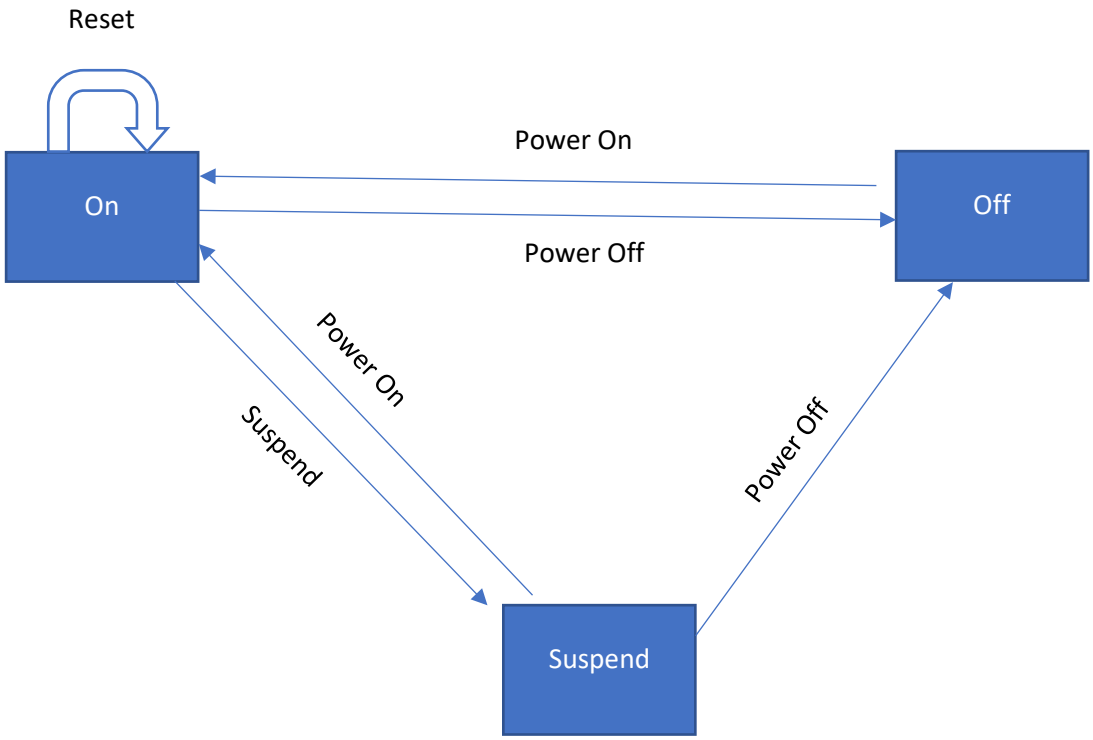
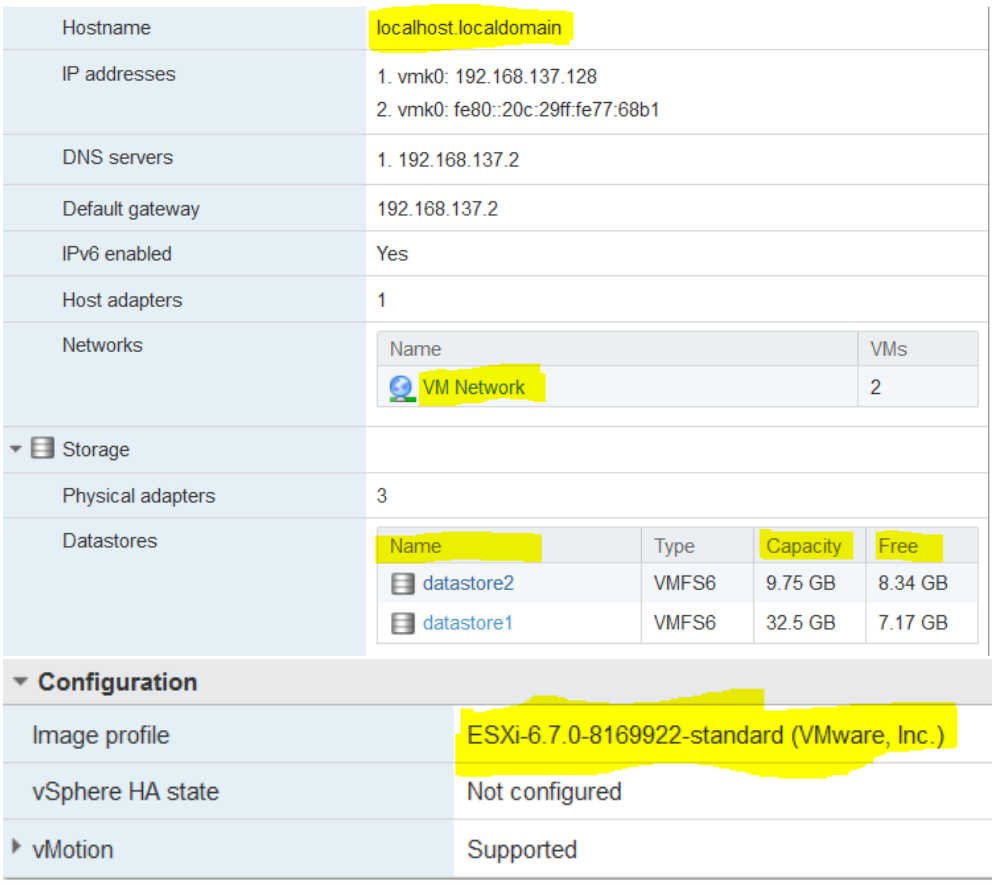
1.



