] [ 50% ] [ Sun 04 Dec ] [ 08:42 am ] [ 59% ]
File Machine Help
Tools
New Add Settings Discard Start
ARcH
Powered Off
Xubuntu 20.04
Powered Off
Fedora 37
Powered Off
Fedora 37 Clone
Powered Off
Windows 8.1
Powered Off
Preview
General
Name: ARcH
Operating System: Arch Linux (64-bit)
System
Base Memory: 4096 MB
Processors: 2
Boot Order: Floppy, Optical, Hard Disk
EFI: Enabled
Acceleration: Nested Paging, KVM Paravirtualization
Display
Video Memory: 16 MB
Graphics Controller: VMSVGA
Remote Desktop Server: Disabled
Recording: Disabled
Storage
Controller: IDE
IDE Secondary Device 0: [Optical Drive] Empty
Controller: SATA
SATA Port 0: ARcH.vdi (Normal, 30.00 GB)
Audio
Host Driver: PulseAudio
Controller: ICH AC97
Network
Adapter 1: Intel PRO/1000 MT Desktop (NAT)
USB
USB Controller: OHCI, EHCI
Device Filters: 0 (0 active)
Shared folders
None


Oracle VM VirtualBox Manager
[ 2.4Gi ] [ 50% ] [ Sun 04 Dec ] [ 08:43 am ] [ 59% ]
[ ] [ 3% ] [ Sun 04 Dec ] [ 08:42 am ]
File Machine Help
Tools
New Add Settings Discard Show
ARcH
Running
Xubuntu 20.04
Powered Off
Fedora 37
Powered Off
Fedora 37 Clone
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IDE Secondary Device 0: [Optical Drive] Empty
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SATA Port 0: ARcH.vdi (Normal, 30.00 GB)
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Host Driver: PulseAudio
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Adapter 1: Intel PRO/1000 MT Desktop (NAT)
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USB Controller: OHCI, EHCI
Device Filters: 0 (0 active)
Shared folders
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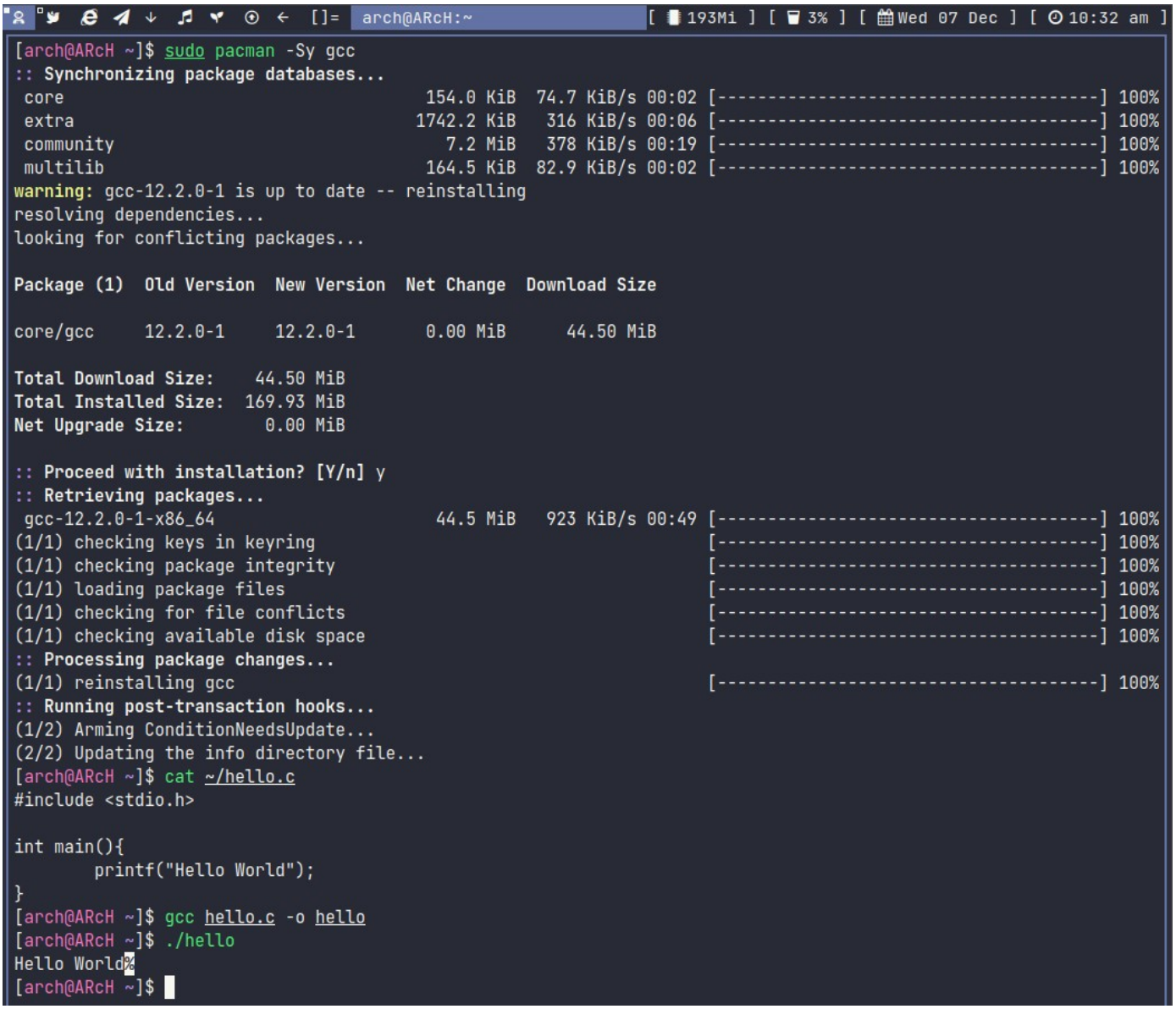
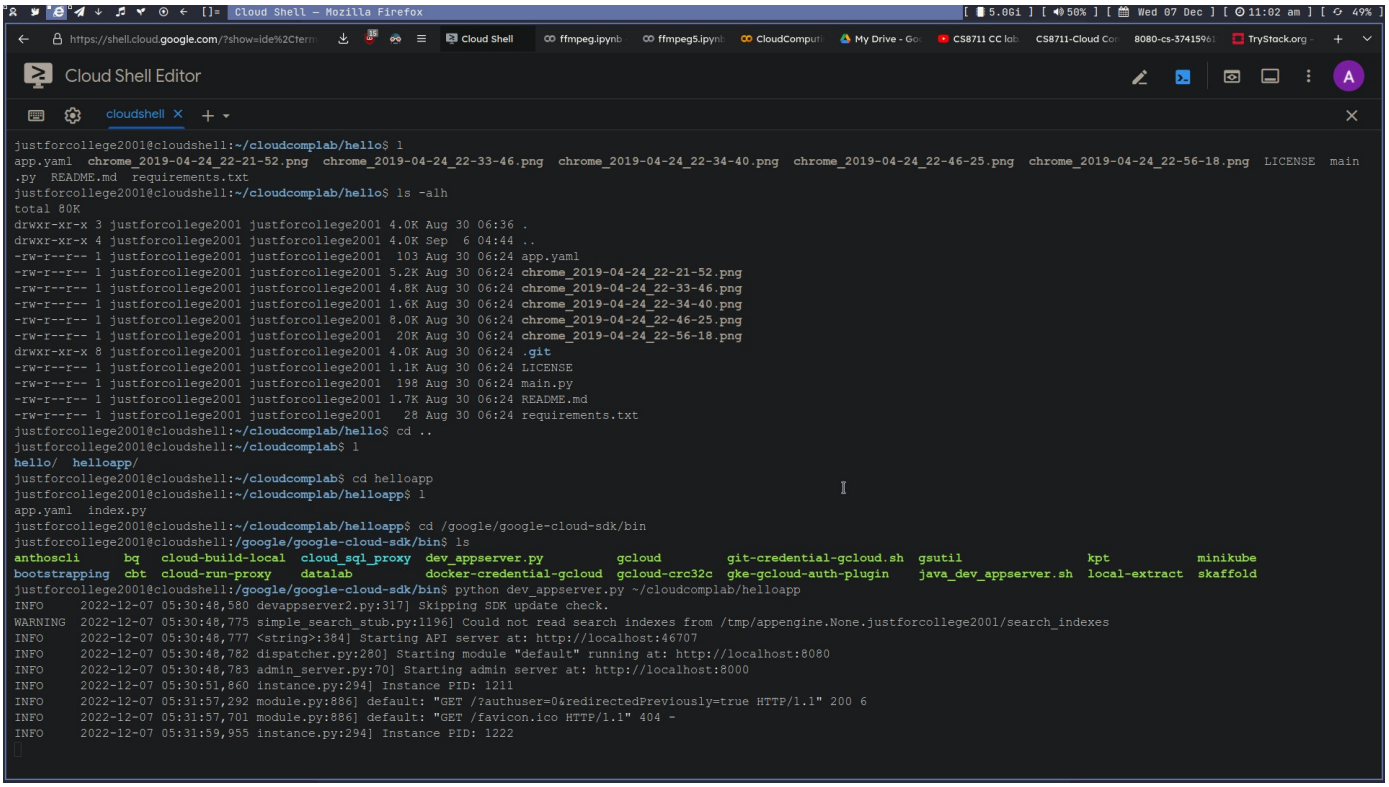
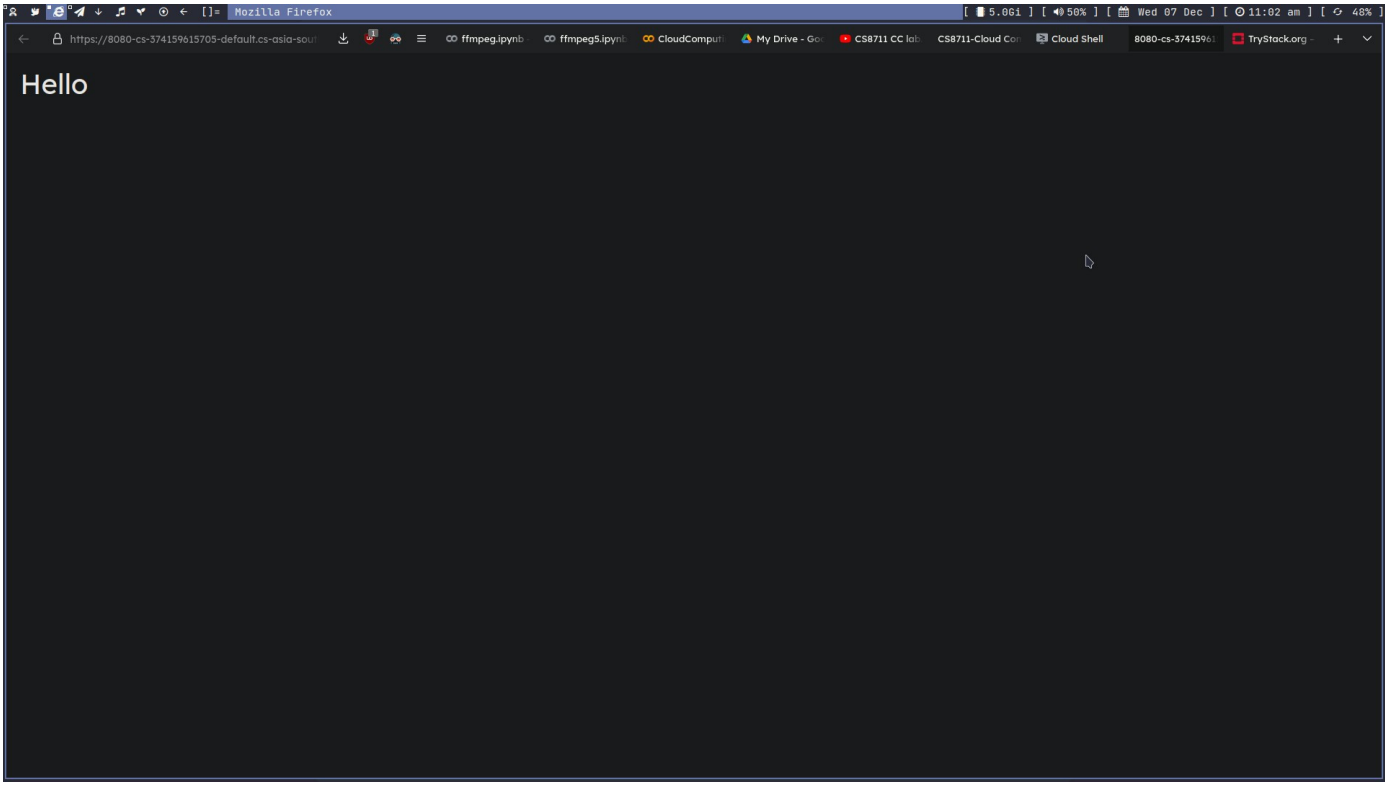
Output:


