

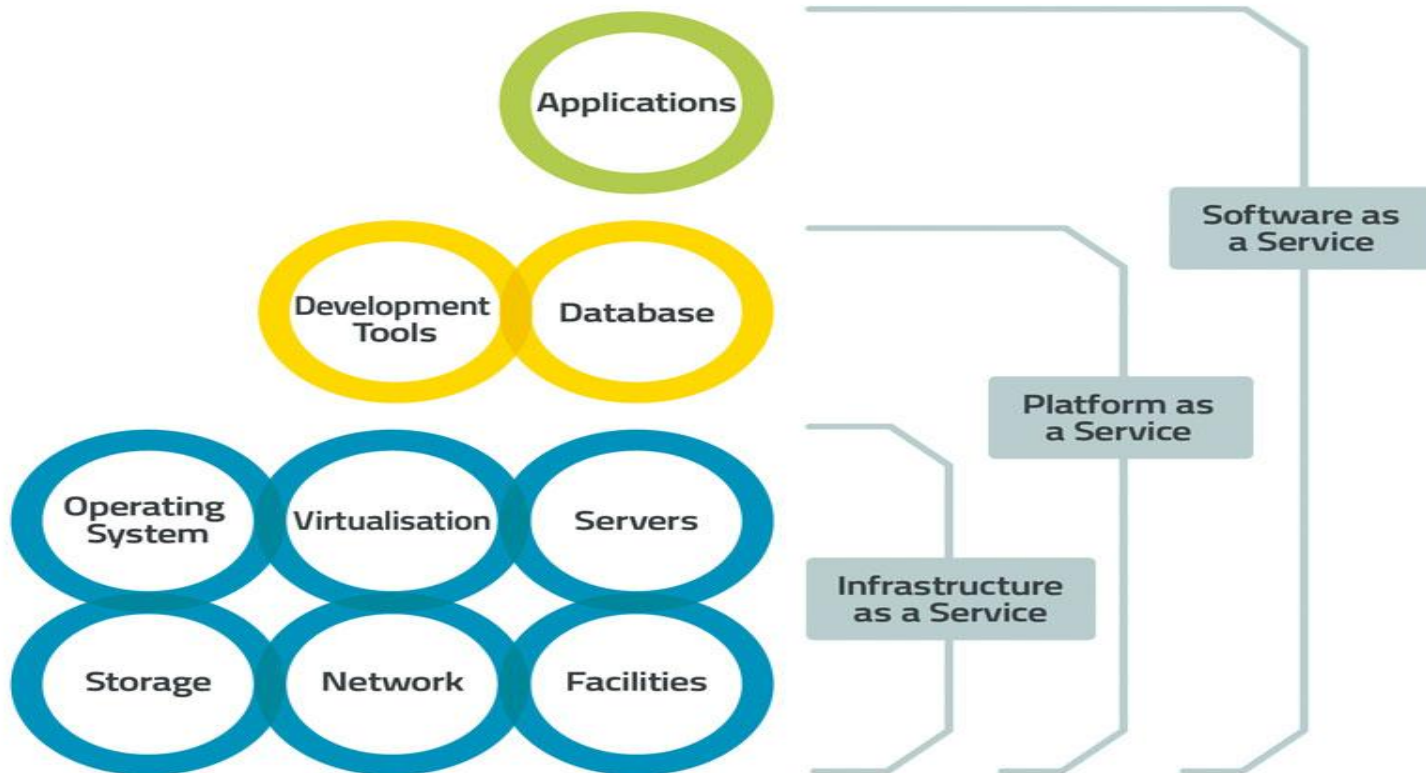
CloudSim

Cloud Simulation Toolkit

Agenda

- 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



Cloud Infrastructure Challenges for researchers

- 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.

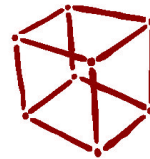
re-producing reliable results and benchmarking is extremely difficult.