VM can be in three states, either On, Off or Suspend. When a VM is reset, it returns back to “on” state. When a VM is “powered on”, it can either changed to either “off” or “suspend”. However, when a VM is “powered off” and is in “off” state, it can only be “powered on”. Similarly, when a VM is in “suspend” state, it can either be “powered on” or “powered off”. A VM can be only be “reset” when it is in “on” state.

2.

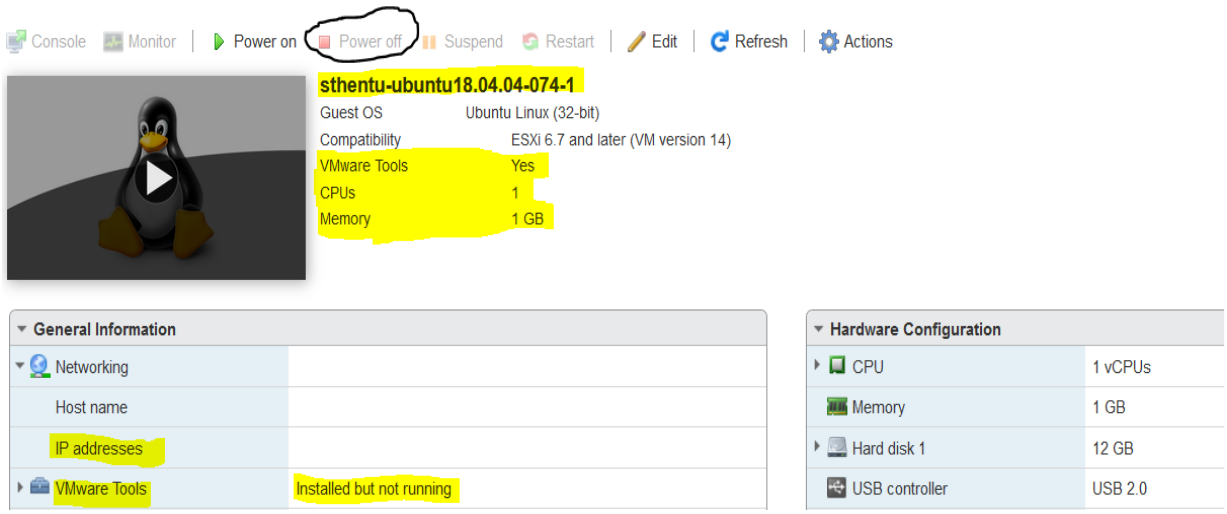
Run 1, step 1: host related screenshots



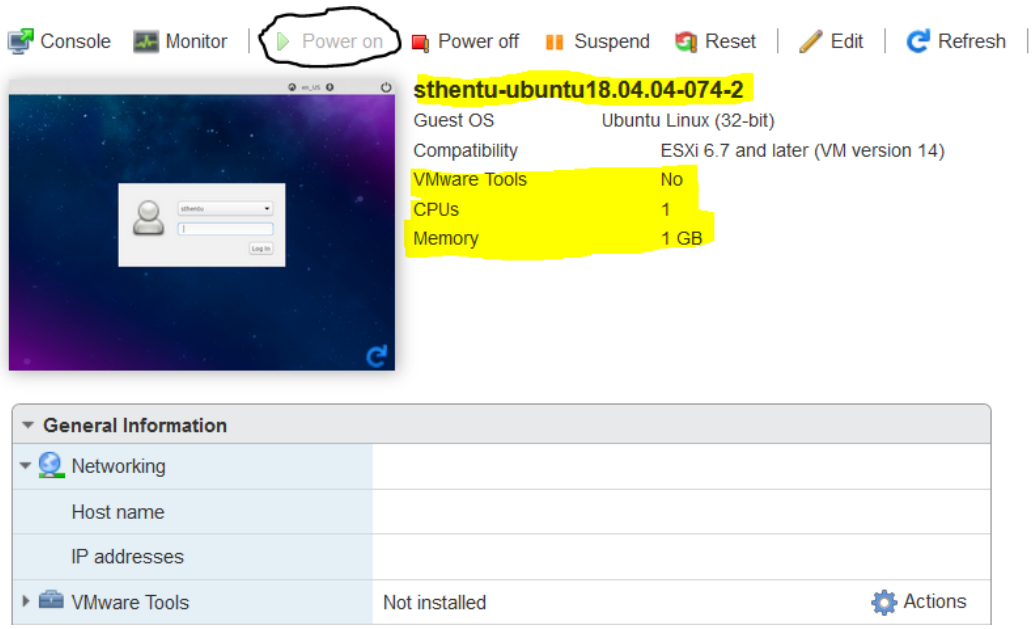
Hostname	localhost.localdomain
IP addresses	1. vmk0: 192.168.137.128 2. vmk0: fe80::20c:29ff:fe77:68b1
DNS servers	1. 192.168.137.2
Default gateway	192.168.137.2
IPv6 enabled	Yes
Host adapters	1