arch@ARcH:~
[ 193Mi ] [ 3% ] [ Wed 07 Dec ] [ 10:32 am ]
[arch@ARcH ~]$ sudo pacman -Sy gcc
:: Synchronizing package databases...
core 154.0 KiB 74.7 KiB/s 00:02 [----------] 100%
extra 1742.2 KiB 316 KiB/s 00:06 [----------] 100%
community 7.2 MiB 378 KiB/s 00:19 [----------] 100%
multilib 164.5 KiB 82.9 KiB/s 00:02 [----------] 100%
warning: gcc-12.2.0-1 is up to date -- reinstalling
resolving dependencies...
looking for conflicting packages...
Package (1) Old Version New Version Net Change Download Size
core/gcc 12.2.0-1 12.2.0-1 0.00 MiB 44.50 MiB
Total Download Size: 44.50 MiB
Total Installed Size: 169.93 MiB
Net Upgrade Size: 0.00 MiB
:: Proceed with installation? [Y/n] y
:: Retrieving packages...
gcc-12.2.0-1-x86_64 44.5 MiB 923 KiB/s 00:49 [----------] 100%
(1/1) checking keys in keyring [----------] 100%
(1/1) checking package integrity [----------] 100%
(1/1) loading package files [----------] 100%
(1/1) checking for file conflicts [----------] 100%
(1/1) checking available disk space [----------] 100%
:: Processing package changes...
(1/1) reinstalling gcc [----------] 100%
:: Running post-transaction hooks...
(1/2) Arming ConditionNeedsUpdate...
(2/2) Updating the info directory file...
[arch@ARcH ~]$ cat ~/hello.c
#include <stdio.h>
int main(){
printf("Hello World");
}
[arch@ARcH ~]$ gcc hello.c -o hello
[arch@ARcH ~]$ ./hello
Hello World%
[arch@ARcH ~]$

# Output:


Cloud Shell – Mozilla Firefox
Cloud Shell Editor
cloudshell
justforcollege2001@cloudshell:~/cloudcomplab/hello$ l
app.yaml chrome_2019-04-24_22-21-52.png chrome_2019-04-24_22-33-46.png chrome_2019-04-24_22-34-40.png chrome_2019-04-24_22-46-25.png chrome_2019-04-24_22-56-18.png LICENSE main.py README.md requirements.txt
justforcollege2001@cloudshell:~/cloudcomplab/hello$ ls -alh
total 80K
drwxr-xr-x 3 justforcollege2001 justforcollege2001 4.0K Aug 30 06:36 .
drwxr-xr-x 4 justforcollege2001 justforcollege2001 4.0K Sep 6 04:44 ..
-rw-r--r-- 1 justforcollege2001 justforcollege2001 103 Aug 30 06:24 app.yaml
-rw-r--r-- 1 justforcollege2001 justforcollege2001 5.2K Aug 30 06:24 chrome_2019-04-24_22-21-52.png
-rw-r--r-- 1 justforcollege2001 justforcollege2001 4.8K Aug 30 06:24 chrome_2019-04-24_22-33-46.png
-rw-r--r-- 1 justforcollege2001 justforcollege2001 1.6K Aug 30 06:24 chrome_2019-04-24_22-34-40.png
-rw-r--r-- 1 justforcollege2001 justforcollege2001 8.0K Aug 30 06:24 chrome_2019-04-24_22-46-25.png
-rw-r--r-- 1 justforcollege2001 justforcollege2001 20K Aug 30 06:24 chrome_2019-04-24_22-56-18.png
drwxr-xr-x 8 justforcollege2001 justforcollege2001 4.0K Aug 30 06:24 .git
-rw-r--r-- 1 justforcollege2001 justforcollege2001 1.1K Aug 30 06:24 LICENSE
-rw-r--r-- 1 justforcollege2001 justforcollege2001 198 Aug 30 06:24 main.py
-rw-r--r-- 1 justforcollege2001 justforcollege2001 1.7K Aug 30 06:24 README.md
-rw-r--r-- 1 justforcollege2001 justforcollege2001 28 Aug 30 06:24 requirements.txt
justforcollege2001@cloudshell:~/cloudcomplab/hello$ cd ..
justforcollege2001@cloudshell:~/cloudcomplab$ l
hello/ helloapp/
justforcollege2001@cloudshell:~/cloudcomplab$ cd helloapp
justforcollege2001@cloudshell:~/cloudcomplab/helloapp$ l
app.yaml index.py
justforcollege2001@cloudshell:~/cloudcomplab/helloapp$ cd /google/google-cloud-sdk/bin
justforcollege2001@cloudshell:/google/google-cloud-sdk/bin$ ls
anthoscli bq cloud-build-local cloud_sql_proxy dev_appserver.py gcloud git-credential-gcloud.sh gsutil kpt minikube
bootstrapping cbt cloud-run-proxy datalab docker-credential-gcloud gcloud-crc32c gke-gcloud-auth-plugin java_dev_appserver.sh local-extract skaffold
justforcollege2001@cloudshell:/google/google-cloud-sdk/bin$ python dev_appserver.py ~/cloudcomplab/helloapp
INFO 2022-12-07 05:30:48,580 devappserver2.py:317] Skipping SDK update check.
WARNING 2022-12-07 05:30:48,775 simple_search_stub.py:1196] Could not read search indexes from /tmp/appengine.None.justforcollege2001/search_indexes
INFO 2022-12-07 05:30:48,777 <string>:384] Starting API server at: http://localhost:46707
INFO 2022-12-07 05:30:48,782 dispatcher.py:280] Starting module "default" running at: http://localhost:8080
INFO 2022-12-07 05:30:48,783 admin_server.py:70] Starting admin server at: http://localhost:8000
INFO 2022-12-07 05:30:51,860 instance.py:294] Instance PID: 1211
INFO 2022-12-07 05:31:57,292 module.py:886] default: "GET /?authuser=0&redirectedPreviously=true HTTP/1.1" 200 6
INFO 2022-12-07 05:31:57,701 module.py:886] default: "GET /favicon.ico HTTP/1.1" 404 -
INFO 2022-12-07 05:31:59,955 instance.py:294] Instance PID: 1222


Mozilla Firefox
Hello

Program:

app.yaml

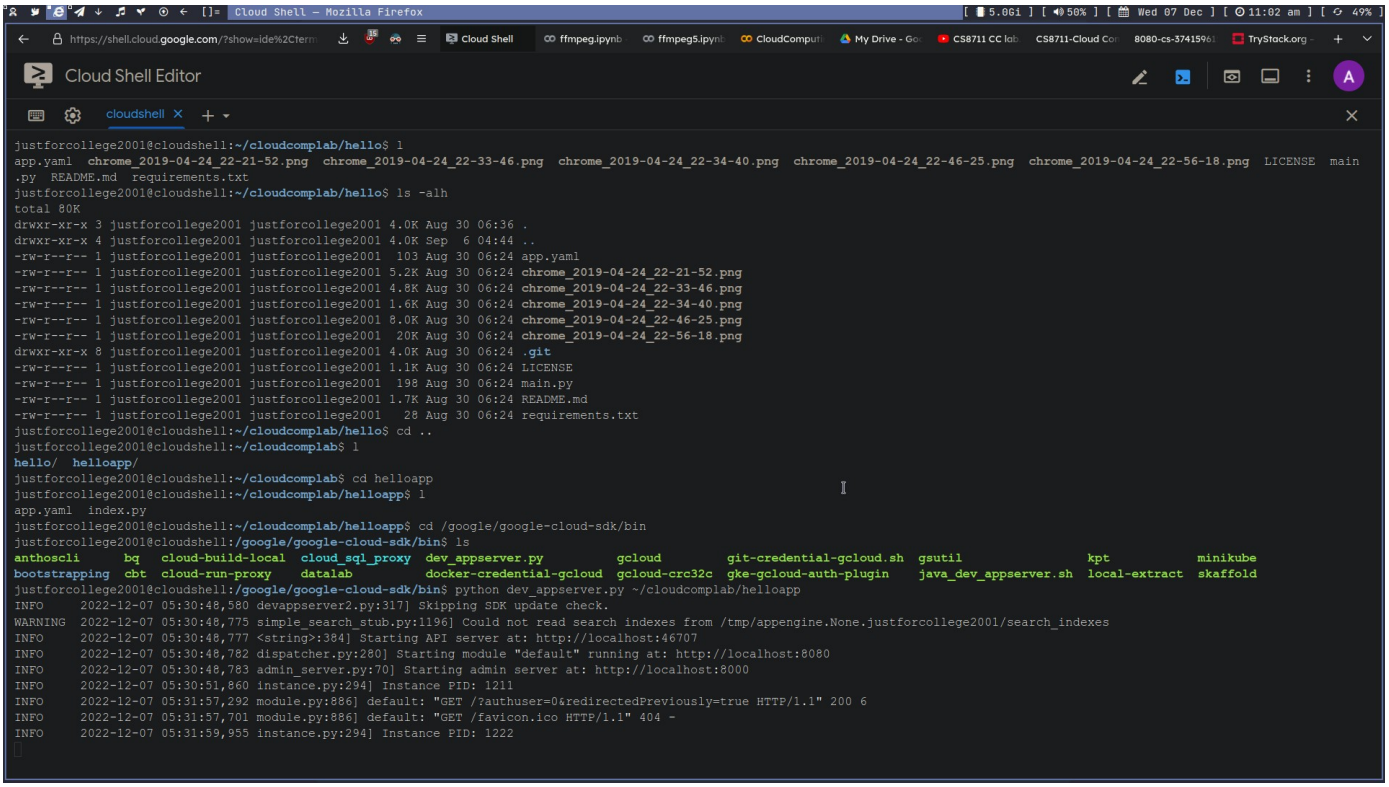
```
runtime: python27
threadsafe: false

handlers:
  - url: /
    script: index.py
```

