



CloudSim

Cloud Simulation Toolkit

Agenda

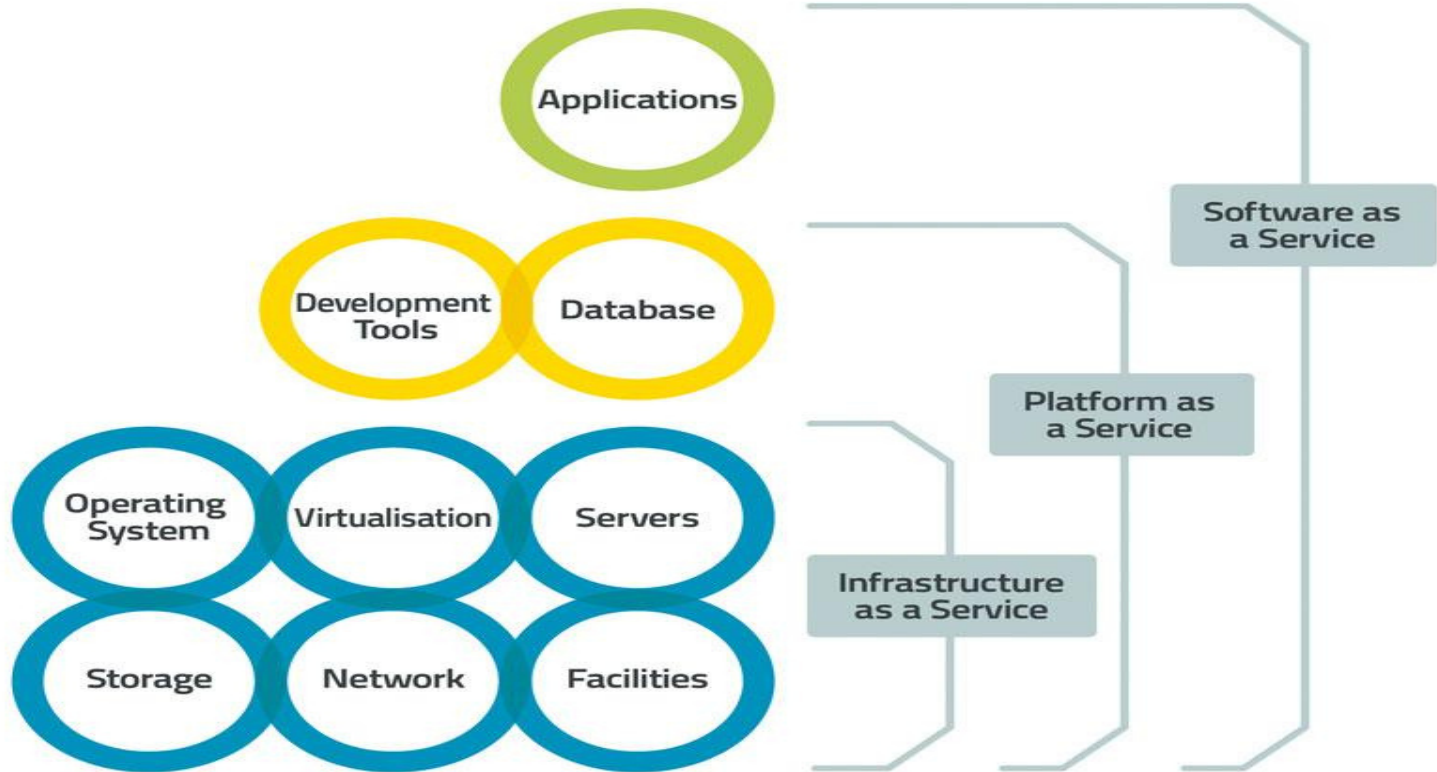
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- Introduction - Cloud Computing & Cloudsim.
- Essentials to start with Cloudsim. Insight on
- Cloudsim modeled components. Insight on
- Cloudsim simulation process. Hands-on
- examples.

Introduction - Cloud Computing Service Stack

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Cloud Infrastructure Challenges for researchers

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- Cloud exhibit varying demands, supply patterns, system sizes and resources.
- Users have heterogeneous, dynamic and competing QoS requirements.
- Applications have varying performance, workload and dynamic application scaling requirements.
- due to third party ownership, no flexibility on configuration and cost.

re-producing reliable results and benchmarking is extremely difficult.