Networks	Name: VM Network; VMs: 2
Storage	
Physical adapters	3
Datastores	Name: datastore2, Type: VMFS6, Capacity: 9.75 GB, Free: 8.34 GB Name: datastore1, Type: VMFS6, Capacity: 32.5 GB, Free: 7.17 GB
Configuration	
Image profile	ESXi-6.7.0-8169922-standard (VMware, Inc.)
vSphere HA state	Not configured
vMotion	Supported

```
CS 218 Fall 2020 HW2 from Siddartha Thentu
host[0]:
Name = localhost.localdomain
ProductFullName = VMware ESXi 6.7.0 build-8169922
Datastore[0]:  name=datastore1, Capacity = 32.5 GB, Freespace = 7.1689453125 GB
Datastore[1]:  name=datastore2, Capacity = 9.75 GB, Freespace = 8.3447265625 GB
Network[0] : name=VM Network
```

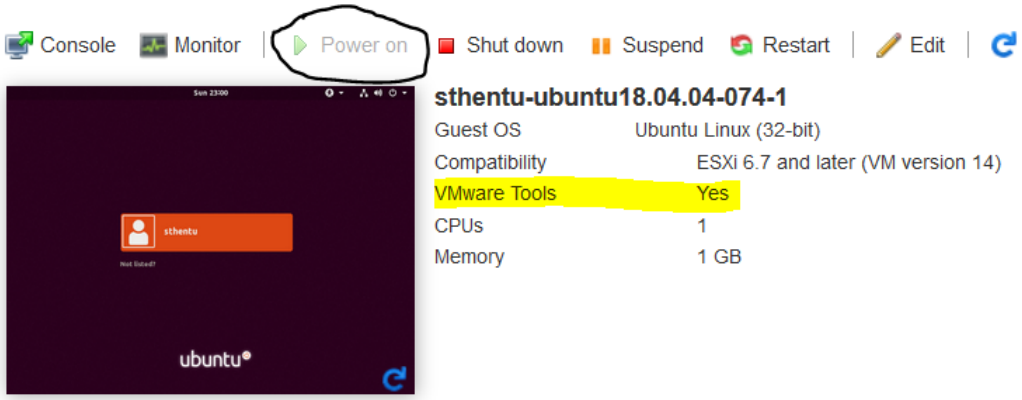
Run 1, before step 2: vm1 related screenshots



