



CloudSim

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Introduction

- What are the benefits of simulating any application instead of practically running it
- Evaluating the supposition made regarding that application (how it will behave)
- We can check whether it is running properly or not
- Our supposition was true or not
- So simulation will give us a test environment

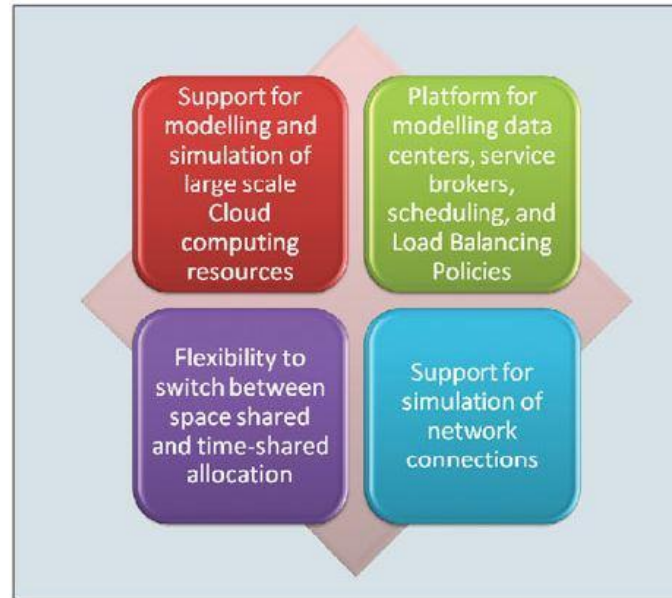
Simulation and Cloud Computing

- In cloud computing it will help giving us a controlled environment , it can help us find limitations in our algorithms,
- We don't have to build a whole cloud environment which is very costly to build and also very time consuming so in this case simulation will help finding the limitations in short period of time
- We can develop various virtual machine and do their mapping with the task according to our needs
- Free of cost it is an open source tool

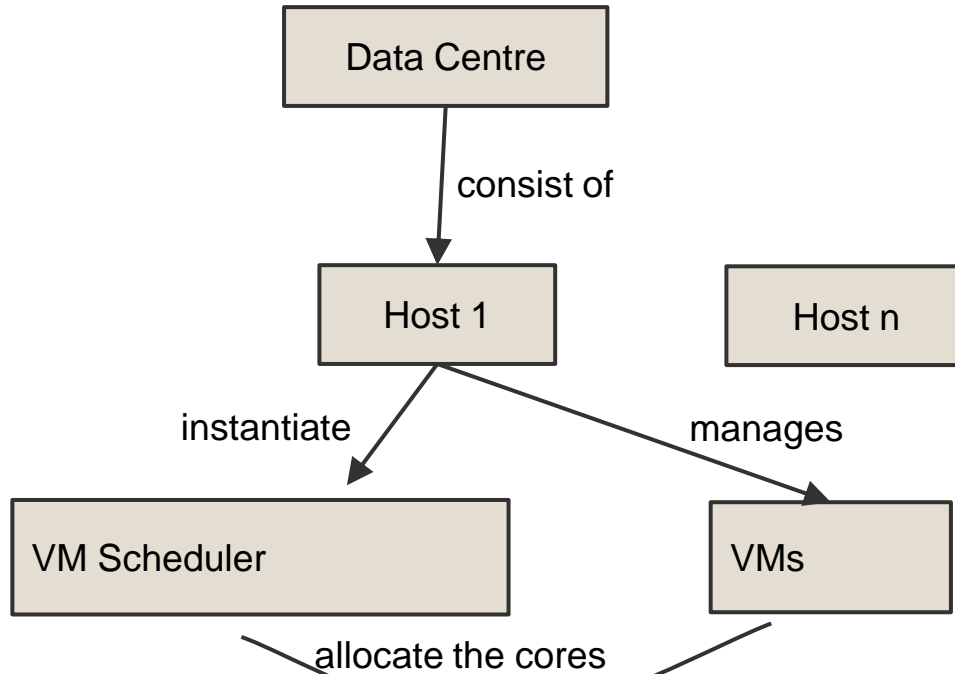
CloudSim

CloudSim is basically a toolkit or we can say that it is a library of java classes for simulation of cloud computing scenarios

Features



Cloud Infrastructure



Data Centre

- It is a class built in cloudSim
- It basically act as a service provide in simulating environment
- Composed of hosts which are responsible for managing the VMs

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Host

- It represents the physical computing server (homo or hetro)
- We assign a pre configured specs to a Host along with a scheduling policy for allocating processing cores to VMs
- Attributes:
 - Memory
 - Storage
 - processor speed (MIPS)
 - Number of Cores
 - Vm Scheduler