Cloudsim - a viable alternative

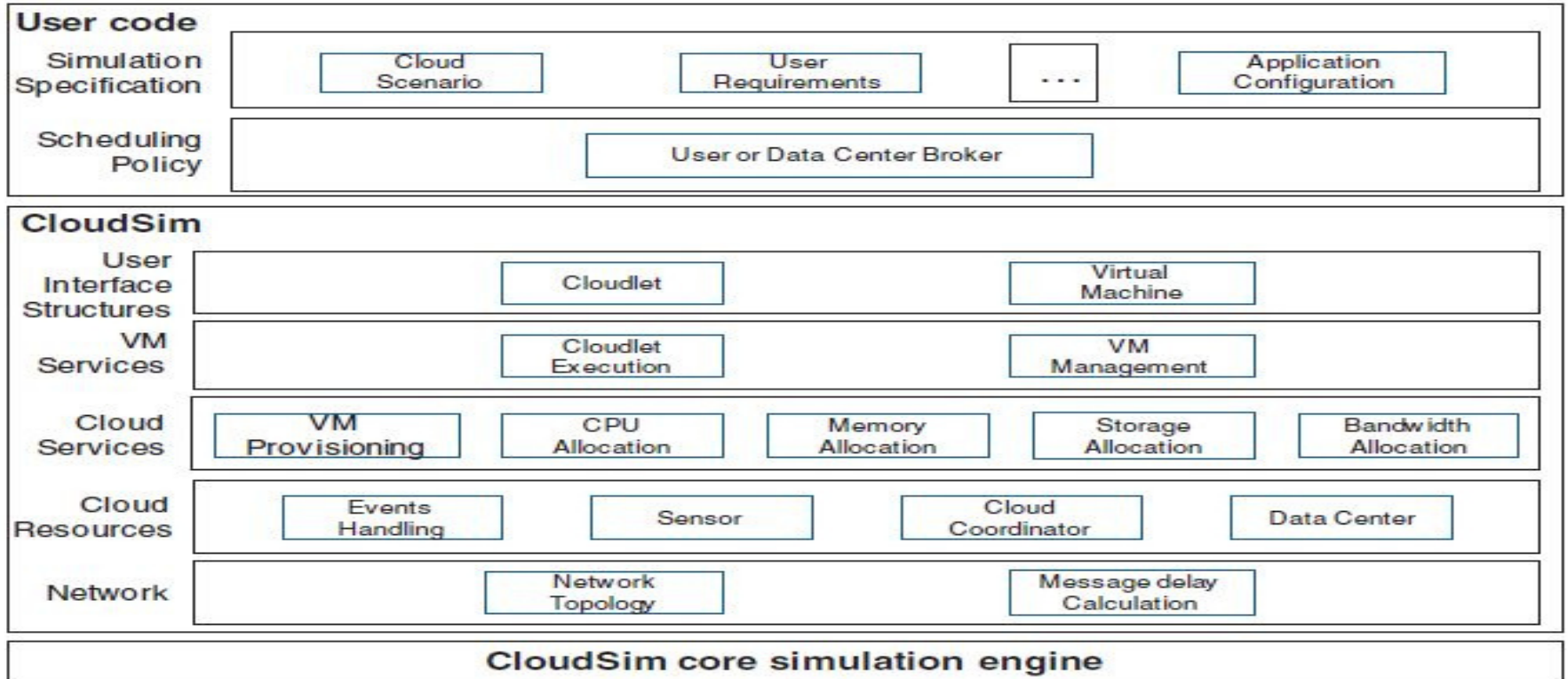
- Hasslefree extensible modeling and event based simulation of large scale cloud infrastructure with support of virtualization engine.
- Self contained platform for modeling:
 - Clouds,
 - Service brokers
 - Provisioning and allocation policies.
- Flexibility to switch between:
 - Space-shared
 - Time-shared allocation, at all the levels.
- simulation of network connections among the simulated systems elements.
- Support for federated cloud environment.