Run 1, before step 2: vm2 related screenshots

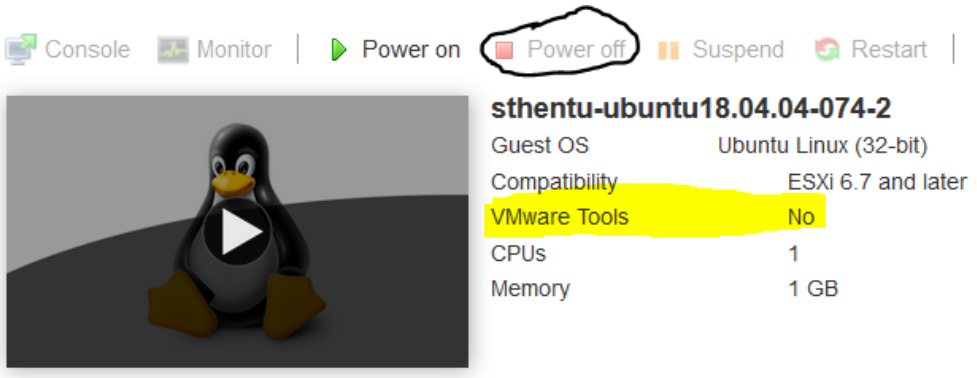


Run 1, after step 2: vm1 and task related screenshots



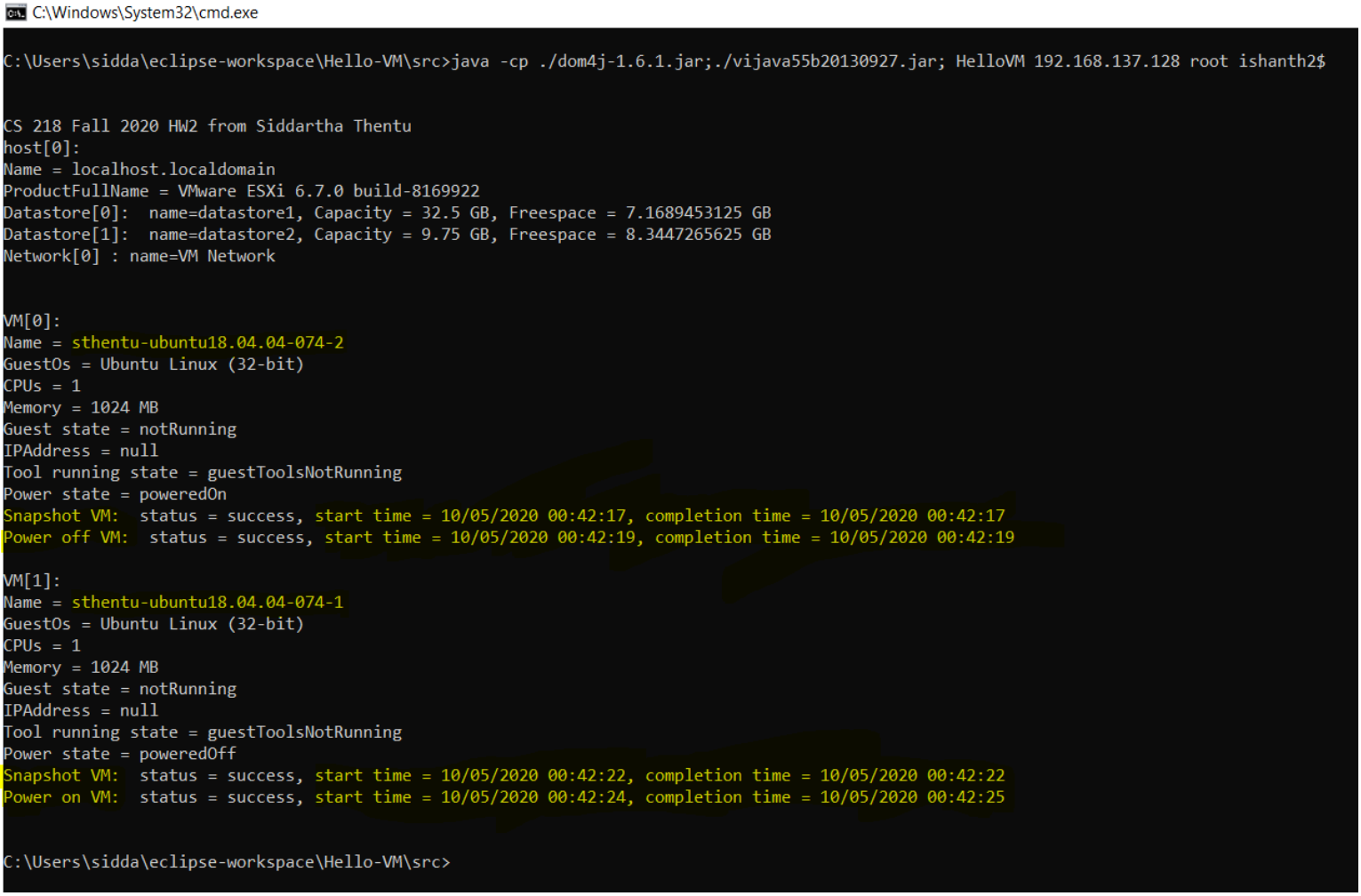
Task	Target			Started		Completed ▼
Power On VM	sthentu-ubuntu18.04.04-074-1	roc	1	10/05/2020 00:42:24		10/05/2020 00:42:25
Create Snapshot	sthentu-ubuntu18.04.04-074-1	roc	1	10/05/2020 00:42:22		10/05/2020 00:42:22