index.py

```
print("Hello")
```

# Output: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-rw-r--r-- 1 justforcollege2001 justforcollege2001 1.6K Aug 30 06:24 chrome_2019-04-24_22-34-40.png
-rw-r--r-- 1 justforcollege2001 justforcollege2001 8.0K Aug 30 06:24 chrome_2019-04-24_22-46-25.png
-rw-r--r-- 1 justforcollege2001 justforcollege2001 20K Aug 30 06:24 chrome_2019-04-24_22-56-18.png
drwxr-xr-x 8 justforcollege2001 justforcollege2001 4.0K Aug 30 06:24 .git
-rw-r--r-- 1 justforcollege2001 justforcollege2001 1.1K Aug 30 06:24 LICENSE
-rw-r--r-- 1 justforcollege2001 justforcollege2001 198 Aug 30 06:24 main.py
-rw-r--r-- 1 justforcollege2001 justforcollege2001 1.7K Aug 30 06:24 README.md
-rw-r--r-- 1 justforcollege2001 justforcollege2001 28 Aug 30 06:24 requirements.txt
justforcollege2001@cloudshell:~/cloudcomplab/hello$ cd ..
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hello/ helloapp/
justforcollege2001@cloudshell:~/cloudcomplab$ cd helloapp
justforcollege2001@cloudshell:~/cloudcomplab/helloapp$ l
app.yaml index.py
justforcollege2001@cloudshell:~/cloudcomplab/helloapp$ cd /google/google-cloud-sdk/bin
justforcollege2001@cloudshell:/google/google-cloud-sdk/bin$ ls
anthoscli bq cloud-build-local cloud_sql_proxy dev_appserver.py gcloud git-credential-gcloud.sh gsutil kpt minikube
bootstrapping cbt cloud-run-proxy datalab docker-credential-gcloud gcloud-crc32c gke-gcloud-auth-plugin java_dev_appserver.sh local-extract skaffold
justforcollege2001@cloudshell:/google/google-cloud-sdk/bin$ python dev_appserver.py ~/cloudcomplab/helloapp
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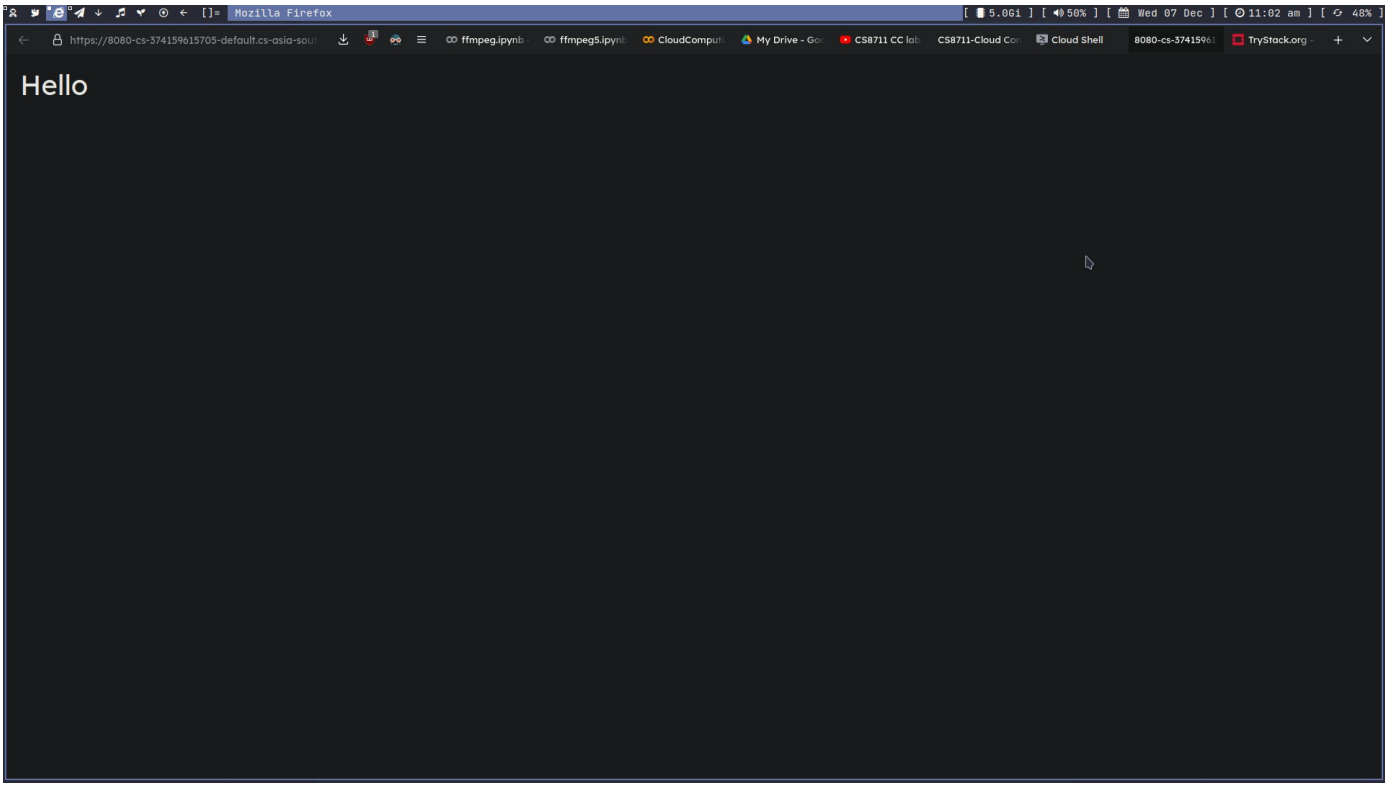

Mozilla Firefox
Hello

Program:

SJF.java

```
//https://raw.githubusercontent.com/kritidubey/Scheduling-Algorithms-Using-CloudSim/main/SJF.java
package myapp;

import java.text.DecimalFormat;
import java.util.ArrayList;
import java.util.Calendar;
import java.util.LinkedList;
import java.util.List;

import org.cloudbus.cloudsim.Cloudlet;
import org.cloudbus.cloudsim.CloudletSchedulerSpaceShared;
import org.cloudbus.cloudsim.CloudletSchedulerTimeShared;
import org.cloudbus.cloudsim.Datacenter;
import org.cloudbus.cloudsim.DatacenterBroker;
import org.cloudbus.cloudsim.DatacenterCharacteristics;
import org.cloudbus.cloudsim.Host;
import org.cloudbus.cloudsim.Log;
import org.cloudbus.cloudsim.Pe;
import org.cloudbus.cloudsim.Storage;
import org.cloudbus.cloudsim.UtilizationModel;
import org.cloudbus.cloudsim.UtilizationModelFull;
import org.cloudbus.cloudsim.Vm;
import org.cloudbus.cloudsim.VmAllocationPolicySimple;
import org.cloudbus.cloudsim.VmSchedulerTimeShared;
import org.cloudbus.cloudsim.core.CloudSim;
import org.cloudbus.cloudsim.provisioners.BwProvisionerSimple;
import org.cloudbus.cloudsim.provisioners.PeProvisionerSimple;
import org.cloudbus.cloudsim.provisioners.RamProvisionerSimple;

public class Myapp {
        private static List<Cloudlet> cloudletList,cloudletListSJF;
        private static List<Vm> vmlist;
        private static List<Vm> createVM(int userId, int vms, int idShift) {
                LinkedList<Vm> list = new LinkedList<Vm>();
                long size = 1000;
                int ram = 512;
                int mips = 250;
                long bw = 1000;
                int pesNumber = 1;
                String vmm = "Xen";
                int jk=1;
                Vm[] vm = new Vm[vms];
                for(int i=0;i<vms;i++){
                        if (i%2==0 )
                                mips += jk;
                        else
                                mips -= jk;
```

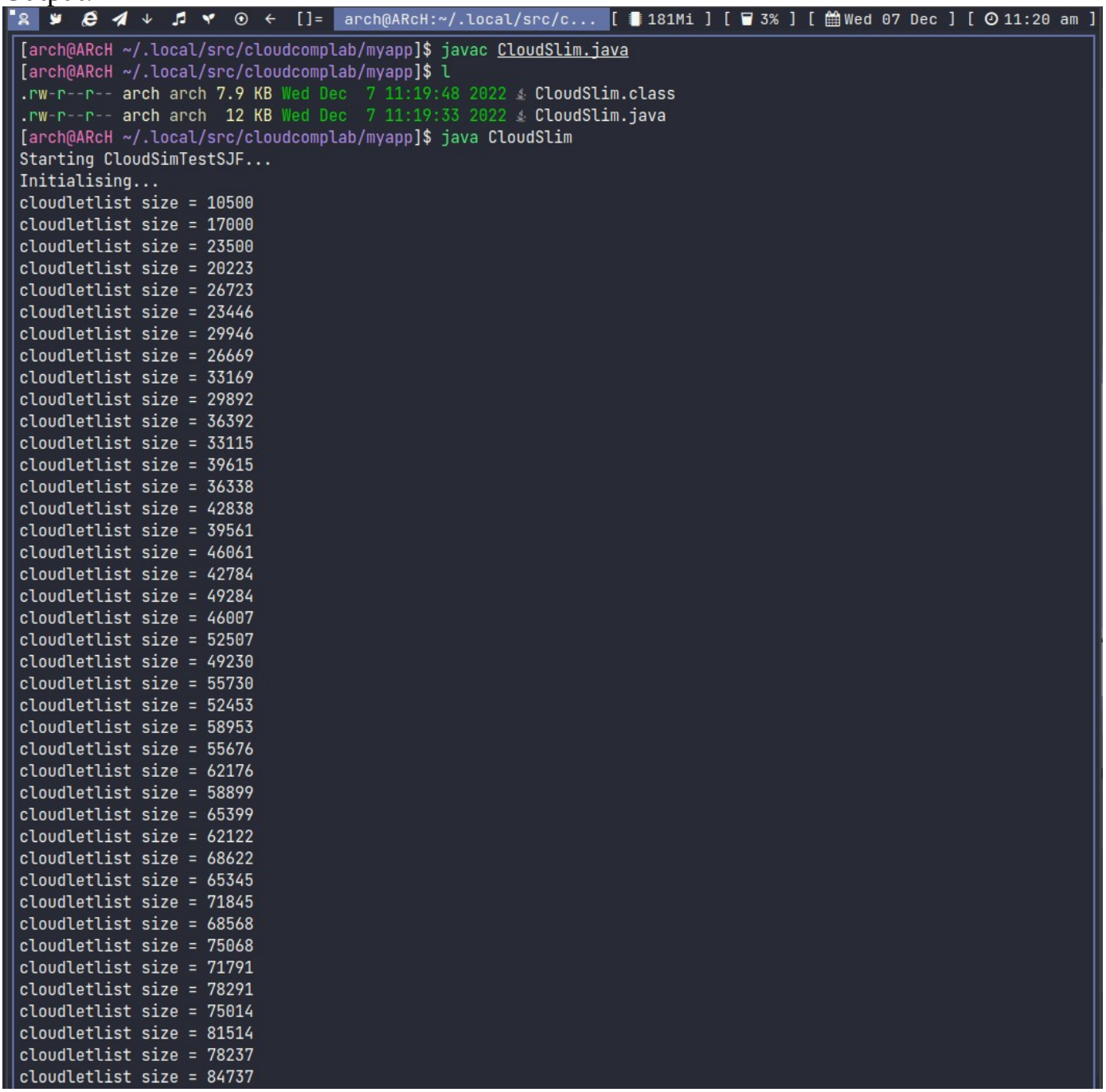
```
                                vm[i] = new Vm(idShift + i, userId, mips, pesNumber,
ram, bw, size, vmm, new CloudletSchedulerSpaceShared());
                                jk+=2;
                        list.add(vm[i]);
                }
                return list;
        }
        private static List<Cloudlet> createCloudlet(int userId, int cloudlets, int
idShift){
                LinkedList<Cloudlet> list = new LinkedList<Cloudlet>();
                long length = 4000;
                long fileSize = 300;
                long outputSize = 300;
                int pesNumber = 1;
                UtilizationModel utilizationModel = new UtilizationModelFull();
                Cloudlet[] cloudlet = new Cloudlet[cloudlets];
                for(int i=0;i<cloudlets;i++){
                        if (i%2==0 || i<2)
                                length +=  6500;
                        else
                                length -=  3277;
                        cloudlet[i] = new Cloudlet(idShift + i, length, pesNumber,
fileSize, outputSize, utilizationModel, utilizationModel, utilizationModel);
                        cloudlet[i].setUserId(userId);
                        list.add(cloudlet[i]);
                        Log.printLine("cloudletlist size = "
+cloudlet[i].getCloudletTotalLength());
                }
                return list;
        }
        private static void getCloudletListSJF(List<Cloudlet> clist)
        {
                int min=0;
                for (int i=0; i<clist.size();i++)
                        if (clist.get(i).getCloudletLength() <
clist.get(min).getCloudletLength())
                                min=i;
                cloudletListSJF.add(clist.get(min));
                clist.remove(min);
                if (clist.size()!=0)
                        getCloudletListSJF(clist);
        }

        @SuppressWarnings("unused")
        private static void sortCloudletList(List<Cloudlet> clist){
         Cloudlet c;
         for (int i=0; i<clist.size()-1; i++)
                 if (clist.get(i).getCloudletLength() <
clist.get(i+1).getCloudletLength()){
                         c=clist.get(i);
                         clist.add(i, clist.get(i+1));
                         clist.add(i+1,c);
```