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 - Essentials

- JDK 1.6 or above <http://tinyurl.com/JNU-JAVA>
- Eclipse 4.2 or above <http://tinyurl.com/JNU-Eclipse>
- Alternatively NetBeans <https://netbeans.org/downloads>
- Up & Running with cloudsim guide: <https://goo.gl/TPL7Zh>

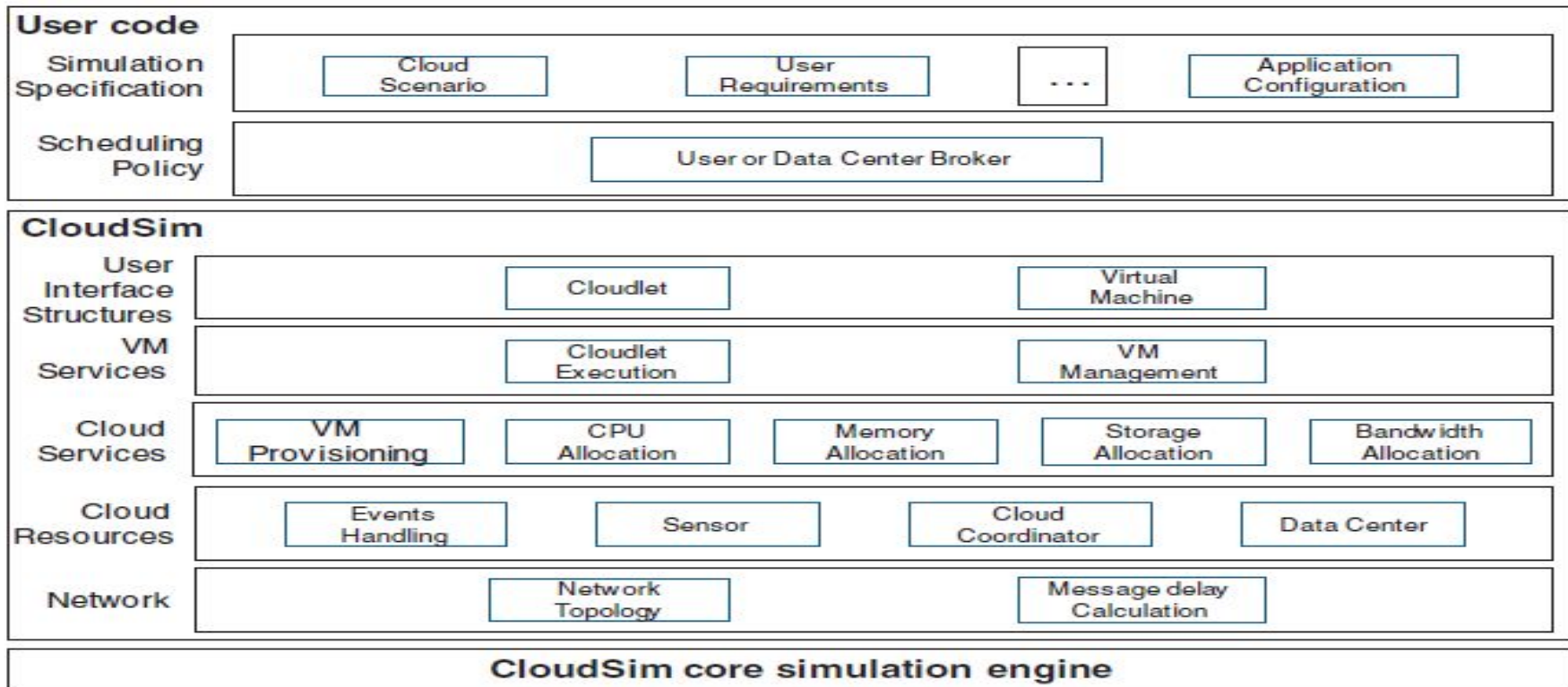


NetBeans

Cloudsim-Directory structure

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