Run 1, after step 2: vm2 and task related screenshots



Task	Target	Initiator		Started		Completed ▼
Power Off VM	sthentu-ubuntu18.04.04-074-2	root	1(	10/05/2020 00:42:19		10/05/2020 00:42:19
Create Snapshot	sthentu-ubuntu18.04.04-074-2	root	1(	10/05/2020 00:42:17		10/05/2020 00:42:17

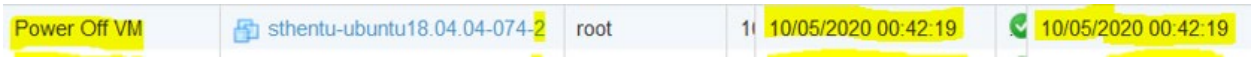
Run 1, step 3: Java program execution stdout screenshot



Correlating VM 1 tasks after run1 and stdout for run1


```
Name = sthentu-ubuntu18.04.04-074-1
GuestOs = Ubuntu Linux (32-bit)
CPUs = 1
Memory = 1024 MB
Guest state = notRunning
IPAddress = null
Tool running state = guestToolsNotRunning
Power state = poweredOff
Snapshot VM:  status = success, start time = 10/05/2020 00:42:22, completion time = 10/05/2020 00:42:22
Power on VM:  status = success, start time = 10/05/2020 00:42:24, completion time = 10/05/2020 00:42:25
```

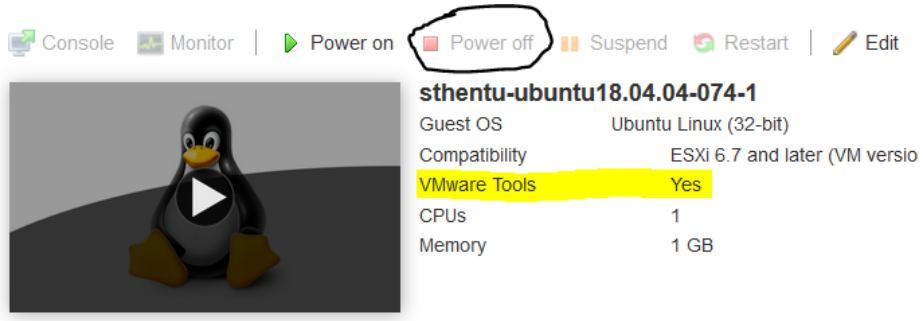
Correlating VM 2 tasks after run1 and stdout for run1




```
VM[0]:
Name = sthentu-ubuntu18.04.04-074-2
GuestOs = Ubuntu Linux (32-bit)
CPUs = 1
Memory = 1024 MB
Guest state = notRunning
IPAddress = null
Tool running state = guestToolsNotRunning
Power state = poweredOn
Snapshot VM:  status = success, start time = 10/05/2020 00:42:17, completion time = 10/05/2020 00:42:17
Power off VM:  status = success, start time = 10/05/2020 00:42:19, completion time = 10/05/2020 00:42:19
```

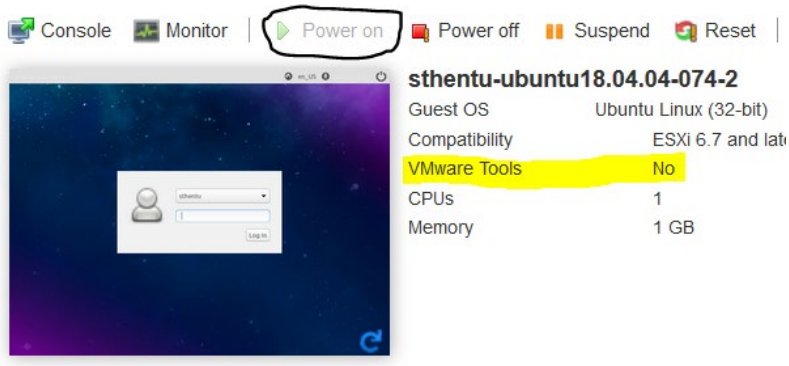
Run	Task	Task start time	Task completion time
1	**Power on vm1**, vm name= **sthentu-ubuntu18.04.04-074-1**	**10/05/2020 00:42:24**	**10/05/2020 00:42:25**
1	**Power off vm2**, vm name=**sthentu-ubuntu18.04.04-074-2**	**10/05/2020 00:42:19**	**10/05/2020 00:42:19**
2	Power off vm1, vm name=		
2	Power on vm2, vm name=		