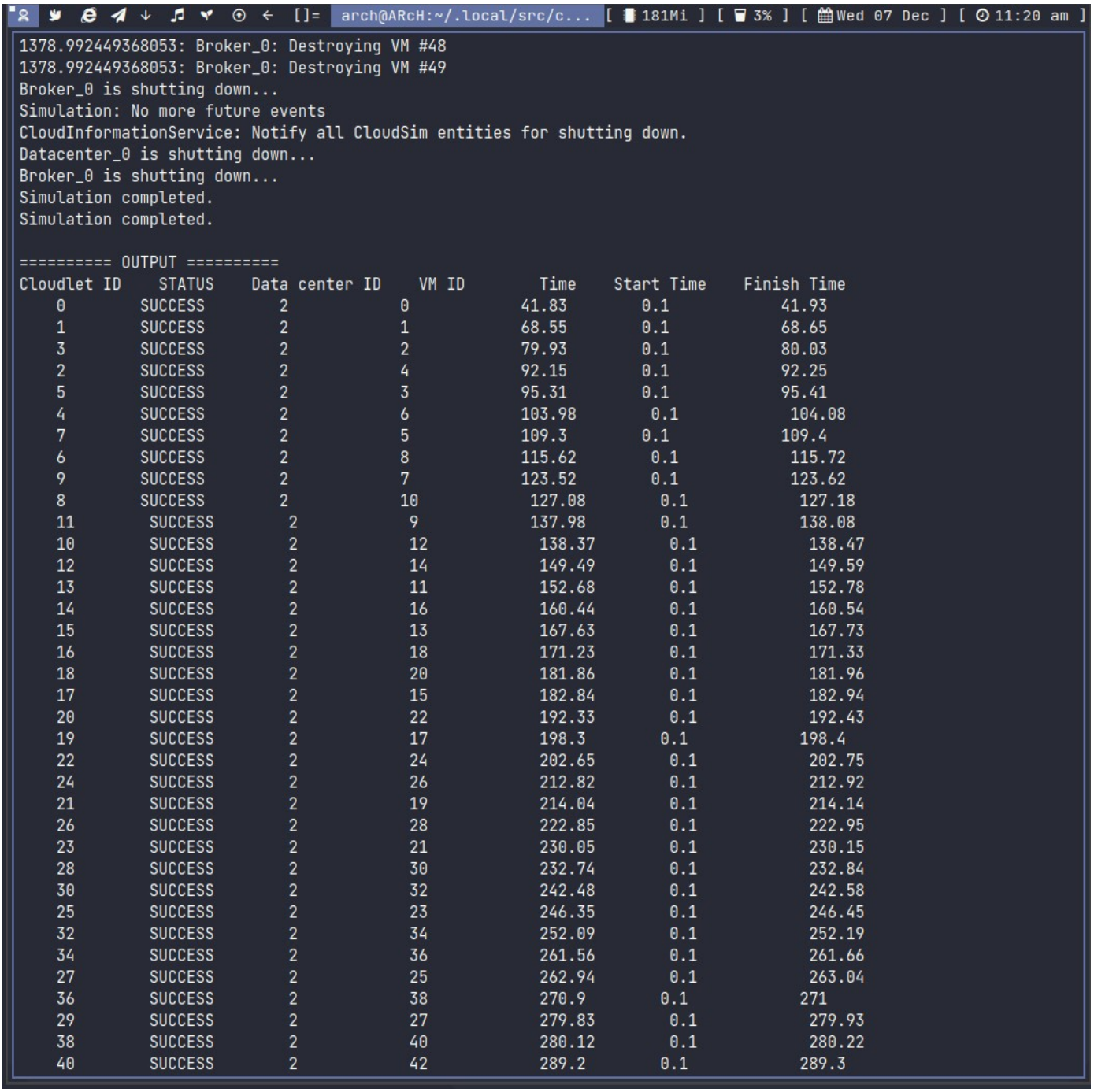
```
                        c=null;
                 }
        }
        private static double VmArt(List<Cloudlet> list, int VmId){
                int c = 0;
                double art = 0;
                for(int i=0;i<list.size();i++)
                        if (list.get(i).getVmId() == VmId)
                        {
                                art = art + list.get(i).getExecStartTime();    c++;
                        }
                        art =  art / c;
                return art;
        }
        private static double VmMakespane(List<Cloudlet> list, int VmId){
                double mkspane = 0;
                for(int i=0;i<list.size();i++)
                        if (list.get(i).getVmId() == VmId)
                                if (list.get(i).getFinishTime() > mkspane)
                                        mkspane =  list.get(i).getFinishTime();
                return mkspane;
        }
        public static void main(String[] args) {
                Log.printLine("Starting CloudSimTestSJF...");
                try {
                        int num_user = 1;
                        Calendar calendar = Calendar.getInstance();
                        boolean trace_flag = false;
                        CloudSim.init(num_user, calendar, trace_flag);
                        Datacenter datacenter0 = createDatacenter("Datacenter_0");
                        int vms = 50;
                        int cloudlets=100;
                         DatacenterBroker broker = createBroker("Broker_0");
                        int brokerId = broker.getId();
                        vmlist  = createVM(brokerId, vms, 0);
            broker.submitVmList(vmlist);
                        cloudletList = createCloudlet(brokerId, cloudlets, 0);
                        Log.printLine("cloudletlist size = " + cloudletList.size());
                        cloudletListSJF = new LinkedList<Cloudlet>();
                        getCloudletListSJF(cloudletList);
                        broker.submitCloudletList(cloudletListSJF);
                        CloudSim.startSimulation();
                        List<Cloudlet> newList = broker.getCloudletReceivedList();
                        CloudSim.stopSimulation();
                printCloudletList(newList);
                        Log.printLine("CloudSimTestSJF finished!");
                }
                catch (Exception e) {
                        e.printStackTrace();
                        Log.printLine("The simulation has been terminated due to an
unexpected error");
                }
```

```
	}
	private static Datacenter createDatacenter(String name){
		List<Host> hostList = new ArrayList<Host>();
		List<Pe> peList1 = new ArrayList<Pe>();
		int mips = 102400;
		peList1.add(new Pe(0, new PeProvisionerSimple(mips)));
		peList1.add(new Pe(1, new PeProvisionerSimple(mips)));
		peList1.add(new Pe(2, new PeProvisionerSimple(mips)));
		peList1.add(new Pe(3, new PeProvisionerSimple(mips)));
		List<Pe> peList2 = new ArrayList<Pe>();
		peList2.add(new Pe(0, new PeProvisionerSimple(mips)));
		peList2.add(new Pe(1, new PeProvisionerSimple(mips)));
		int hostId=0;
		int ram = 102400;
		long storage = 1000000;
		int bw = 200000;
		hostList.add(
			new Host(
				hostId,
				new RamProvisionerSimple(ram),
				new BwProvisionerSimple(bw),
				storage,
				peList1,
				new VmSchedulerTimeShared(peList1)
			)
		);
		hostId++;
		String arch = "x86";
		String os = "Linux";
		String vmm = "Xen";
		double time_zone = 10.0;
		double cost = 3.0;
		double costPerMem = 0.05;
		double costPerStorage = 0.1;
		double costPerBw = 0.1;
		LinkedList<Storage> storageList = new LinkedList<Storage>();

		DatacenterCharacteristics characteristics = new
DatacenterCharacteristics(
		arch, os, vmm, hostList, time_zone, cost, costPerMem, costPerStorage,
costPerBw);
		Datacenter datacenter = null;
		try {
			datacenter = new Datacenter(name, characteristics, new
VmAllocationPolicySimple(hostList), storageList, 0);
		} catch (Exception e) {
			e.printStackTrace();
		}

		return datacenter;
	}
	private static DatacenterBroker createBroker(String name){
```

```
                DatacenterBroker broker = null;
                try {
                        broker = new DatacenterBroker(name);
                } catch (Exception e) {
                        e.printStackTrace();
                        return null;
                }
                return broker;
        }
        private static void printCloudletList(List<Cloudlet> list) {
                int size = list.size();
                Cloudlet cloudlet;

                double avrt=0;

                String indent = "    ";
                Log.printLine();
                Log.printLine("========== OUTPUT ==========");
                Log.printLine("Cloudlet ID" + indent + "STATUS" + indent +
                                "Data center ID" + indent + "VM ID" + indent + indent
+ "Time" + indent + "Start Time" + indent + "Finish Time");

                DecimalFormat dft = new DecimalFormat("###.##");
                for (int i = 0; i < size; i++) {
                        cloudlet = list.get(i);
                        Log.print(indent + cloudlet.getCloudletId() + indent +
indent);

                        if (cloudlet.getCloudletStatus() == Cloudlet.SUCCESS){
                                Log.print("SUCCESS");
                                avrt += cloudlet.getActualCPUTime();
                                Log.printLine( indent + indent +
cloudlet.getResourceId() + indent + indent + indent + cloudlet.getVmId() +
                                                indent + indent + indent +
dft.format(cloudlet.getActualCPUTime()) +
                                                indent + indent +
dft.format(cloudlet.getExecStartTime())+ indent + indent + indent +
dft.format(cloudlet.getFinishTime()));

                        }
                        else{
                        Log.print("Failure");
                    }
                }
        }
}
```

