A REPORT ON CLOUD SIM BASICS

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Cloud Computing :

Cloud Computing is a type of Internet based computing that provides shared computer processing resources and data to computers and other devices on demand.

Types:

- Public cloud
- private cloud
- Community cloud
- Hybrid cloud

Cloud Stacks :

- Infrastructure as a service(IAAS)
- Platform as a service(PAAS)
- Software as a service(SAAS)

Advantages of cloud :

- Globalizing work on the cheap
- improve accessibility
- virtualization and multilatency
- less personal training is needed
- reliabilty and security is provided

Benefits Of using a simulator:

- Evaluating the supposition , which we make regarding the application.
- Instead of running the application into actual environment it gives us the test environment.
- Bottle necks, limitations in the algorithms can be found in short period of time without actually building the whole cloud environment which is very costlier.
- Different workload mix
- Free of cost

Cloud sim

- A cloud sim is a toolkit (library of java classes) for simulation of cloud computing scenarious.
- Support for modeling and simulation of large scale cloud computing infrastructure, including data centers on a single physical computing mode.
- Availability of virtualization engine, which aids in creation and management of multiple independent, and co hosted virtualized services on a datacenter node.
- Provides basic classes for describing data centers, virtual machines, applications users, computational resources, and policies (eg. Scheduling and provisiong).

Prerequisite :

- basic java programming
- knowledge about cloud computing
- knowledge on programming IDEs like Eclipse or NetBeans

Class Diagram Of Cloud Sim:

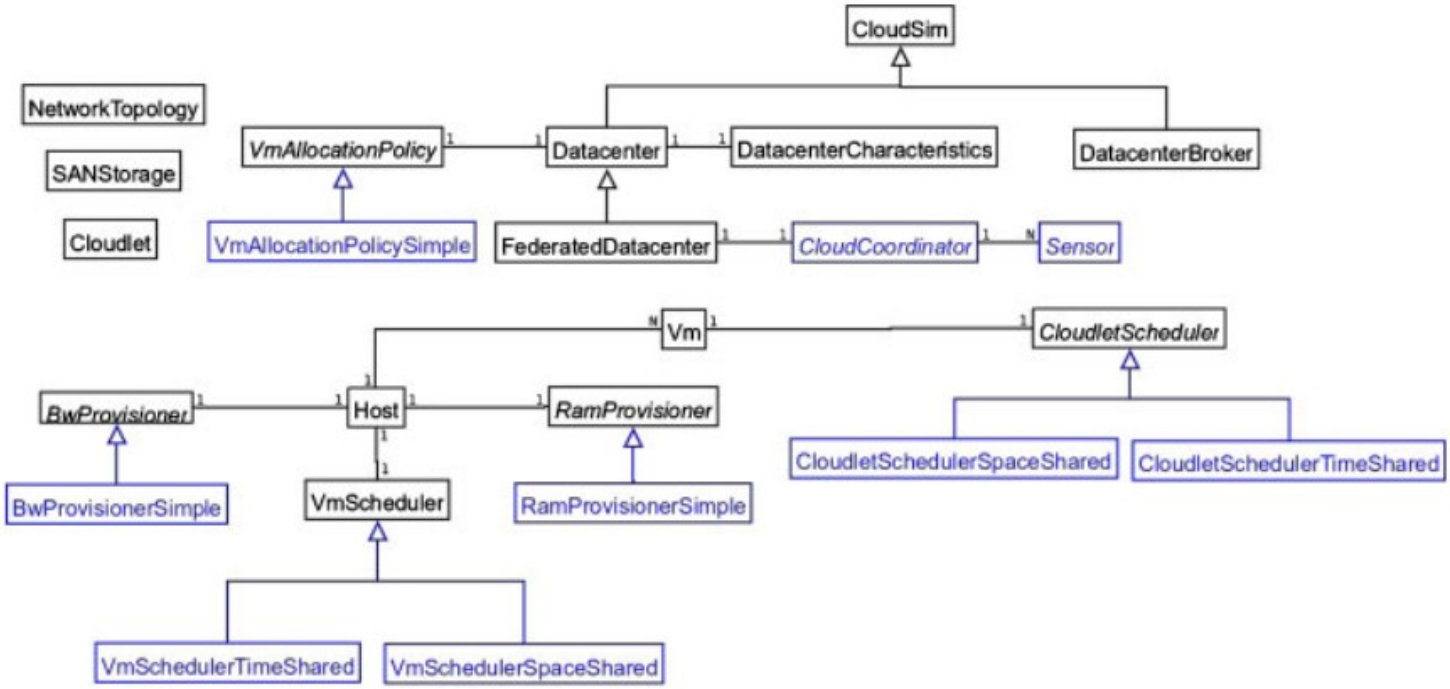

Figure 6. CloudSim class design diagram.

Datacenter(class in cloud sim):
>Models the core infrastructure level services(hardware).
>Composed of set of hosts which is responsible of managing VM during their life cycles.

Hosts :
>Component that represents a physical computing node in a cloud
>Assigned a pre-configured processing capability, memory, storage and a scheduling policy for allocating processing cores to virtual machines.

VM:
>Models a virtual machine
>Host can simultaneouly instantiate multiple VM s allocate cores based on predefined processor sharing policies (space-shared(sequentual allocation of processor to vm), time-shared(concurrent simultaneous allocation of processor to vm)).

Cloudlet(user's tasks):
>Models that cloud based application services which are commonly developed in the data centers.
>Every application has a pre assigned instruction length contains attributes like mips (million instructions per second).

CloudletScheduler:
>Determines how the available CPU resources of virtual machines are divided among cloudlets.
For example we have two cloudlets and one virtual machine ,then
Two types of policies are offered:
.Space shared
.time shared

VMScheduler:
>Determines how processing cores of a host are allocated to virtual machines.
>The policies takes into accound
-> how many processing cores will be delegated to each VM,
-> how much of the processing core's capacity will efficiently be attributed for a given VM.
For example we have two VMs and one processor ,then
Two types of policies are offered:
.Space shared
.time shared

NetworkTopology:

This class contains the information for inducing network behavior (latencies)
in the simulation.

SanStorage:
This class models a storage area network that is commonly ambient in Cloud-based
data centers for storing large chunks of data (such as Amazon S3, Azure blob storage). SanStorage implements a simple interface that can be used to simulate storage and retrieval of any amount of data, subject to the availability of network bandwidth.

Space-shared vs Time shared :

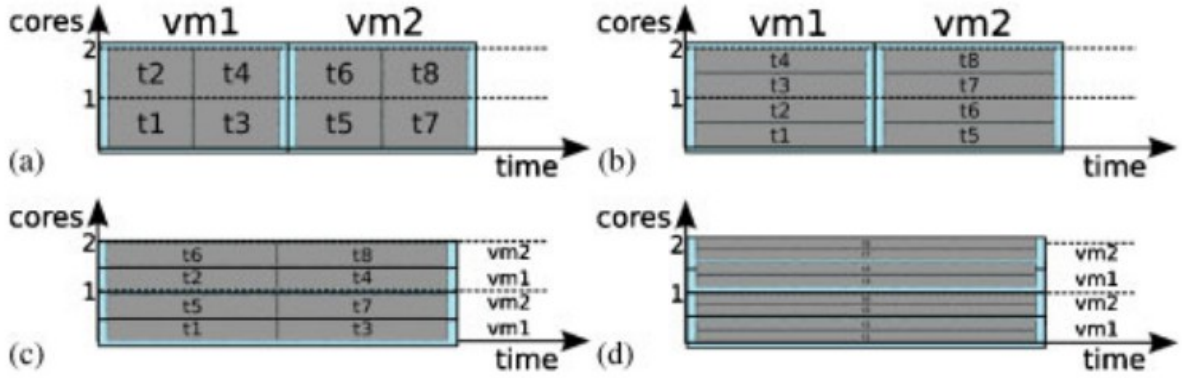

Figure 4. Effects of different provisioning policies on task unit execution: (a) space-shared provisioning for VMs and tasks; (b) space-shared provisioning for VMs and time-shared provisioning for tasks; (c) time-shared provisioning for VMs, space-shared provisioning for tasks; and (d) time-shared provisioning for VMs and tasks.

