

HOMEWORK 1 PROJECT DOCUMENTATION

CREATE CLOUD SIMULATIONS IN SCALA FOR EVALUATING EXECUTING EXECUTIONS OF APPLICATIONS IN CLOUD DATACENTERS WITH DIFFERENT CHARACTERISTICS AND DEPLOYMENT MODELS

CS 441

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- Knowledge Requirements:
 - 1) Some knowledge of language Scala since the project is written in Scala
 - 2) Good knowledge of cloud environment structure, understanding of terminologies such as Datacenters, simulations, virtual machines etc.
 - 3) Familiarity with usage of CloudSimPlus simulation framework
- For Coding Environment setup, you will need IDEA IntelliJ, JDK version 8-16, Simple Build Toolkit (SBT).
- Setting up Basic Code provided:

Start by downloading/cloning the Homework Github repository onto your machine. Now open the project folder on terminal and hit “ls” to check if all files from github was uploaded properly in your folder. After that (you need to have your SBT and JDK 8-16 setup and ready to use) you try the following command,

“sbt clean compile”

“sbt run”

The output will show you basic simulation result provided by professor.
- What affects the efficiency, cost, time etc. in different could architecture?

A lot of factors can affect efficiency such as, number of virtual machines, number of datacenters, cloud cost optimization, etc.

ANALYSIS OF RESULTS PRODUCED BY MY SIMULATIONS:

#NOTE: Please download and run the CloudOrgSimulator.zip file for my simulation

- 1) Result of Running BasicCloudSimPlusExample,

You need to make sure that you comment out other scala classes containing simulations of different kind.
Src->Scala-> Simulations.scala

```
===== Starting CloudSim Plus 6.4.3 =====
17:39:50.722 [run-main-0] INFO  DatacenterBroker - DatacenterBrokerSimple1 is starting...
17:39:50.724 [run-main-0] INFO  Datacenter - 0.00: DatacenterSimple2 is starting...
17:39:50.725 [run-main-0] INFO  CloudSim - Entities started.
17:39:50.729 [run-main-0] INFO  DatacenterBroker - 0.00: DatacenterBrokerSimple1: List of 1 datacenters(s) received.
17:39:50.730 [run-main-0] INFO  DatacenterBroker - 0.00: DatacenterBrokerSimple1: Trying to create Vm 0 in DatacenterSimple2
17:39:50.737 [run-main-0] INFO  VmAllocationPolicy - 0.00: VmAllocationPolicySimple: Vm 0 has been allocated to Host 0/DC 2
17:39:50.738 [run-main-0] INFO  DatacenterBroker - 0.10: DatacenterBrokerSimple1: Sending Cloudlet 0 to Vm 0 in Host 0/DC 2.
17:39:50.739 [run-main-0] INFO  DatacenterBroker - 0.10: DatacenterBrokerSimple1: Sending Cloudlet 1 to Vm 0 in Host 0/DC 2.
17:39:50.741 [run-main-0] INFO  DatacenterBroker - 0.10: DatacenterBrokerSimple1: All 2 waiting Cloudlets submitted to some VM.
17:39:50.751 [run-main-0] INFO  DatacenterBroker - 40.11: DatacenterBrokerSimple1: Cloudlet 0 finished in Vm 0 and returned to broker.
17:39:50.752 [run-main-0] INFO  DatacenterBroker - 40.11: DatacenterBrokerSimple1: Cloudlet 1 finished in Vm 0 and returned to broker.
17:39:50.753 [run-main-0] INFO  CloudSim - 40.22: Processing last events before simulation shutdown.
17:39:50.754 [run-main-0] INFO  DatacenterBroker - 40.22: DatacenterBrokerSimple1 is shutting down...
17:39:50.755 [run-main-0] INFO  DatacenterBroker - 40.22: DatacenterBrokerSimple1: Requesting Vm 0 destruction.
17:39:50.758 [run-main-0] INFO  Datacenter - 40.22: DatacenterSimple: Vm 0 destroyed on Host 0/DC 2.
17:39:50.759 [run-main-0] INFO  CloudSim - Simulation: No more future events
17:39:50.760 [run-main-0] INFO  CloudInformationService - CloudInformationService0: Notify all CloudSim Plus entities to shutdown.
17:39:50.761 [run-main-0] INFO  CloudSim -
===== Simulation finished at time 40.22 =====

SIMULATION RESULTS
Cloudlet|Status|DC|Host|Host PEs|VM|VM PEs|CloudletLen|CloudletPEs|StartTime|FinishTime|ExecTime
ID|ID|ID|CPU cores|ID|CPU cores|MI|CPU cores|Seconds|Seconds|Seconds
-----
0|SUCCESS|2|0|1|0|1|10000|1|0|40|40
1|SUCCESS|2|0|1|0|1|10000|1|0|40|40
-----
```

