P.A.D.A. - Dept. Mech. Information Technology and Computers

Course: CLOUD COMPUTING AND SERVICES

ASSIGNMENT #1 [25% on BTHM] - Date Delivery: 2/6/2024

A. Scenarios in CloudSim

After installing the CloudSim simulator (either on windows or linux) run the Example ' **CloudSimExample 6'** . Based on the example code and the output you get, try to clearly answer the following questions:

1. How many Datacenters are being created? and how many Hosts are created in each Datacenter ?
2. How many processors (PEs) and what other features does each Host have (mips , memory, etc)?
3. What other features does each Datacenter have ? and in what class are they represented?
4. How many VMs are created? and what characteristics does each one have?
5. What parameters determine how many VMs each Host can accommodate ? And how (with what algorithm) is the attempt to assign them to the available Hosts (that is, how is it decided whether and on which Host each VM will run)?
6. How many VMs will eventually run and on which Host ? Why will some VMs not be assigned to any Host ? How would the above change (and why) if each VM was initially created with 2 PEs of 250 MIPS and 256 MB RAM ?
7. How many Cloudlets are created? and with what characteristics each one?
8. How is it decided for each Cloudlet in which VM it will run (that is, with what algorithm is Cloudlets allocated to the available VMs)? How many Cloudlets will eventually run (both in total across all VMs and on each individual VM)?
9. With what policy (space sharing or time sharing – and where in the code is this seen / specified) is (a) routing the Cloudlets to the VMs they are ultimately assigned to run on? and (b) the routing of the VMs to the PEs (or otherwise, the delegation of the PEs to the VMs) of the Host on which they run?
10. Please explain in detail the final part of the results (output table at the end) of the example - what each column gives etc, and in particular among others the start and end times of the Cloudlets (in direct correlation with the routing policies you observed being followed in question 9).

After answering the above questions, then deal with the following:

A. Run the example again with the rest of the alternatives provided to you (space/time sharing) for points 9(a) and 9(b) above, i.e. (a) for routing Cloudlets to VMs, and (b) for routing of VMs to Hosts. Study the output again in each case, see whether or not there are differences, and explain why. Also run the example again applying a time policy to route the VMs sharing with over - subscription and describe-explain the output again .

B. all VMs can run (without over - subscription) . Give three versions, (a) one without increasing the number of hosts and PEs (i.e. increasing only their attributes), (b) one increasing the number of PEs (without increasing the number of hosts), and (c) one increasing the number of hosts . Study the output again, see whether or not there are differences, and explain why.

C. Where in the code (simulator implementation) and how would you intervene (a) to change the policy / decision algorithm for 5. and 8., and (b) to add some other policy of your own for 9(a) and 9(b); In particular with regard to 5. (the policy followed i.e. for assigning VMs to Hosts), explain in more detail how you would implement another policy of your choice – search and select another specific policy (consult, among others, the attached links and papers – see folder ' VM Allocation Policies '), describe it briefly, and then try to implement it.

Instructions for installing and using CloudSim can be found in the course area in Eclass , in the directory 'Software' -> ' CloudSim ' (pay special attention to the relevant Links listed there).

B. Post your work deliverable

When you have completed your work, try to post it (**in addition to Eclass -** where you should post a word deliverable in each case file with your - sufficiently documented - answers) and on a website (which e.g. also be protected by a password that you will send us) which you will create (and will be hosted there) on the **Microsoft platform Azure .**

Explore the possibilities you have (both for the above and for other free services (limited area - no card) of the above platform for students (e.g. create a linux VM and connect to it with ssh coke), *by visiting https://azure.microsoft.com/en-us/free/students and using your institutional (Microsoft) account.*

*Also try to post your work on a website in the **Okeanos infrastructure** (provided to you as part of the course).*