Cloudsim-Directory structure

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- cloudsim/ -- top level CloudSim directory
- docs/ -- CloudSim API Documentation
- examples/ -- CloudSim examples
- jars/ -- CloudSim jar archives
- sources/ -- CloudSim source code

Cloudsim - Layered Architecture

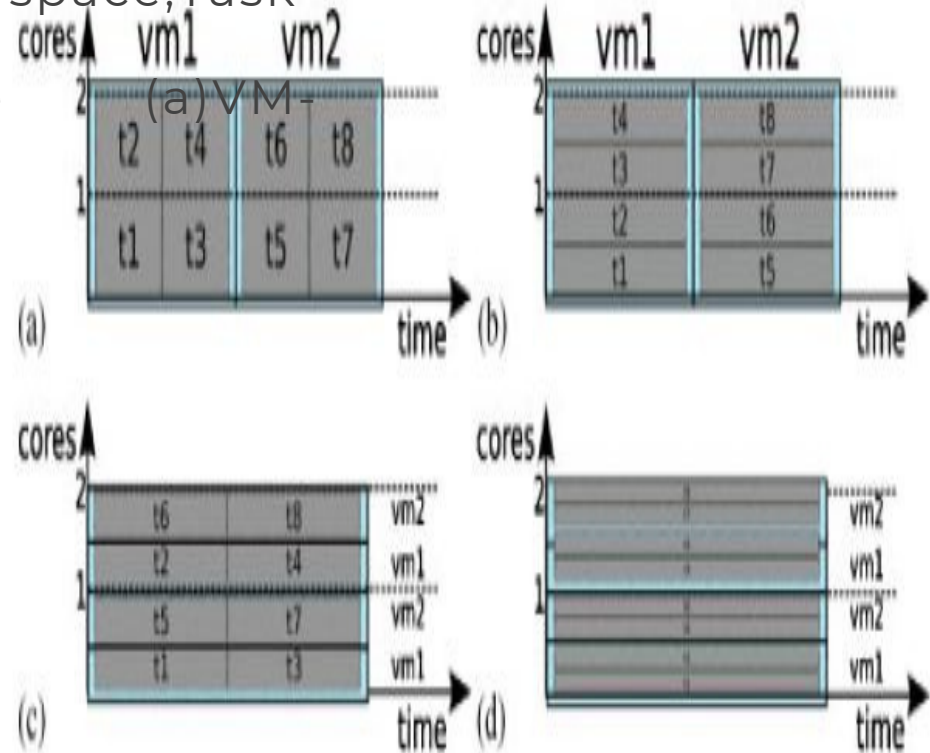


Cloudsim - Time/Space shared models

(a) VM-space, Task-space (b) VM-space, Task-

time (c) VM-time, Task-space

time, Task-time



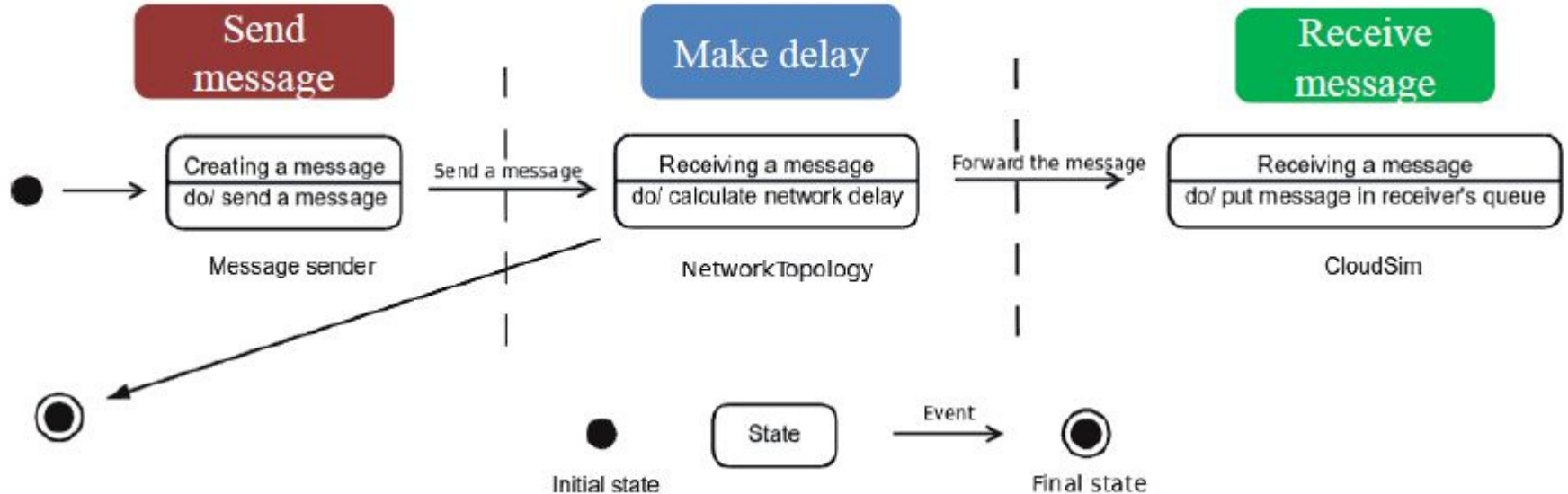
Cloudsim - Network latency matrix using BRITE

