**Homework 1:**

The documents consist of various models simulated for varying configurations. Given below are four simulation results performed using different heuristics. Parameters and their values used in each simulation is mentioned in the table

**Program Execution:**

The below options are displayed once the program is run.

Choose from the options to run the desired simulations

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Simulation 1 to 4 are run using simulation example 1 and simulation example 2 using the mentioned configuration

**Simulation 1:**

**CONFIGURATION DETAILS:**

|  |  |
| --- | --- |
| Number of Datacenters | 1 |
| Number of Hosts | 4 |
| Number of VMs | 16 |
| Number of hosts PE | 6 |
| Number of VM PE | 1 |
| VM Scheduling Policy | Time Shared |
| Cloudlet Scheduling Policy | Time Shared |
| VM Allocation Policy | First Fit |
| Utilization model | Full(100%) |

**The result of Simulation 1:**

A picture containing window, computer

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A screenshot of a computer

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**Simulation 2:**

|  |  |
| --- | --- |
| Number of Datacenters | 1 |
| Number of Hosts | 4 |
| Number of VMs | 16 |
| Number of hosts PE | 6 |
| Number of VM PE | 1 |
| VM Scheduling Policy | Time Shared |
| Cloudlet Scheduling Policy | Time Shared |
| VM Allocation Policy | Round Robin |
| Utilization model | Full(100%) |

**The result of Simulation 2:**

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The two simulations (1 and 2) show how different VM allocation policy affect the assignment of VM to the hosts and in turn the scheduling of the cloudlets. First Fit allocation policy tries to assign VM to the First Host which satisfies the requirements of the VM whereas Round robin selects a VM in cyclic manner. Once a VM is allocated to the host, it moves to the next host for assigning the next VM. This way it activates the inactive host and increases the power consumption of the datacenter. Thus, First Fit performs optimally in comparison with Round Robin.

**Simulation 3:**

|  |  |
| --- | --- |
| Number of Datacenters | 1 |
| Number of Hosts | 4 |
| Number of VMs | 1 |
| Number of hosts PE | 6 |
| Number of VM PE | 1 |
| Number of Cloudlets | 32 |
| VM PES Capacity | 1000 |
| Cloudlet Length | 10000 |
| Cloudlet Scheduling Policy | Time Shared |
| VM Allocation Policy | Round Robin |
| Utilization model (Dynamic) | Full(100%) |
| VM Scheduling Policy | Time Shared |

**The result of Simulation 3:**

A picture containing computer

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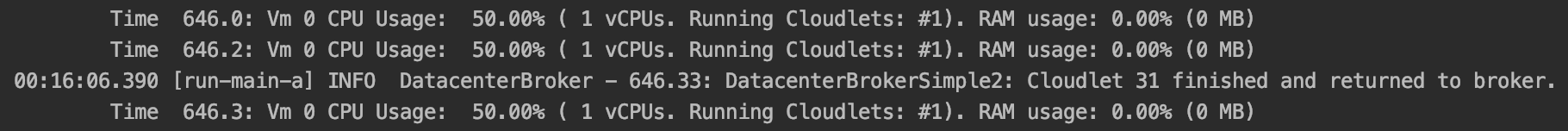
A screenshot of a computer

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**Simulation 4:**

|  |  |
| --- | --- |
| Number of Datacenters | 1 |
| Number of Hosts | 4 |
| Number of VMs | 1 |
| Number of hosts PE | 6 |
| Number of VM PE | 1 |
| Number of Cloudlets | 32 |
| VM PES Capacity | 1000 |
| Cloudlet Length | 10000 |
| Cloudlet Scheduling Policy | Space Shared |
| VM Allocation Policy | Round Robin |
| Utilization model (Dynamic) | Half (50%) |
| VM Scheduling Policy | Time Shared |

**The result of Simulation 4:**



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The simulations (3 and 4) show the effect of Cloudlet Scheduling policy and Utilization model on execution of cloudlets. In simulation 3, VM uses Time shared cloud scheduling policy, due to which the resources and PE are shared among the cloudlets. This increases the execution time of cloudlets since the cloudlets share the resource periodically. Whereas in simulation 4, the VM uses Space Shared Cloudlet Scheduling policy, this allows the cloudlet to complete the execution before the VM allocates the resources to the next Cloudlet. Thus, the order of execution is preserved in this case. Also, since only half the PE is utilized, the cloudlet takes 20 seconds to complete the execution rather than 10 seconds.