Scala 3 support is a work in progress.
Consider using nightly builds.
[Configure updates...](#)

2) Result of Running CloudSimEgOne,
You need to make sure that you comment out other scala classes containing simulations of different kind.
Src->Scala-> Simulations.scala

```
17:39:14.407 [run-main-0] INFO Datacenter - 0.00: DatacenterSimple3 is starting...
17:39:14.407 [run-main-0] INFO CloudSim - Entities started.
17:39:14.414 [run-main-0] INFO DatacenterBroker - 0.00: DatacenterBrokerSimple1: List of 2 datacenters(s) received.
17:39:14.414 [run-main-0] INFO DatacenterBroker - 0.00: DatacenterBrokerSimple1: Trying to create Vm 0 in DatacenterSimple2
17:39:14.431 [run-main-0] INFO VmAllocationPolicy - 0.00: VmAllocationPolicySimple: Vm 0 has been allocated to Host 0/DC 3
17:39:14.433 [run-main-0] INFO DatacenterBroker - 0.10: DatacenterBrokerSimple1: Sending Cloudlet 0 to Vm 0 in Host 0/DC 3.
17:39:14.434 [run-main-0] INFO DatacenterBroker - 0.10: DatacenterBrokerSimple1: Sending Cloudlet 1 to Vm 0 in Host 0/DC 3.
17:39:14.435 [run-main-0] INFO DatacenterBroker - 0.10: DatacenterBrokerSimple1: All 2 waiting Cloudlets submitted to some VM.
17:39:14.448 [run-main-0] INFO DatacenterBroker - 20.11: DatacenterBrokerSimple1: Cloudlet 0 finished in Vm 0 and returned to broker.
17:39:14.449 [run-main-0] INFO DatacenterBroker - 20.11: DatacenterBrokerSimple1: Cloudlet 1 finished in Vm 0 and returned to broker.
17:39:14.451 [run-main-0] INFO CloudSim - 20.22: Processing last events before simulation shutdown.
17:39:14.454 [run-main-0] INFO DatacenterBroker - 20.22: DatacenterBrokerSimple1 is shutting down...
17:39:14.454 [run-main-0] INFO DatacenterBroker - 20.22: DatacenterBrokerSimple1: Requesting Vm 0 destruction.
17:39:14.459 [run-main-0] INFO Datacenter - 20.22: DatacenterSimple: Vm 0 destroyed on Host 0/DC 3.
17:39:14.459 [run-main-0] INFO CloudSim - Simulation: No more future events
17:39:14.461 [run-main-0] INFO CloudInformationService - CloudInformationService0: Notify all CloudSim Plus entities to shutdown.
17:39:14.462 [run-main-0] INFO Datacenter - 20.22: DatacenterSimple3 is shutting down...
17:39:14.463 [run-main-0] INFO CloudSim -
===== Simulation finished at time 20.22 =====

SIMULATION RESULTS
Cloudlet|Status|DC|Host|Host PE|VM|VM PE|CloudletLen|CloudletPEs|StartTime|FinishTime|ExecTime
ID|ID|ID|CPU cores|ID|CPU cores|MI|CPU cores|Seconds|Seconds|Seconds
-----
0|SUCCESS|3|0|10|0|10|10000|1|0|20|20
1|SUCCESS|3|0|10|0|10|10000|1|0|20|20
-----

17:39:14.502 [run-main-0] INFO java.lang.Class - Finished cloud simulation...
```

- Difference in above shown Simulation results are,
 - 1) Total time in finishing simulation 40.22 for BasicCloudSimPlusExample and 20.22 for CloudSimEgOne
 - 2) CloudSimEgOne has more number of CPU cores (10) than BasicCloudSimPlusExample (1)
 - 3) CloudSimEgOne has 10 Virtual Machines while BasicCloudSimPlusExample has just 1
- Class CloudSimEgTwo:

The idea was to implement a simulation which can calculate the timeshared between different hosts depending upon varying number of CPU load.