E_{ij}

E_{ij} = Delay from entity i to entity j

0	40	120	80	200
40	0	60	100	100
120	60	0	90	40
80	100	90	0	70
200	100	40	70	0

Cloudsim - Network latency behavior

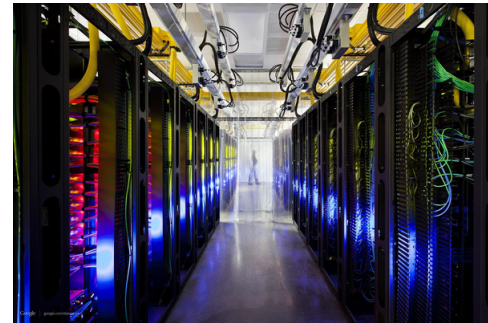
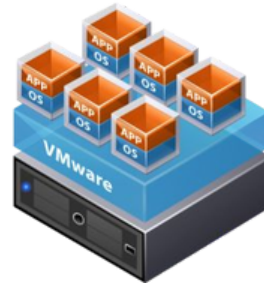


Components of Virtualized Infrastructure



Cloudsim - Component model classes

- CloudInformationService.java
- Datacenter.java, Host.java, Pe.java
- Vm.java, Cloudlet.java DatacenterBroker.java
- Storage.java, HarddriveStorage.java, SanStorage.java
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Cloudsim - Major blocks/Modules

- org.cloudbus.cloudsim
- org.cloudbus.cloudsim.core
 - org.cloudbus.cloudsim.core.predicates
 - org.cloudbus.cloudsim.distributions
 - org.cloudbus.cloudsim.lists
 - org.cloudbus.cloudsim.network
 - org.cloudbus.cloudsim.network.datacenter
 - org.cloudbus.cloudsim.power
 - org.cloudbus.cloudsim.power.lists
 - org.cloudbus.cloudsim.power.models
 - org.cloudbus.cloudsim.provisioners
 - org.cloudbus.cloudsim.util