Run 2, after step 2: vm1 and task related screenshots



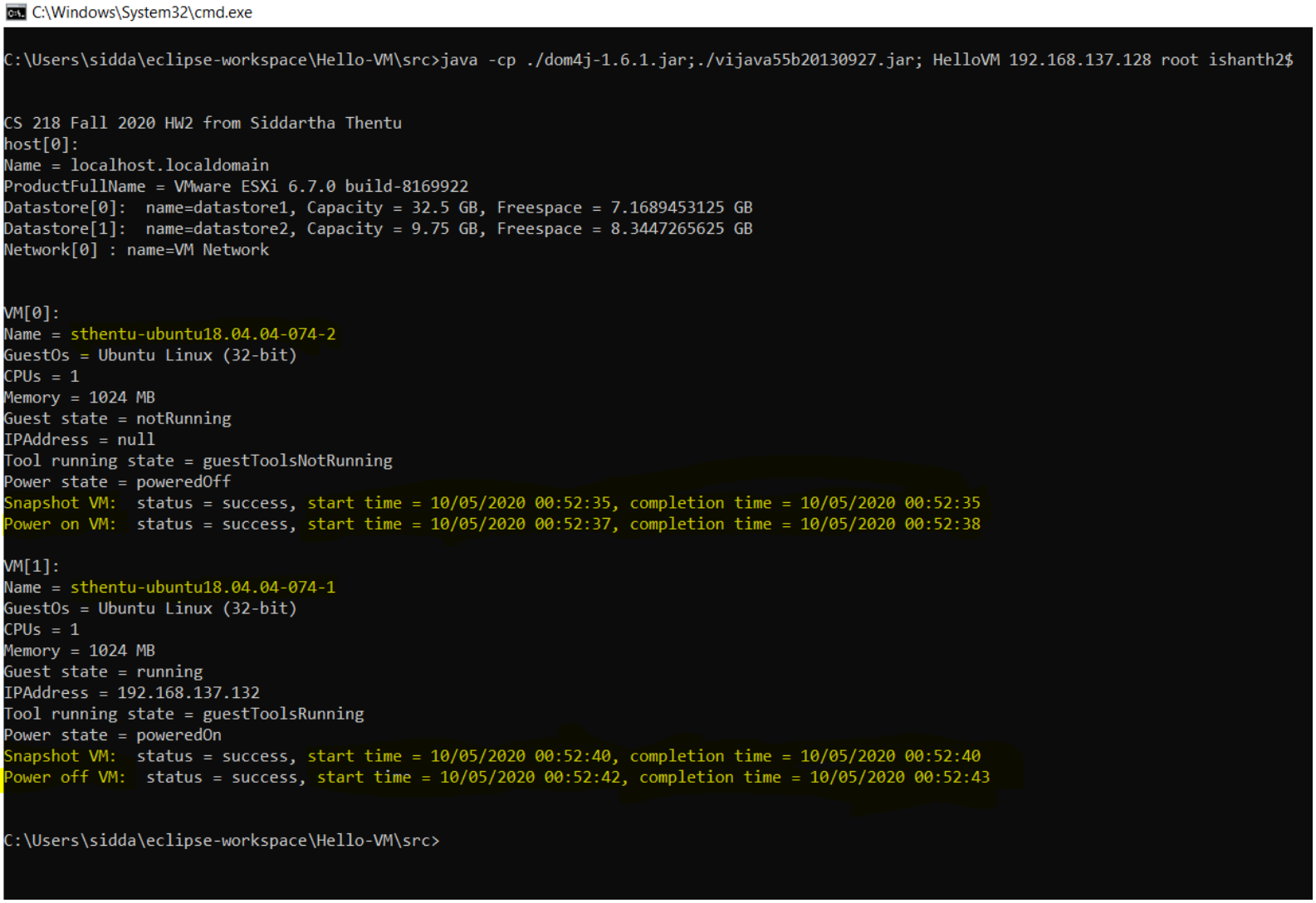
Task	Target	Ir		Started		Completed ▾
Power Off VM	sthentu-ubuntu18.04.04-074-1	root	1(	10/05/2020 00:52:42		10/05/2020 00:52:43
Create Snapshot	sthentu-ubuntu18.04.04-074-1	root	1(	10/05/2020 00:52:40		10/05/2020 00:52:40
Power On VM	sthentu-ubuntu18.04.04-074-1	root	1(	10/05/2020 00:42:24		10/05/2020 00:42:25
Create Snapshot	sthentu-ubuntu18.04.04-074-1	root	1(	10/05/2020 00:42:22		10/05/2020 00:42:22