Output:

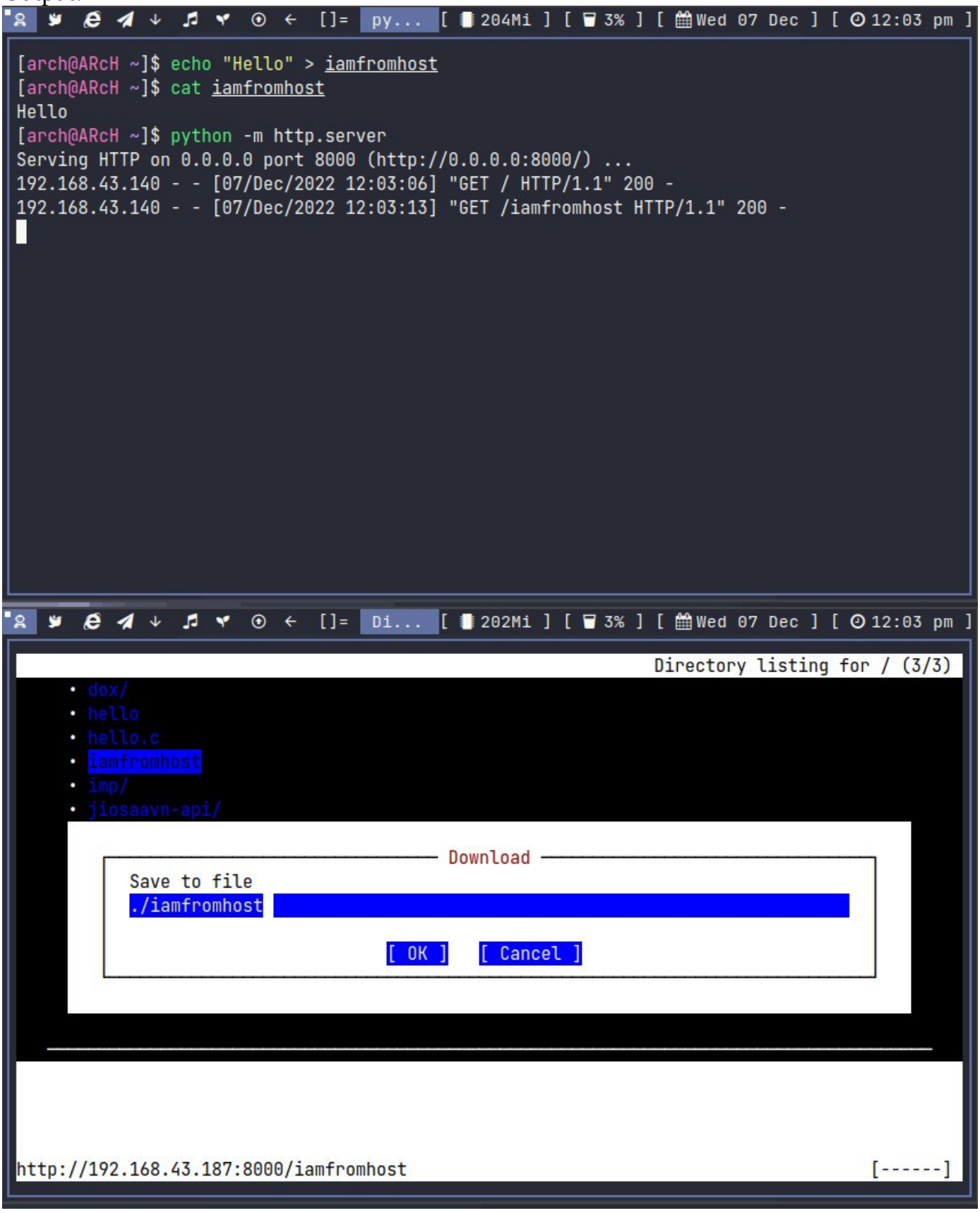

arch@ARcH:~/.local/src/c...
[ 181Mi ] [ 3% ] [ Wed 07 Dec ] [ 11:20 am ]
[arch@ARcH ~/.local/src/cloudcomplab/myapp]$ javac CloudSlim.java
[arch@ARcH ~/.local/src/cloudcomplab/myapp]$ l
.rw-r--r-- arch arch 7.9 KB Wed Dec 7 11:19:48 2022 CloudSlim.class
.rw-r--r-- arch arch 12 KB Wed Dec 7 11:19:33 2022 CloudSlim.java
[arch@ARcH ~/.local/src/cloudcomplab/myapp]$ java CloudSlim
Starting CloudSimTestSJF...
Initialising...
cloudletlist size = 10500
cloudletlist size = 17000
cloudletlist size = 23500
cloudletlist size = 20223
cloudletlist size = 26723
cloudletlist size = 23446
cloudletlist size = 29946
cloudletlist size = 26669
cloudletlist size = 33169
cloudletlist size = 29892
cloudletlist size = 36392
cloudletlist size = 33115
cloudletlist size = 39615
cloudletlist size = 36338
cloudletlist size = 42838
cloudletlist size = 39561
cloudletlist size = 46061
cloudletlist size = 42784
cloudletlist size = 49284
cloudletlist size = 46007
cloudletlist size = 52507
cloudletlist size = 49230
cloudletlist size = 55730
cloudletlist size = 52453
cloudletlist size = 58953
cloudletlist size = 55676
cloudletlist size = 62176
cloudletlist size = 58899
cloudletlist size = 65399
cloudletlist size = 62122
cloudletlist size = 68622
cloudletlist size = 65345
cloudletlist size = 71845
cloudletlist size = 68568
cloudletlist size = 75068
cloudletlist size = 71791
cloudletlist size = 78291
cloudletlist size = 75014
cloudletlist size = 81514
cloudletlist size = 78237
cloudletlist size = 84737