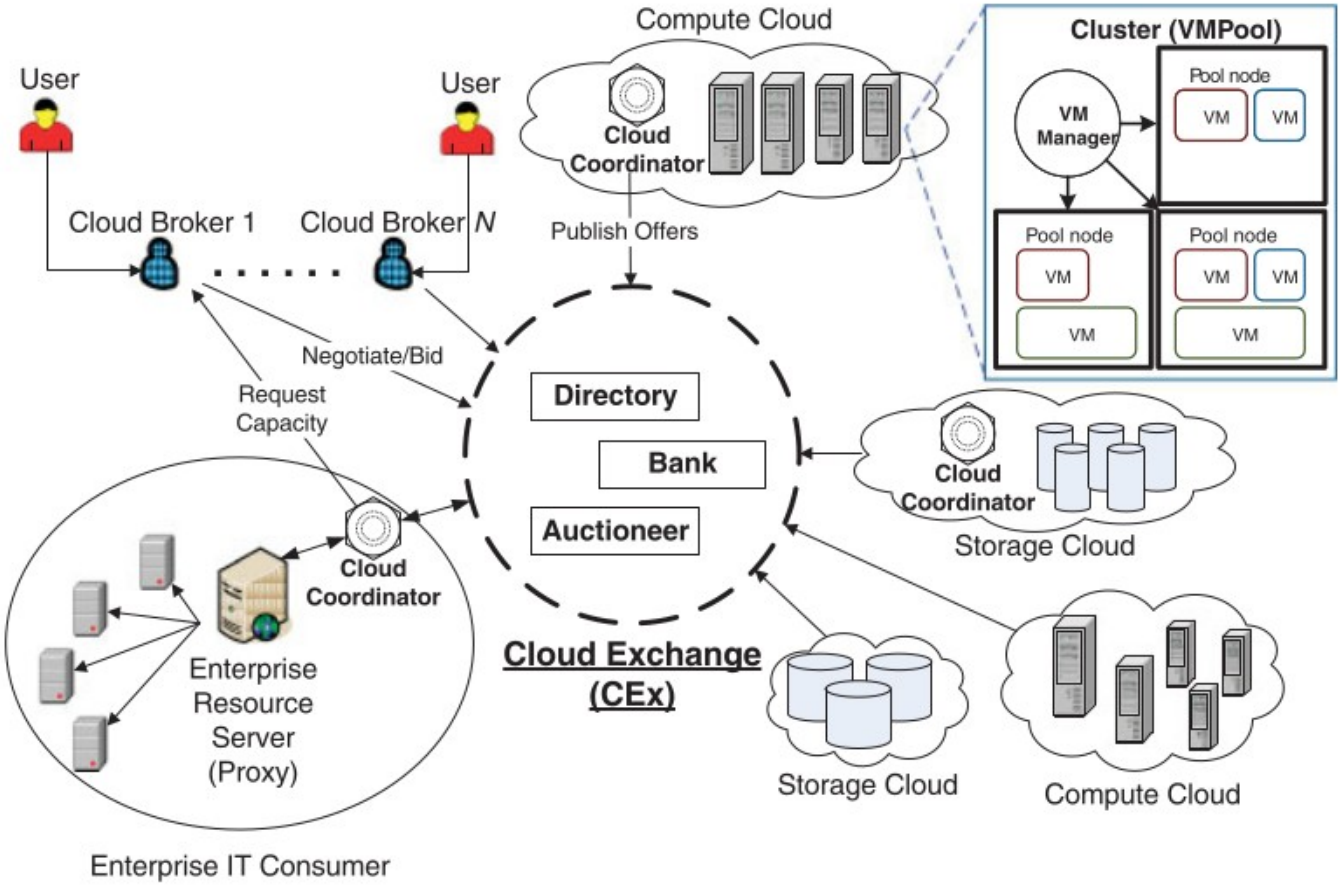

Figure 2. Clouds and their federated network.