Run 2, after step 2: vm2 and task related screenshots



Task	Target	Initiator		Started		Completed ▾
Power On VM	sthentu-ubuntu18.04.04-074-2	root	1	10/05/2020 00:52:37		10/05/2020 00:52:38
Create Snapshot	sthentu-ubuntu18.04.04-074-2	root	1	10/05/2020 00:52:35		10/05/2020 00:52:35
Power Off VM	sthentu-ubuntu18.04.04-074-2	root	1	10/05/2020 00:42:19		10/05/2020 00:42:19
Create Snapshot	sthentu-ubuntu18.04.04-074-2	root	1	10/05/2020 00:42:17		10/05/2020 00:42:17

Run 2, step 3: Java program execution stdout screenshot



Correlating VM 1 tasks after run1 and stdout for run2

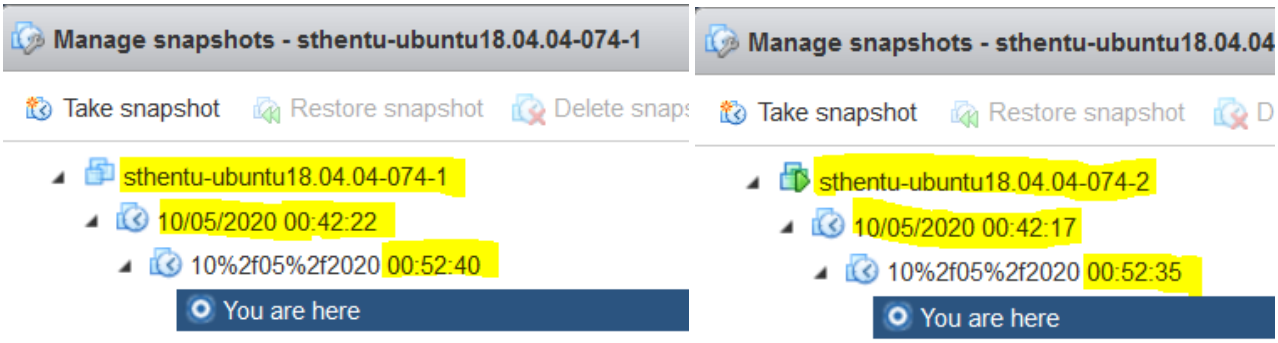

```
VM[1]:
Name = sthentu-ubuntu18.04.04-074-1
GuestOs = Ubuntu Linux (32-bit)
CPUs = 1
Memory = 1024 MB
Guest state = running
IPAddress = 192.168.137.132
Tool running state = guestToolsRunning
Power state = poweredOn
Snapshot VM:  status = success, start time = 10/05/2020 00:52:40, completion time = 10/05/2020 00:52:40
Power off VM:  status = success, start time = 10/05/2020 00:52:42, completion time = 10/05/2020 00:52:43
```

Correlating VM 2 tasks after run1 and stdout for run2


```
VM[0]:
Name = sthentu-ubuntu18.04.04-074-2
GuestOs = Ubuntu Linux (32-bit)
CPUs = 1
Memory = 1024 MB
Guest state = notRunning
IPAddress = null
Tool running state = guestToolsNotRunning
Power state = poweredOff
Snapshot VM:  status = success, start time = 10/05/2020 00:52:35, completion time = 10/05/2020 00:52:35
Power on VM:  status = success, start time = 10/05/2020 00:52:37, completion time = 10/05/2020 00:52:38
```

Run	Task	Task start time	Task completion time
1	Power on vm1, vm name= sthentu-ubuntu18.04.04-074-1	10/05/2020 00:42:24	10/05/2020 00:42:25
1	Power off vm2, vm name=sthentu-ubuntu18.04.04-074-2	10/05/2020 00:42:19	10/05/2020 00:42:19
2	**Power off vm1**, vm name= **sthentu-ubuntu18.04.04-074-1**	**10/05/2020 00:52:42**	**10/05/2020 00:52:43**
2	**Power on vm2**, vm name= **sthentu-ubuntu18.04.04-074-2**	**10/05/2020 00:52:37**	**10/05/2020 00:52:38**

After Run 1 & 2: vm1 & vm2 snapshot tree screenshots

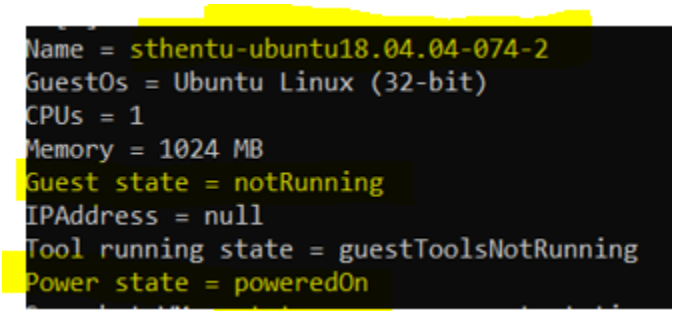


3.

```
VirtualMachinePowerState state = vm.getRuntime().getPowerState();
if(state.toString().equals("poweredOn")) {
    task2 = vm.powerOffVM_Task();
    System.out.print("Power off VM: ");
    if(task.waitForTask().equals("success")) {
        System.out.print(" status = "+task2.waitForTask()+", start time = "+formatter.format(task
    }
    else {
        System.out.print(" status = "+task.getTaskInfo().getError().getLocalizedMessage());
    }
}
```