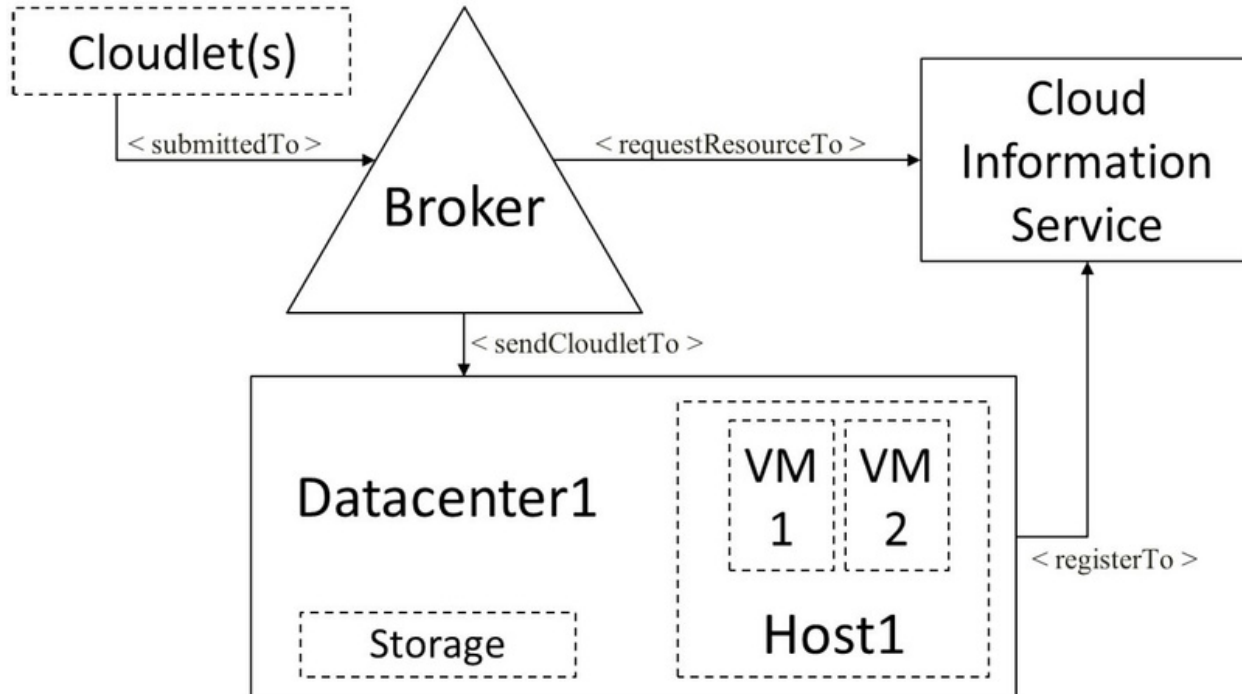
Cloudsim - key components

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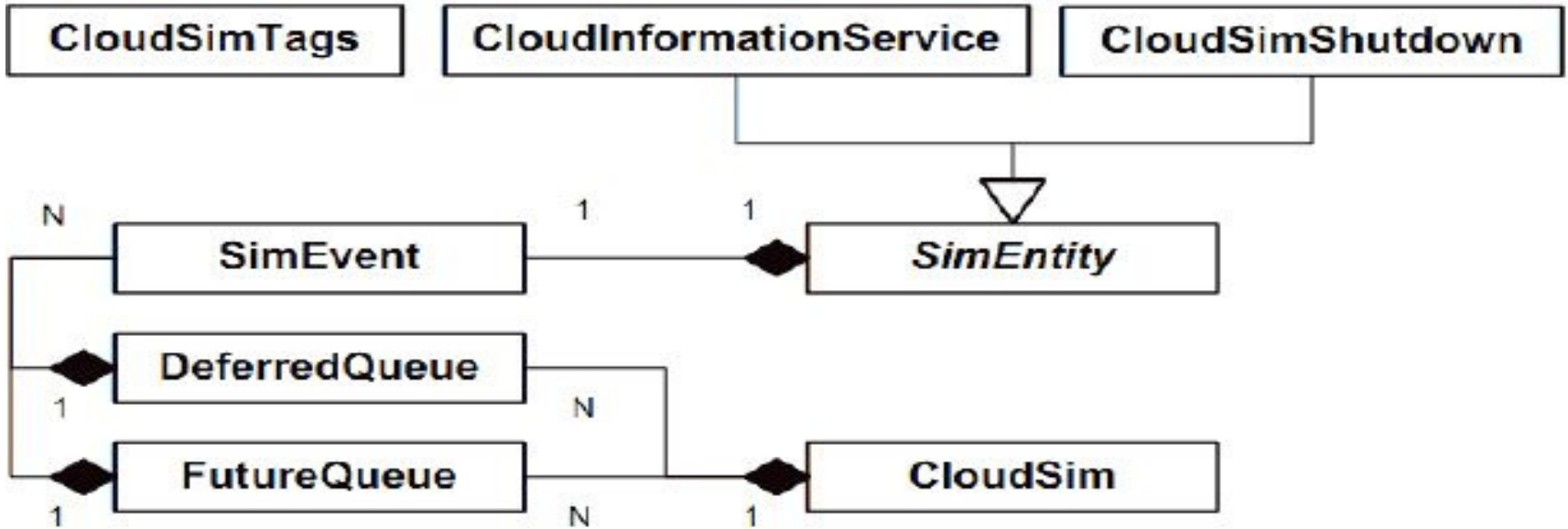
- Datacenter
- DataCenterCharacteristics
- Host
- DatacenterBroker
- RamProvisioner
- BwProvisioner
- Storage
- Vm
- VMAllocationpolicy
- VmScheduler
- Cloudlet
- CloudletScheduler
- CloudInformationService
- CloudSim
- CloudSimTags
- SimEvent
- SimEntity
- CloudsimShutdown
- FutureQueue
- DefferedQueue
- Predicate and associative classes.