A federated **cloud** (also called **cloud federation**) is the deployment and management of multiple external and internal **cloud** computing services to match business needs.

Inter-networking of administratively distributed clouds offers significant performance and financial benefits such as:

- improving the ability of SaaS providers in meeting QoS levels for clients and offer improved service by optimizing the service placement and scale;
- Enhancing the peak-load handling and dynamic system expansion capacity of every member cloud by allowing them to dynamically acquire additional resources from federation. This frees the Cloud providers from the need of setting up a new data centre in every location
- Adapting to failures, such as natural disasters and regular system maintenance, is more graceful as providers can transparently migrate their services to other domains in the federation, thus avoiding SLA violations and the resulting penalties. Hence, federation of clouds not only ensures business continuity but also augments the reliability of the participating Cloud providers.

cloud coordinator:

This component is instantiated by each cloud in the system whose responsibility is to undertake the following important activities:

- Exporting Cloud services, both infrastructure and platform-level, to the federation;
- keeping track of load on the Cloud resources (VMs, computing services) and undertaking negotiation with other Cloud providers in the federation for handling the sudden peak in resource demand at local cloud;
- Monitoring the application execution over its life cycle and overseeing that the agreed SLAs are delivered. The Cloud brokers acting on behalf of SaaS providers identify suitable Cloud service providers through the Cloud Exchange (CEx). Further, Cloud brokers can also negotiate with the respective Cloud Coordinators for allocation of resources that meets the QoS needs of hosted or to be hosted SaaS applications. The CEx acts as a market maker by bringing together Cloud service (IaaS) and SaaS providers. CEx aggregates the infrastructure demands from the Cloud brokers and evaluates them against the available supply currently published by the Cloud Coordinators.

Advantage:
advantage of such mechanisms by using the cloud to leverage resources for their high-throughput e-Science applications, such as Monte–Carlo simulation and Medical Image Registration. In this scenario, the clouds can be augmented to the existing cluster and grid-based resource pool to meet research deadlines and milestones.

> **User Code:**
Exposes configuration related functionalities for hosts, applications, VM number of users and their application types, and broker scheduling policies.

> Brokers and Datacenters are independent, and definition of which datacenter receives each request from the broker is part of the broker policies that are supposed to be developed by CloudSim users.

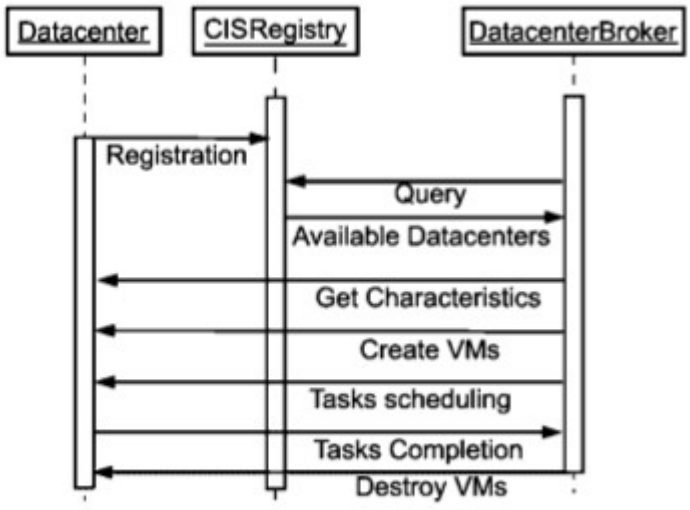

Figure 9. Simulation data flow.