**IaaS Simulation:**

This class shows implementation of Infrastructure as a Service. Here, the user has control over the hardware and software specification of VM and Cloudlets. Configurations are specified in the config file under “**Infrastructure as a Service”**

User specifies the following things -  
1) Number of Virtual Machine and their specification  
2) VM Allocation policy to be used by data center for allocation of VM  
3) Number of cloudlets and their specification  
4) Utilization Model to be used by Cloudlet

**Results of IaaS Simulation:**

The results are based on parameters and configuration specified in the config file

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**Graphical user interface, text

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**PaaS Simulation:**

This class provides the simulation for **Platform as a Service** implementation. Based on the requirement of the user, the cloudlets are assigned are to the Datacenter. Current implementation has 3 datacenters with different Hardware and software specification and different pricing. The cloudlet acts as the software application/web service that the user wants to run on the VM. User chooses the service provider based on the requirements and pricing. Service provider assigns the cloudlets in the chosen datacenter if it can accommodate the VM and Cloudlets.

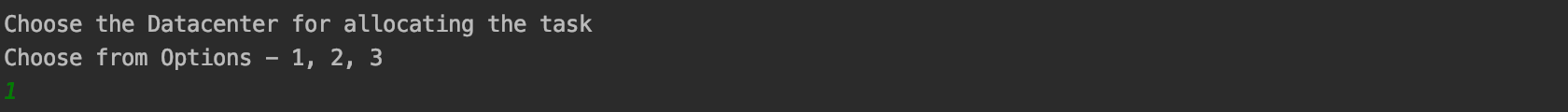
Configuration for PaaS Cloudlet can be specified in the config file. Change the parameters for **“Cloudlets”**

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Description automatically generated**

The user choses the service provider based on their requirement and pricing category.

Suppose the user needs VM with OS **Linux x86**, then he/she choose **Datacenter 1** as their platform. The cloudlets are sent to datacenter 1 for execution. User has no control over how these cloudlets are assigned to the VM the chosen datacenter. It is the service provider’s responsibility to assign the cloudlets based on availability.



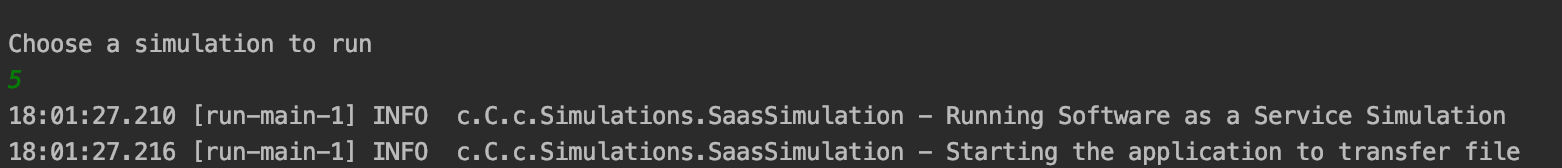
**Results of PaaS Simulation:**

A picture containing table

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**SaaS Simulation:**

This class shows implementation of **Software as a Service**. The simulation shows an application to transfer data (Like a file transfer service). Cloudlets use the service to transfer the packets between two VM hosted on two different hosts. The user only invokes this application and has no control over the internal hardware and software specification. Specification file size can be specified in **SaaS\_Cloudlets** in the config file.



**Results of SaaS Simulations:**

**Graphical user interface

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**Results of Testing:**

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