VM class

- Models a Virtual Machine
- Host can Simultaneously instantiate multiple VMs and allocate cores depending on the predefined sharing policies

- Two processor sharing policies :

Time Shared (Parallel we can say)
Space Shared (Sequential)

Characteristics:

- Size (storage)
- Ram
- bandwidth
- PES (amount of core)
- VMM
- Priority
- MIPS
- cloudletscheduler

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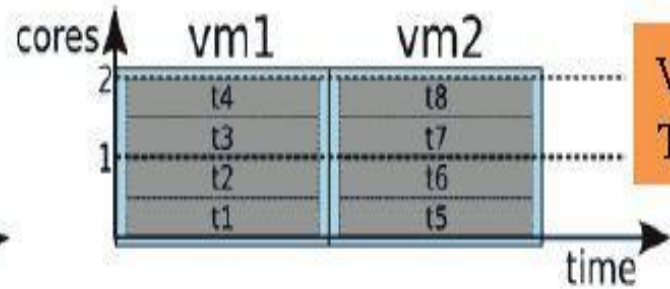
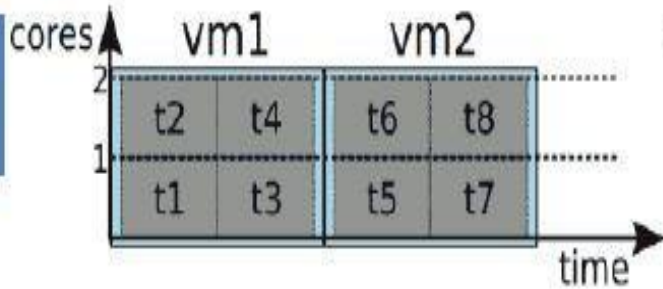


Cloudlet

- It is basically a task
- User send task to data center for execution these tasks are called cloudlet
- Every task has a predefined instructions length (MI : Million instructions)
- Cloudlet Scheduler (how to divide resources among tasks)
- timeshare
- space share

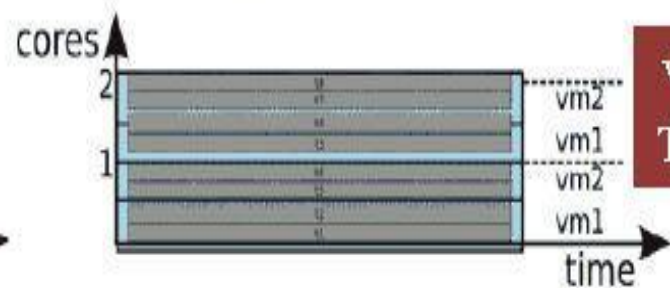
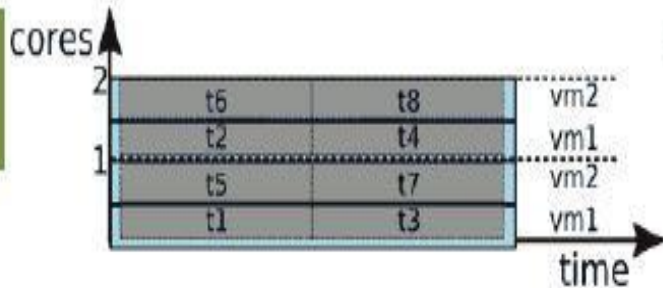
Scheduling (Time Vs Space)

VM Space
Task Space



VM Space
Task Time

VM Time
Task Space



VM Time
Task Time

How CloudSim Works

- Initialize CloudSim Package (Init)
- Create datacentres
- Broker (interface between user and provider)
- Create VMs
- Create Cloudlets
- Start Sim (All tasks are mapped to VMs)
- Stop Sim
- Output (how mapping is done and how much time is taken for execution)

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CloudSim

- CloudSim provide example, by studying these examples we can extend them according to our needs
- from these examples we will learn how to create data center how to create a host how to put Vm on this host and how to map Cloudlets with VMs
- Everything is scalable
- create you own cloud environment by extending the Framework

Architecture

User code

Simulation Specification

Cloud Scenario

User Requirements

...

Application Configuration

Scheduling Policy

User or Data Center Broker

CloudSim

User Interface Structures

Cloudlet

Virtual Machine

VM Services

Cloudlet Execution

VM Management

Cloud Services

VM Provisioning

CPU Allocation

Memory Allocation

Storage Allocation

Bandwidth Allocation

Cloud Resources

Events Handling

Sensor

Cloud Coordinator

Data Center

Network

Network Topology

Message delay Calculation

CloudSim core simulation engine