Here in the code, a Task object is first created when a vm.powerOffVM_Task or vm.powerOnVM_Task is executed. **Task.waitForTask()** executes the task and returns the status whether it's success or failure. This ensures that the program waits until the task is completed and is returned a status. This status is further used to either continue the execution or break the execution of rest of the code.

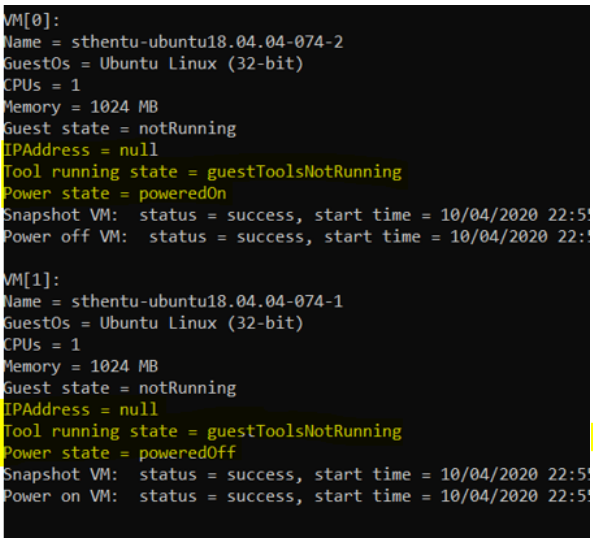
4. In Run1, Vm2, showed discrepancy between power state and guest state.

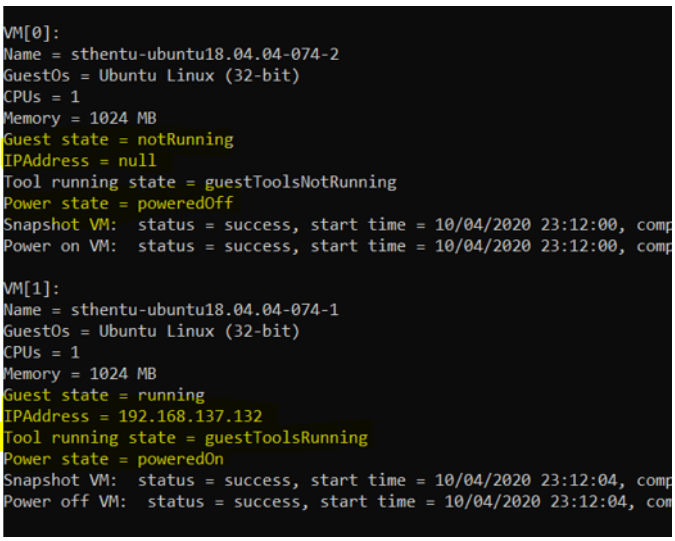


Power state talks about the state of the virtual machine itself. However, Guest state is obtained from VMware tools. Hence, to obtain the properties of guest, VMware tools are supposed to be installed. In this case, Vm2 did not have VMWare tools installed as you can see from "Tool running state = guestToolsNotRunning". Since VMware tools are not running, even though the VM is powered on, the guest state will stay "notRunning."

In other cases, when power state is off, VMware tools would not be running and hence Guest state would be set to "notRunning".

5. **RUN 1** **RUN 2**





Examining Runs 1 and 2, we notice that there were 3 cases when IpAddress was null and one case when IpAddress was not null.

Case1: Power On -> No VMware Tools -> No Ip Address
Case2: Power On -> VMWare Tools -> Valid Ip Address
Case3: Power Off -> No VMWare Tools -> No Ip Address
Case4: Power Off -> VMWare Tools -> No Ip Address.

Just like the previous case, VMWare tools are very essential and are required for obtaining the IP address of the guest. The code to extract the Ip address is ***VirutalMachine.getGuest().ipAddress.*** VMware tools are required to access the properties of the guest system and without them, the IPAddress will always show Null.

On the other hand, when Power state is Off, irrespective of whether VMware tools are installed or not, IPAddress will always be Null since the VM is turned off. However, if VM is powered on, VMWare tools are absolutely necessary to obtain the IPAddress of the guest system.