Simulation flow for basic scenario

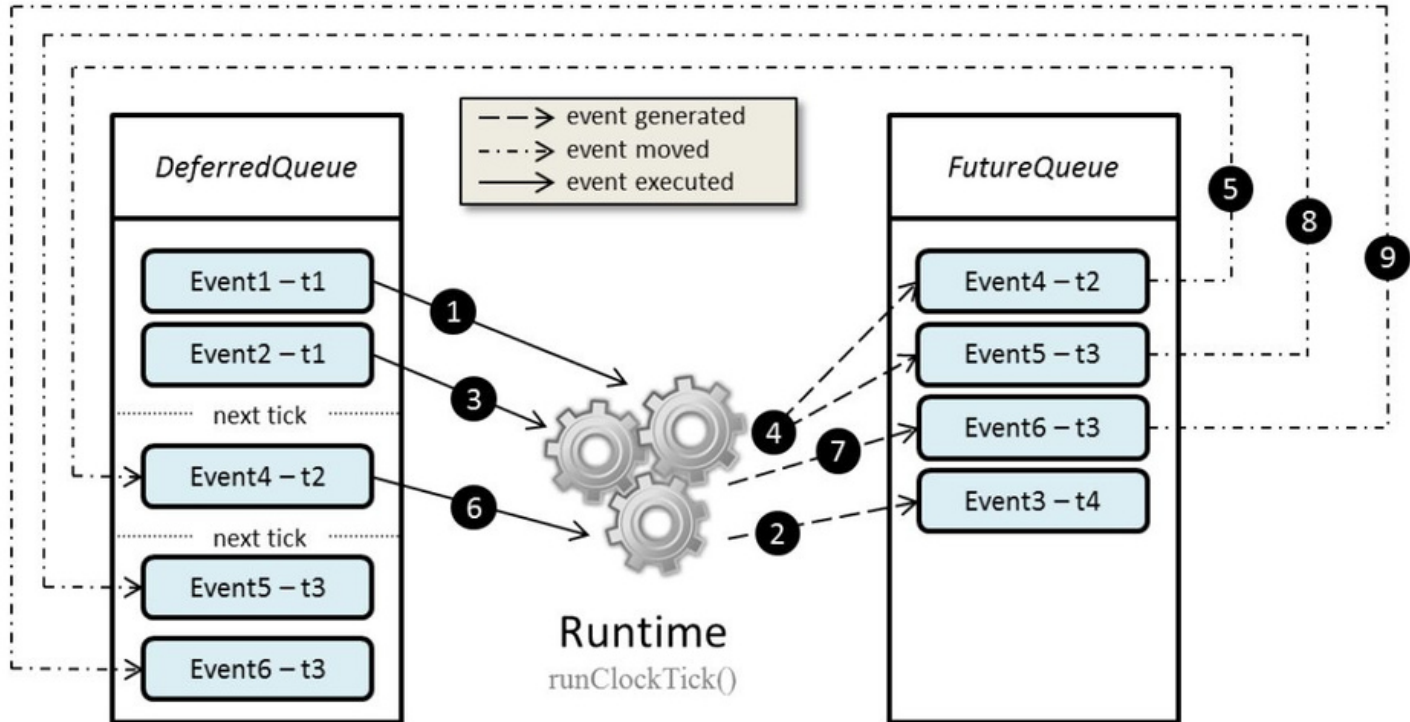
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Cloudsim - Core simulation framework



Task execution Queue management



Cloudsim - General steps to follow

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- Initiate the cloudsim simulation.
- create a datacenter.
- create a datacenter broker.
- create VMs/cloudlet add it to respective lists.
- submit vm and cloudlet list to borker.
- start simulation.
- stop simulation.
- print the end results.