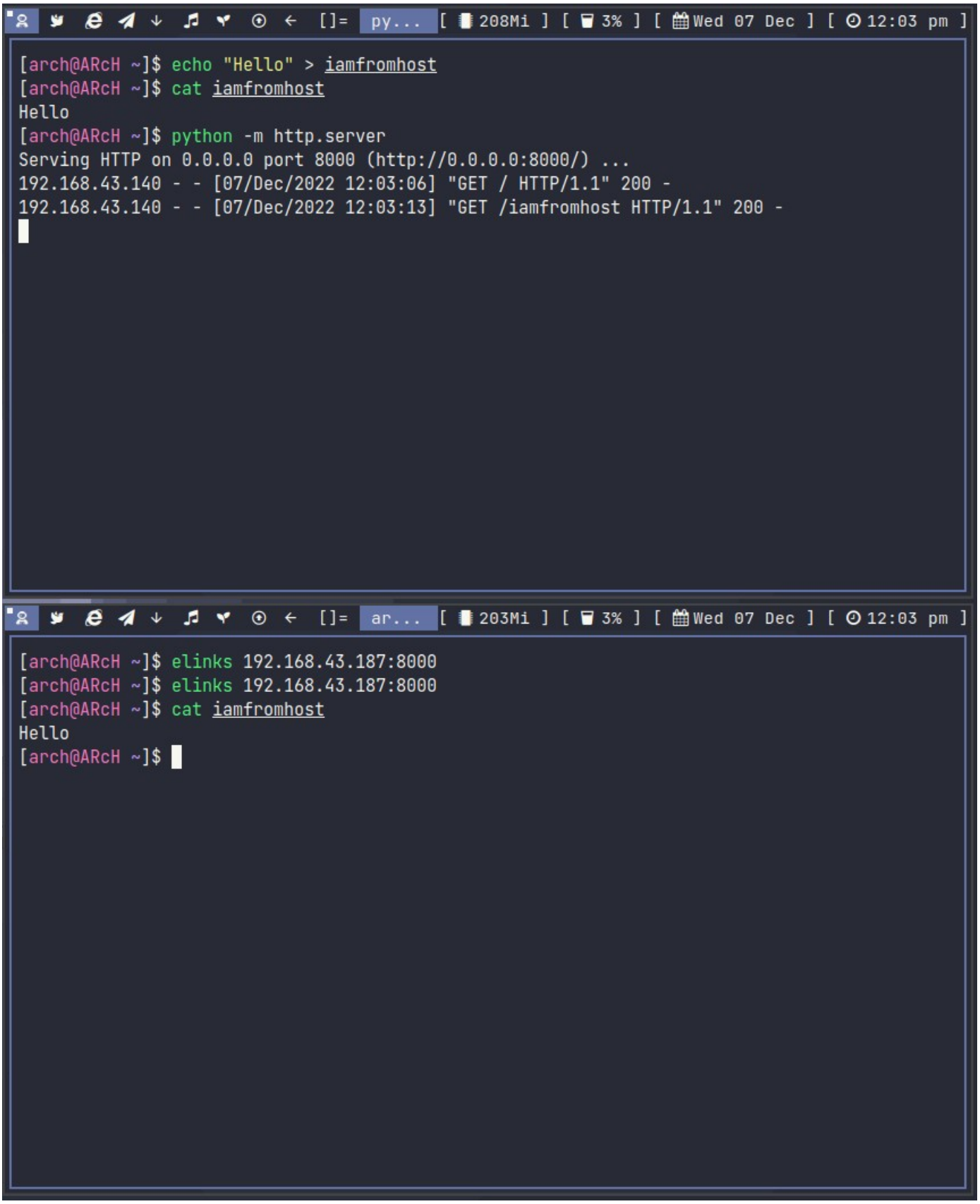


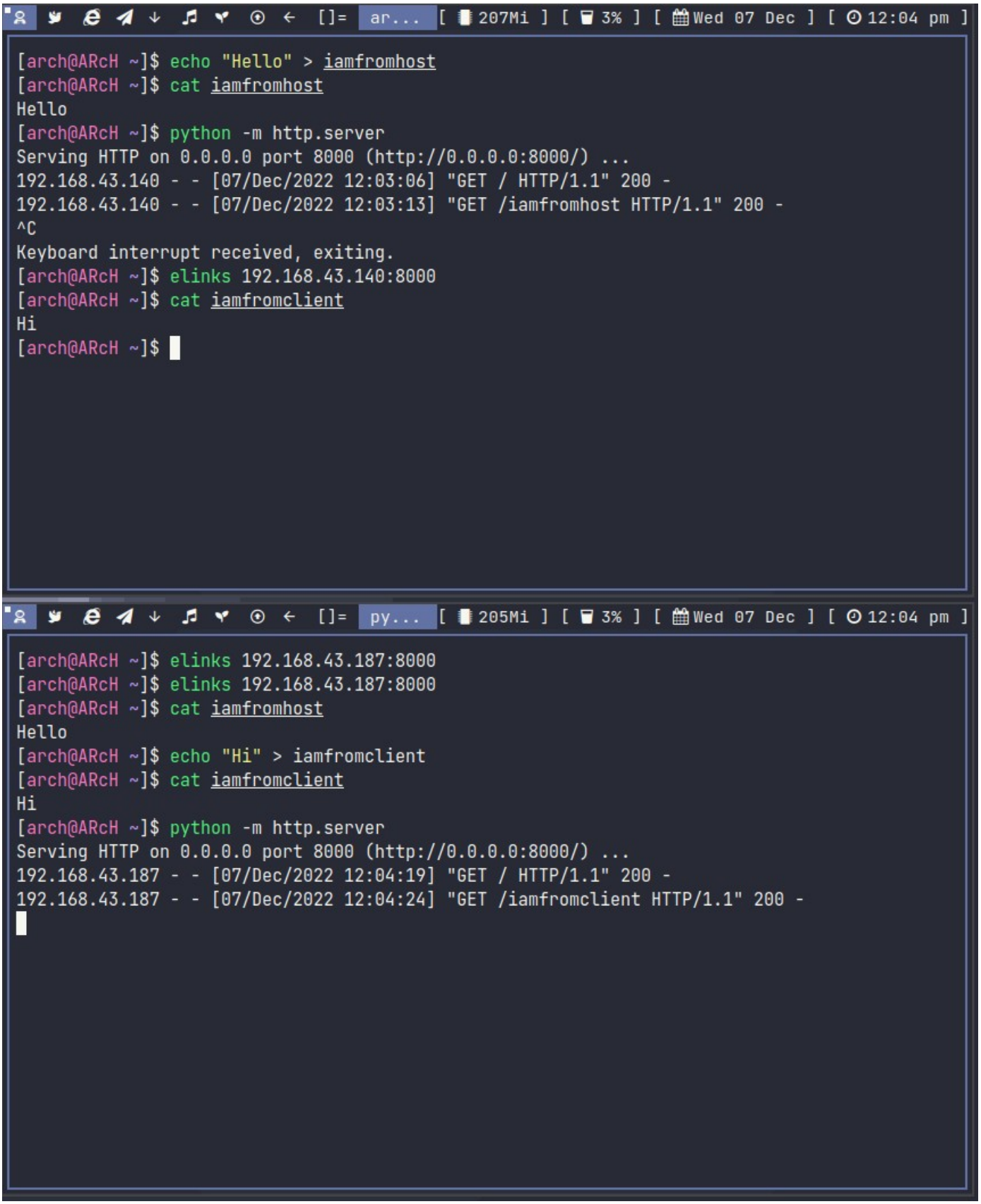

```
1378.992449368053: Broker_0: Destroying VM #48
1378.992449368053: Broker_0: Destroying VM #49
Broker_0 is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Broker_0 is shutting down...
Simulation completed.
Simulation completed.

========== OUTPUT ==========
Cloudlet ID    STATUS    Data center ID    VM ID        Time    Start Time    Finish Time
    0        SUCCESS        2            0           41.83        0.1            41.93
    1        SUCCESS        2            1           68.55        0.1            68.65
    3        SUCCESS        2            2           79.93        0.1            80.03
    2        SUCCESS        2            4           92.15        0.1            92.25
    5        SUCCESS        2            3           95.31        0.1            95.41
    4        SUCCESS        2            6           103.98        0.1            104.08
    7        SUCCESS        2            5           109.3        0.1            109.4
    6        SUCCESS        2            8           115.62        0.1            115.72
    9        SUCCESS        2            7           123.52        0.1            123.62
    8        SUCCESS        2            10           127.08        0.1            127.18
    11        SUCCESS        2            9           137.98        0.1            138.08
    10        SUCCESS        2            12           138.37        0.1            138.47
    12        SUCCESS        2            14           149.49        0.1            149.59
    13        SUCCESS        2            11           152.68        0.1            152.78
    14        SUCCESS        2            16           160.44        0.1            160.54
    15        SUCCESS        2            13           167.63        0.1            167.73
    16        SUCCESS        2            18           171.23        0.1            171.33
    18        SUCCESS        2            20           181.86        0.1            181.96
    17        SUCCESS        2            15           182.84        0.1            182.94
    20        SUCCESS        2            22           192.33        0.1            192.43
    19        SUCCESS        2            17           198.3        0.1            198.4
    22        SUCCESS        2            24           202.65        0.1            202.75
    24        SUCCESS        2            26           212.82        0.1            212.92
    21        SUCCESS        2            19           214.04        0.1            214.14
    26        SUCCESS        2            28           222.85        0.1            222.95
    23        SUCCESS        2            21           230.05        0.1            230.15
    28        SUCCESS        2            30           232.74        0.1            232.84
    30        SUCCESS        2            32           242.48        0.1            242.58
    25        SUCCESS        2            23           246.35        0.1            246.45
    32        SUCCESS        2            34           252.09        0.1            252.19
    34        SUCCESS        2            36           261.56        0.1            261.66
    27        SUCCESS        2            25           262.94        0.1            263.04
    36        SUCCESS        2            38           270.9        0.1            271
    29        SUCCESS        2            27           279.83        0.1            279.93
    38        SUCCESS        2            40           280.12        0.1            280.22
    40        SUCCESS        2            42           289.2        0.1            289.3
```

```
arch@ARcH:~/.local/src/c...  [ 184Mi ] [ 3% ] [ Wed 07 Dec ] [ 11:20 am ]
    55        SUCCESS        2          3          422.85        95.41          518.25
    54        SUCCESS        2          6          417.5        104.08          521.58
    56        SUCCESS        2          8          426.72        115.72          542.44
    57        SUCCESS        2          5          439.52        109.4           548.92
    58        SUCCESS        2          10          435.8        127.18          562.98
    59        SUCCESS        2          7          456.47        123.62          580.09
    60        SUCCESS        2          12          444.74        138.47          583.21
    62        SUCCESS        2          14          453.54        149.59          603.13
    61        SUCCESS        2          9          473.71        138.08          611.78
    64        SUCCESS        2          16          462.22        160.54          622.76
    66        SUCCESS        2          18          470.76        171.33          642.09
    63        SUCCESS        2          11          491.23        152.78          644.01
    68        SUCCESS        2          20          479.18        181.96          661.14
    65        SUCCESS        2          13          509.05        167.73          676.78
    70        SUCCESS        2          22          487.48        192.43          679.91
    72        SUCCESS        2          24          495.65        202.75          698.41
    67        SUCCESS        2          15          527.17        182.94          710.11
    74        SUCCESS        2          26          503.71        212.92          716.63
    76        SUCCESS        2          28          511.65        222.95          734.6
    69        SUCCESS        2          17          545.61        198.4           744.01
    78        SUCCESS        2          30          519.48        232.84          752.31
    80        SUCCESS        2          32          527.2         242.58          769.77
    71        SUCCESS        2          19          564.37        214.14          778.51
    82        SUCCESS        2          34          534.81        252.19          786.99
    84        SUCCESS        2          36          542.31        261.66          803.97
    73        SUCCESS        2          21          583.45        230.15          813.61
    86        SUCCESS        2          38          549.71        271            820.71
    88        SUCCESS        2          40          557          280.22          837.22
    75        SUCCESS        2          23          602.88        246.45          849.33
    90        SUCCESS        2          42          564.2         289.3           853.5
    92        SUCCESS        2          44          571.3         298.27          869.57
    94        SUCCESS        2          46          578.31        307.11          885.42
    77        SUCCESS        2          25          622.65        263.04          885.69
    96        SUCCESS        2          48          585.22        315.84          901.05
    79        SUCCESS        2          27          642.78        279.93          922.7
    81        SUCCESS        2          29          663.27        297.12          960.39
    83        SUCCESS        2          31          684.14        314.63          998.77
    85        SUCCESS        2          33          705.4         332.46          1037.86
    87        SUCCESS        2          35          727.05        350.63          1077.68
    89        SUCCESS        2          37          749.11        369.14          1118.25
    91        SUCCESS        2          39          771.59        388            1159.59
    93        SUCCESS        2          41          794.51        407.23          1201.73
    95        SUCCESS        2          43          817.87        426.82          1244.69
    97        SUCCESS        2          45          841.69        446.81          1288.49
    99        SUCCESS        2          47          865.97        467.18          1333.16
    98        SUCCESS        2          49          891.02        487.97          1378.99
CloudSimTestSJF finished!
[arch@ARcH ~/.local/src/cloudcomplab/myapp]$
```

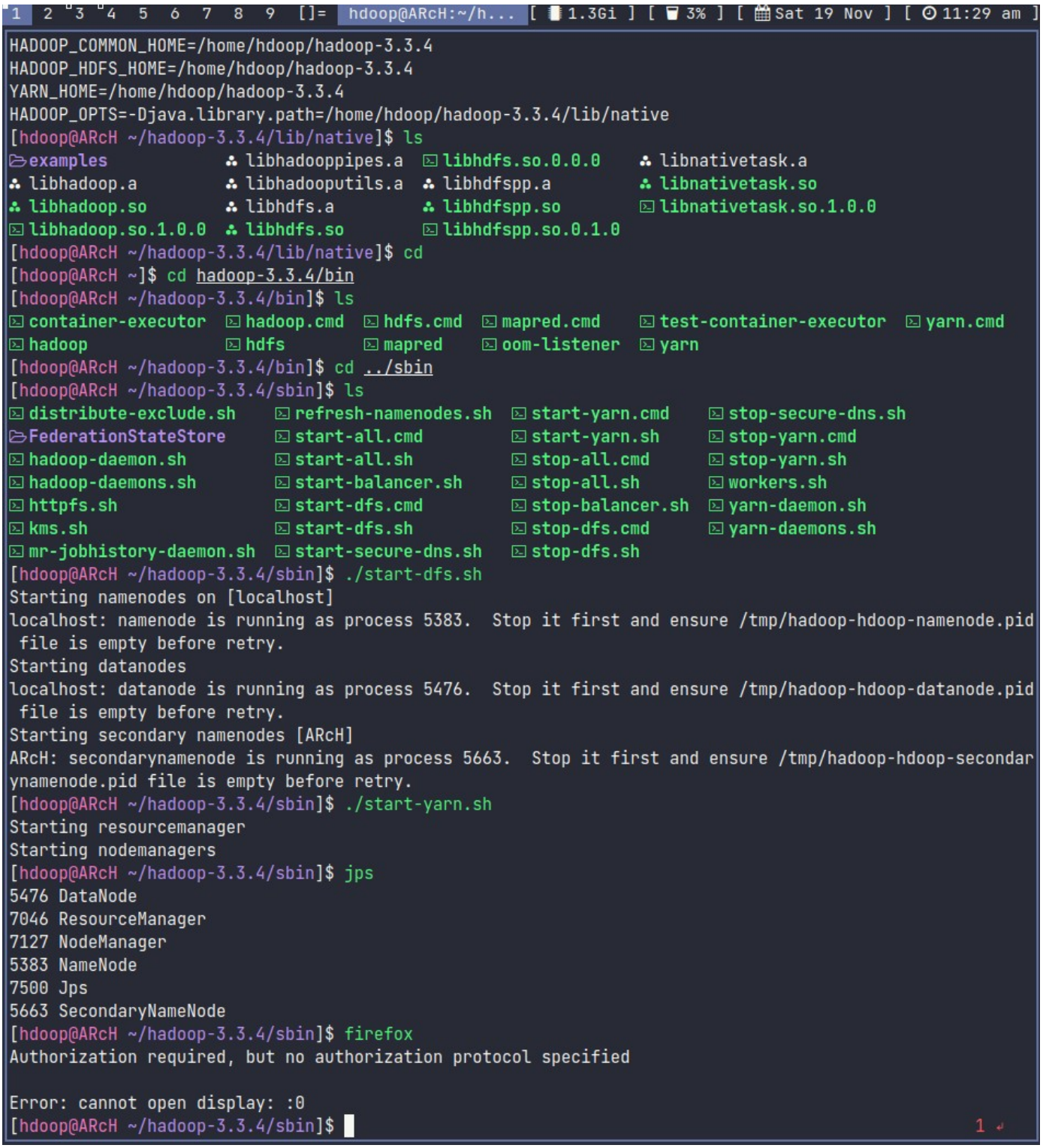
Output:

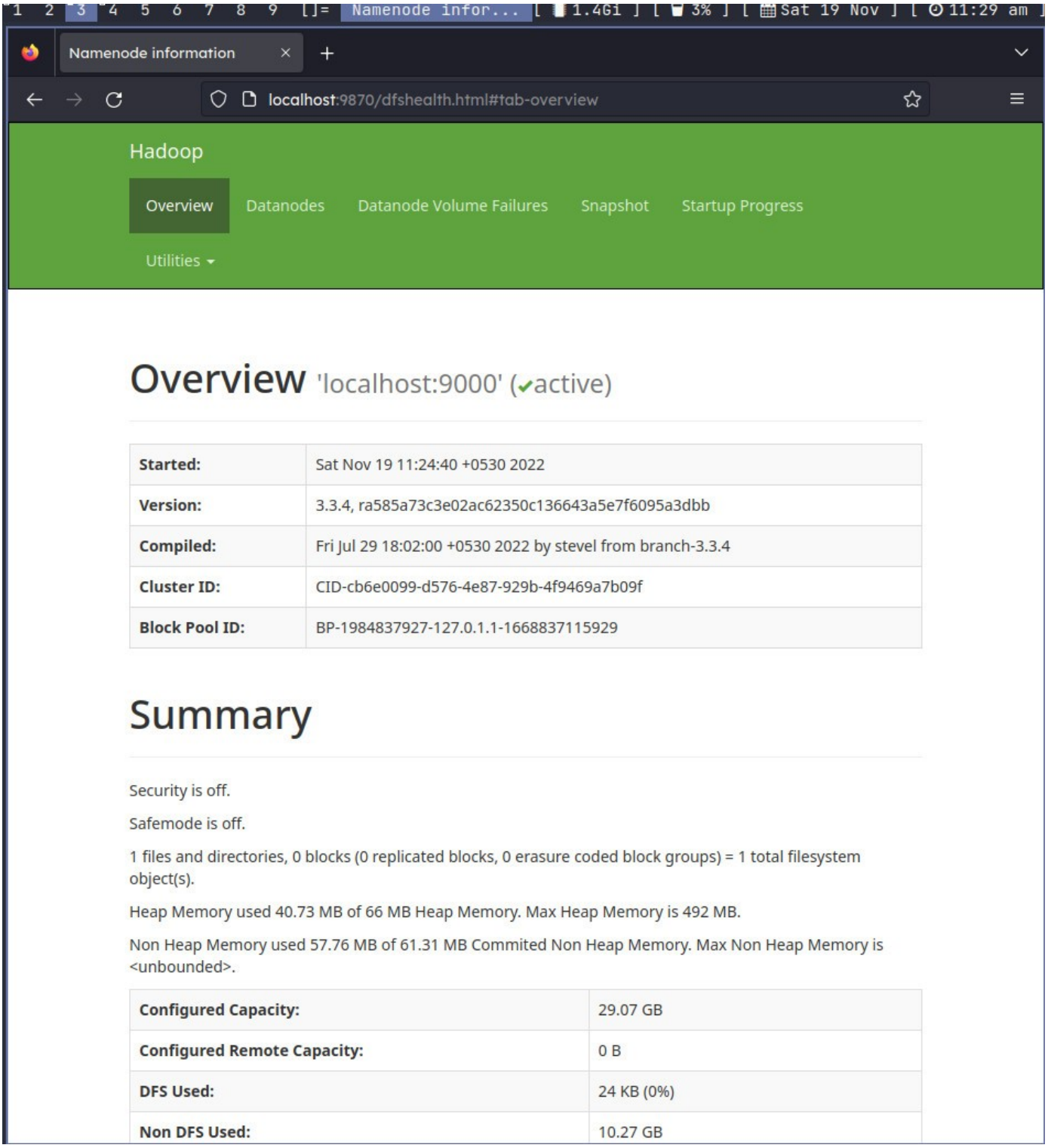

py... [ 204Mi ] [ 3% ] [ Wed 07 Dec ] [ 12:03 pm ]
[arch@ARcH ~]$ echo "Hello" > iamfromhost
[arch@ARcH ~]$ cat iamfromhost
Hello
[arch@ARcH ~]$ python -m http.server
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.43.140 - - [07/Dec/2022 12:03:06] "GET / HTTP/1.1" 200 -
192.168.43.140 - - [07/Dec/2022 12:03:13] "GET /iamfromhost HTTP/1.1" 200 -
Di... [ 202Mi ] [ 3% ] [ Wed 07 Dec ] [ 12:03 pm ]
Directory listing for / (3/3)
dox/
hello
hello.c
iamfromhost
imp/
jiosaavn-api/
Download
Save to file
./iamfromhost
[ OK ]
[ Cancel ]
http://192.168.43.187:8000/iamfromhost
[------]


[]= py... [ 208Mi ] [ 3% ] [ Wed 07 Dec ] [ 12:03 pm ]
[arch@ARcH ~]$ echo "Hello" > iamfromhost
[arch@ARcH ~]$ cat iamfromhost
Hello
[arch@ARcH ~]$ python -m http.server
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.43.140 - - [07/Dec/2022 12:03:06] "GET / HTTP/1.1" 200 -
192.168.43.140 - - [07/Dec/2022 12:03:13] "GET /iamfromhost HTTP/1.1" 200 -
[]= ar... [ 203Mi ] [ 3% ] [ Wed 07 Dec ] [ 12:03 pm ]
[arch@ARcH ~]$ elinks 192.168.43.187:8000
[arch@ARcH ~]$ elinks 192.168.43.187:8000
[arch@ARcH ~]$ cat iamfromhost
Hello
[arch@ARcH ~]$


[]= ar... [ 207Mi ] [ 3% ] [ Wed 07 Dec ] [ 12:04 pm ]
[arch@ARcH ~]$ echo "Hello" > iamfromhost
[arch@ARcH ~]$ cat iamfromhost
Hello
[arch@ARcH ~]$ python -m http.server
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.43.140 - - [07/Dec/2022 12:03:06] "GET / HTTP/1.1" 200 -
192.168.43.140 - - [07/Dec/2022 12:03:13] "GET /iamfromhost HTTP/1.1" 200 -
^C
Keyboard interrupt received, exiting.
[arch@ARcH ~]$ elinks 192.168.43.140:8000
[arch@ARcH ~]$ cat iamfromclient
Hi
[arch@ARcH ~]$
[]= py... [ 205Mi ] [ 3% ] [ Wed 07 Dec ] [ 12:04 pm ]
[arch@ARcH ~]$ elinks 192.168.43.187:8000
[arch@ARcH ~]$ elinks 192.168.43.187:8000
[arch@ARcH ~]$ cat iamfromhost
Hello
[arch@ARcH ~]$ echo "Hi" > iamfromclient
[arch@ARcH ~]$ cat iamfromclient
Hi
[arch@ARcH ~]$ python -m http.server
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
192.168.43.187 - - [07/Dec/2022 12:04:19] "GET / HTTP/1.1" 200 -
192.168.43.187 - - [07/Dec/2022 12:04:24] "GET /iamfromclient HTTP/1.1" 200 -

Output:


1 2 3 4 5 6 7 8 9 []= hdoop@ARcH:~/h... [ 1.3Gi ] [ 3% ] [ Sat 19 Nov ] [ 11:29 am ]
HADOOP_COMMON_HOME=/home/hdoop/hadoop-3.3.4
HADOOP_HDFS_HOME=/home/hdoop/hadoop-3.3.4
YARN_HOME=/home/hdoop/hadoop-3.3.4
HADOOP_OPTS=-Djava.library.path=/home/hdoop/hadoop-3.3.4/lib/native
[hdoop@ARcH ~/hadoop-3.3.4/lib/native]$ ls
examples libhadooppipes.a libhdfs.so.0.0.0 libnativetask.a
libhadoop.a libhadooputils.a libhdfspp.a libnativetask.so
libhadoop.so libhdfs.a libhdfspp.so libnativetask.so.1.0.0
libhadoop.so.1.0.0 libhdfs.so libhdfspp.so.0.1.0
[hdoop@ARcH ~/hadoop-3.3.4/lib/native]$ cd
[hdoop@ARcH ~]$ cd hadoop-3.3.4/bin
[hdoop@ARcH ~/hadoop-3.3.4/bin]$ ls
container-executor hadoop.cmd hdfs.cmd mapred.cmd test-container-executor yarn.cmd
hadoop hdfs mapred oom-listener yarn
[hdoop@ARcH ~/hadoop-3.3.4/bin]$ cd ../sbin
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ ls
distribute-exclude.sh refresh-namenodes.sh start-yarn.cmd stop-secure-dns.sh
FederationStateStore start-all.cmd start-yarn.sh stop-yarn.cmd
hadoop-daemon.sh start-all.sh stop-all.cmd stop-yarn.sh
hadoop-daemons.sh start-balancer.sh stop-all.sh workers.sh
httpfs.sh start-dfs.cmd stop-balancer.sh yarn-daemon.sh
kms.sh start-dfs.sh stop-dfs.cmd yarn-daemons.sh
mr-jobhistory-daemon.sh start-secure-dns.sh stop-dfs.sh
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ ./start-dfs.sh
Starting namenodes on [localhost]
localhost: namenode is running as process 5383. Stop it first and ensure /tmp/hadoop-hdoop-namenode.pid
file is empty before retry.
Starting datanodes
localhost: datanode is running as process 5476. Stop it first and ensure /tmp/hadoop-hdoop-datanode.pid
file is empty before retry.
Starting secondary namenodes [ARcH]
ARcH: secondarynamenode is running as process 5663. Stop it first and ensure /tmp/hadoop-hdoop-secondar
ynamenode.pid file is empty before retry.
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ ./start-yarn.sh
Starting resourcemanager
Starting nodemanagers
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ jps
5476 DataNode
7046 ResourceManager
7127 NodeManager
5383 NameNode
7500 Jps
5663 SecondaryNameNode
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ firefox
Authorization required, but no authorization protocol specified
Error: cannot open display: :0
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$
1