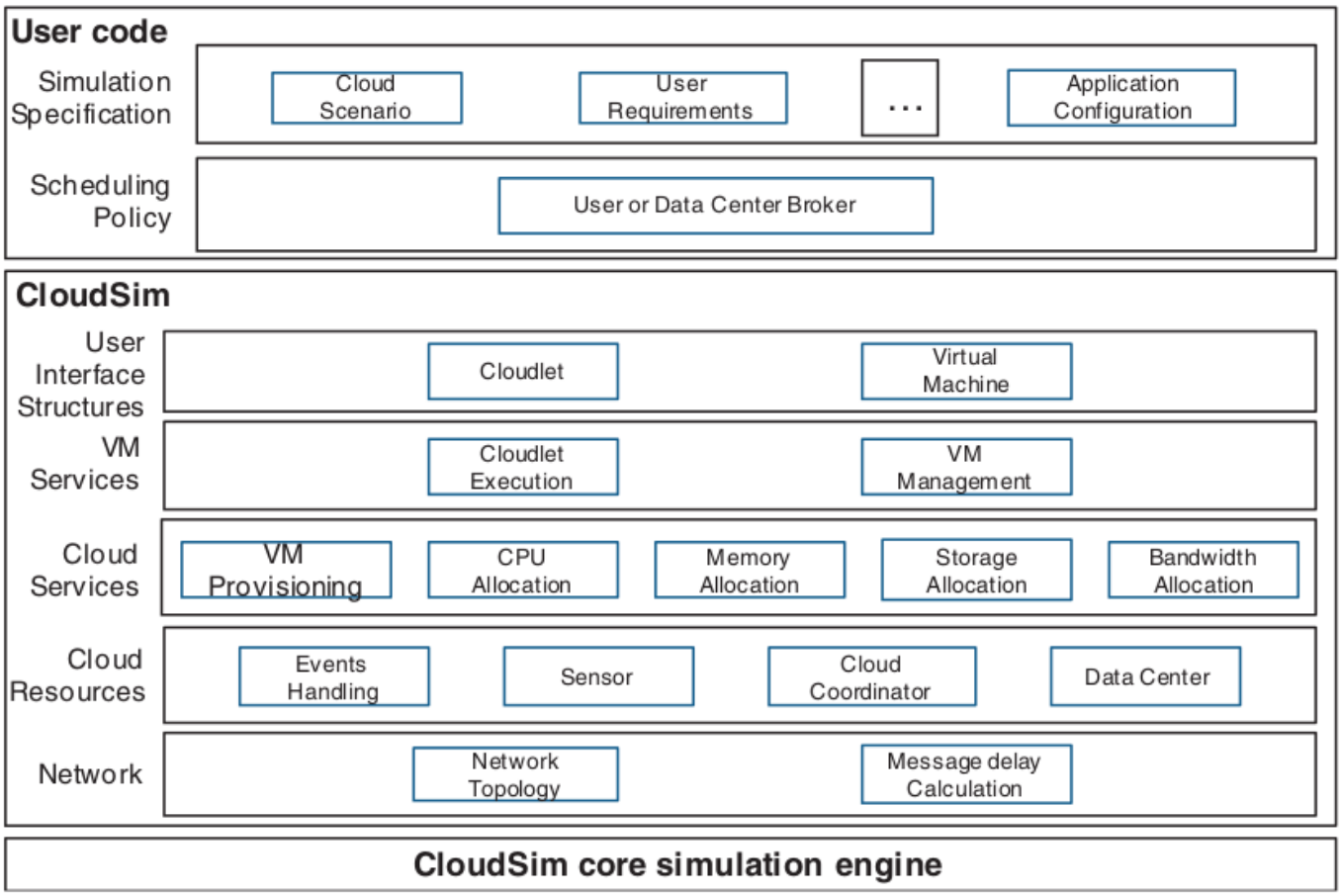

Figure 3. Layered CloudSim architecture.

The Delay Equation

The delay equation below describes the packet delay at a single node along its route from source to destination.

$$d_{nodal} = d_{proc} + d_{queue} + d_{trans} + d_{prop}$$

Cloud provisioning is the allocation of a **cloud** provider's resources to a customer. When a **cloud** provider accepts a request from a customer, it must create the appropriate number of virtual machines (**VMs**) and allocate resources to support them.