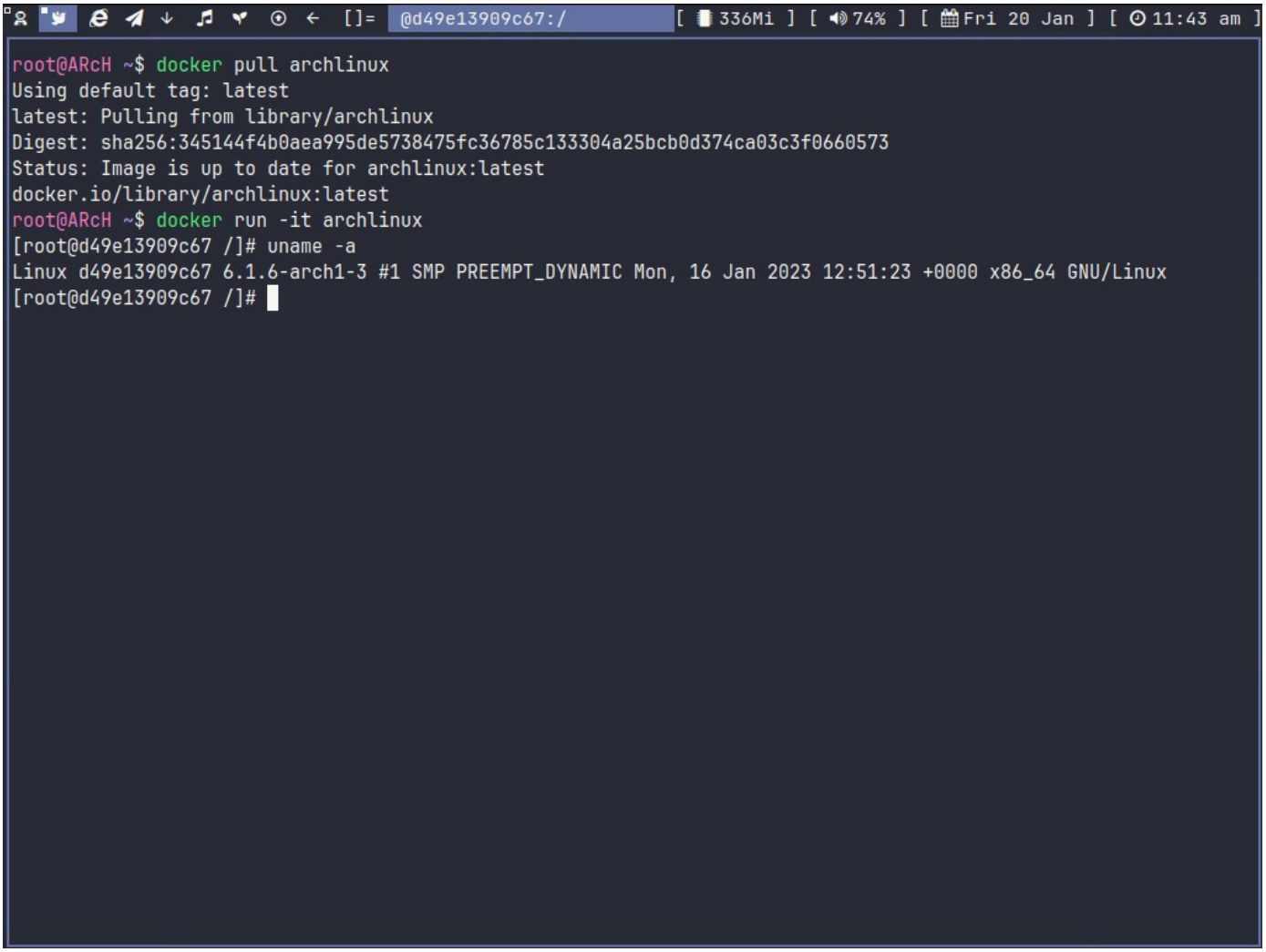

1 2 3 4 5 6 7 8 9 ]= Namenode infor... [ 1.4Gi ] [ 3% ] [ Sat 19 Nov ] [ 11:29 am ]
Namenode information
localhost:9870/dfshealth.html#tab-overview
Hadoop
Overview
Datanodes
Datanode Volume Failures
Snapshot
Startup Progress
Utilities
Overview 'localhost:9000' (active)
Started: Sat Nov 19 11:24:40 +0530 2022
Version: 3.3.4, ra585a73c3e02ac62350c136643a5e7f6095a3dbb
Compiled: Fri Jul 29 18:02:00 +0530 2022 by stevel from branch-3.3.4
Cluster ID: CID-cb6e0099-d576-4e87-929b-4f9469a7b09f
Block Pool ID: BP-1984837927-127.0.1.1-1668837115929
Summary
Security is off.
Safemode is off.
1 files and directories, 0 blocks (0 replicated blocks, 0 erasure coded block groups) = 1 total filesystem object(s).
Heap Memory used 40.73 MB of 66 MB Heap Memory. Max Heap Memory is 492 MB.
Non Heap Memory used 57.76 MB of 61.31 MB Commited Non Heap Memory. Max Non Heap Memory is <unbounded>.
Configured Capacity: 29.07 GB
Configured Remote Capacity: 0 B
DFS Used: 24 KB (0%)
Non DFS Used: 10.27 GB

```
1  2  3  4  5  6  7  8  9  []=  hdoop@ARcH:~/hadoop-3.3....  [ 1.7Gi ] [ 3% ] [ Sat 19 Nov ] [ 11:56 am ]
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -put ~/data input                                    255 ↵
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hadoop jar ../share/hadoop/mapreduce/hadoop-mapreduce-examples-3.3.4.jar wordcou
nt input output
2022-11-19 11:51:16,150 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /127.0.0.
1:8032
2022-11-19 11:51:16,611 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/st
aging/hdoop/.staging/job_1668838594769_0003
2022-11-19 11:51:17,120 INFO input.FileInputFormat: Total input files to process : 1
2022-11-19 11:51:17,609 INFO mapreduce.JobSubmitter: number of splits:1
2022-11-19 11:51:18,011 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1668838594769_0003
2022-11-19 11:51:18,011 INFO mapreduce.JobSubmitter: Executing with tokens: []
2022-11-19 11:51:18,292 INFO conf.Configuration: resource-types.xml not found
2022-11-19 11:51:18,292 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2022-11-19 11:51:18,590 INFO impl.YarnClientImpl: Submitted application application_1668838594769_0003
2022-11-19 11:51:18,678 INFO mapreduce.Job: The url to track the job: http://ARcH.localdomain:8088/proxy/applicati
on_1668838594769_0003/
2022-11-19 11:51:18,678 INFO mapreduce.Job: Running job: job_1668838594769_0003
2022-11-19 11:51:26,828 INFO mapreduce.Job: Job job_1668838594769_0003 running in uber mode : false
2022-11-19 11:51:26,833 INFO mapreduce.Job:  map 0% reduce 0%
2022-11-19 11:51:32,004 INFO mapreduce.Job:  map 100% reduce 0%
2022-11-19 11:51:37,090 INFO mapreduce.Job:  map 100% reduce 100%
2022-11-19 11:51:39,169 INFO mapreduce.Job: Job job_1668838594769_0003 completed successfully
2022-11-19 11:51:39,272 INFO mapreduce.Job: Counters: 54
        File System Counters
                FILE: Number of bytes read=176
                FILE: Number of bytes written=551633
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=213
                HDFS: Number of bytes written=122
                HDFS: Number of read operations=8
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
                HDFS: Number of bytes read erasure-coded=0
        Job Counters
                Launched map tasks=1
                Launched reduce tasks=1
                Data-local map tasks=1
                Total time spent by all maps in occupied slots (ms)=2327
                Total time spent by all reduces in occupied slots (ms)=3124
                Total time spent by all map tasks (ms)=2327
                Total time spent by all reduce tasks (ms)=3124
                Total vcore-milliseconds taken by all map tasks=2327
                Total vcore-milliseconds taken by all reduce tasks=3124
                Total megabyte-milliseconds taken by all map tasks=2382848
                Total megabyte-milliseconds taken by all reduce tasks=3198976
        Map-Reduce Framework
```

```
1  2  3  4  5  6  7  8  9  []=  hdoop@ARcH:~/hadoop-3.3....  [ 1.7Gi ] [ 3% ] [ Sat 19 Nov ] [ 11:56 am ]
        Map-Reduce Framework
                Map input records=6
                Map output records=12
                Map output bytes=146
                Map output materialized bytes=176
                Input split bytes=115
                Combine input records=12
                Combine output records=12
                Reduce input groups=12
                Reduce shuffle bytes=176
                Reduce input records=12
                Reduce output records=12
                Spilled Records=24
                Shuffled Maps =1
                Failed Shuffles=0
                Merged Map outputs=1
                GC time elapsed (ms)=36
                CPU time spent (ms)=1350
                Physical memory (bytes) snapshot=435286016
                Virtual memory (bytes) snapshot=5420552192
                Total committed heap usage (bytes)=318767104
                Peak Map Physical memory (bytes)=252461056
                Peak Map Virtual memory (bytes)=2706952192
                Peak Reduce Physical memory (bytes)=182824960
                Peak Reduce Virtual memory (bytes)=2713600000
        Shuffle Errors
                BAD_ID=0
                CONNECTION=0
                IO_ERROR=0
                WRONG_LENGTH=0
                WRONG_MAP=0
                WRONG_REDUCE=0
        File Input Format Counters
                Bytes Read=98
        File Output Format Counters
                Bytes Written=122
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -cat output/*
zsh: no matches found: output/*
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -cat output/*                                                1 ↵
zsh: no matches found: output/*
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -cat output/_SUCCESS                                         1 ↵
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -cat output/part-r-00000
5383    1
5476    1
5663    1
7046    1
7127    1
8786    1
```

```
 1  2  3  4  5  6  7  8  9  []=  hdoop@ARcH:~/hadoop-3.3....  [  1.6Gi ] [  3% ] [  Sat 19 Nov ] [  11:56 am ]
                Failed Shuffles=0
                Merged Map outputs=1
                GC time elapsed (ms)=36
                CPU time spent (ms)=1350
                Physical memory (bytes) snapshot=435286016
                Virtual memory (bytes) snapshot=5420552192
                Total committed heap usage (bytes)=318767104
                Peak Map Physical memory (bytes)=252461056
                Peak Map Virtual memory (bytes)=2706952192
                Peak Reduce Physical memory (bytes)=182824960
                Peak Reduce Virtual memory (bytes)=2713600000
        Shuffle Errors
                BAD_ID=0
                CONNECTION=0
                IO_ERROR=0
                WRONG_LENGTH=0
                WRONG_MAP=0
                WRONG_REDUCE=0
        File Input Format Counters
                Bytes Read=98
        File Output Format Counters
                Bytes Written=122
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -cat output/*
zsh: no matches found: output/*
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -cat output/*                                                    1 ↵
zsh: no matches found: output/*
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -cat output/_SUCCESS                                             1 ↵
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ hdfs dfs -cat output/part-r-00000
5383    1
5476    1
5663    1
7046    1
7127    1
8786    1
DataNode        1
Jps     1
NameNode        1
NodeManager     1
ResourceManager 1
SecondaryNameNode       1
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$ cat ~/data/testing.txt
8786 Jps
5476 DataNode
7046 ResourceManager
7127 NodeManager
5383 NameNode
5663 SecondaryNameNode
[hdoop@ARcH ~/hadoop-3.3.4/sbin]$
```

Output:


[]= @d49e13909c67:/ [ 336Mi ] [ 74% ] [ Fri 20 Jan ] [ 11:43 am ]
root@ARcH ~$ docker pull archlinux
Using default tag: latest
latest: Pulling from library/archlinux
Digest: sha256:345144f4b0aea995de5738475fc36785c133304a25bcb0d374ca03c3f0660573
Status: Image is up to date for archlinux:latest
docker.io/library/archlinux:latest
root@ARcH ~$ docker run -it archlinux
[root@d49e13909c67 /]# uname -a
Linux d49e13909c67 6.1.6-arch1-3 #1 SMP PREEMPT_DYNAMIC Mon, 16 Jan 2023 12:51:23 +0000 x86_64 GNU/Linux
[root@d49e13909c67 /]#