Cloudsim - Layered Architecture



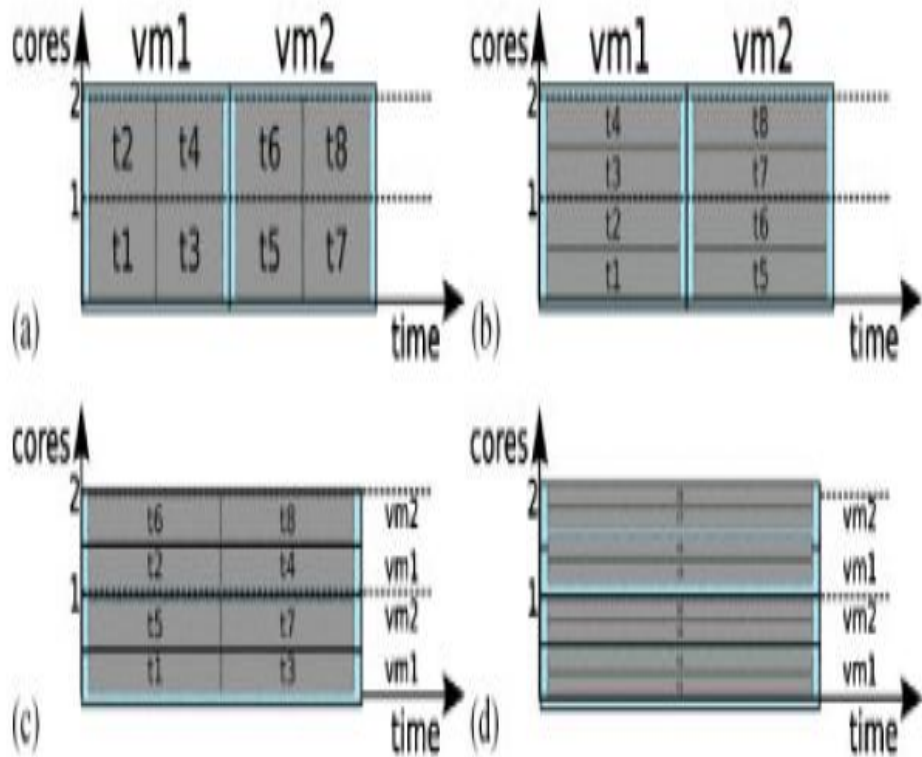
Cloudsim - Time/Space shared models

(a) VM-space, Task-space

(b) VM-space, Task-time

(c) VM-time, Task-space

(a) VM-time, Task-time

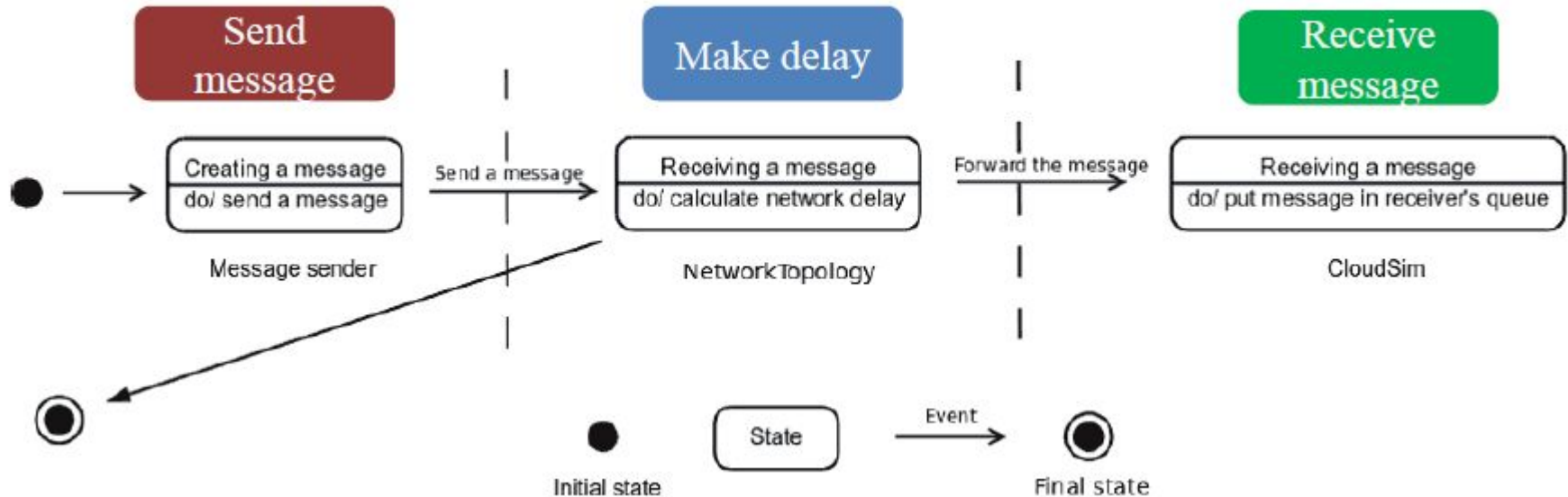


Cloudsim - Network latency matrix using BRITE

E_{ij} = Delay from entity_i to entity_j

$$\begin{bmatrix} 0 & 40 & 120 & 80 & 200 \\ 40 & 0 & 60 & 100 & 100 \\ 120 & 60 & 0 & 90 & 40 \\ 80 & 100 & 90 & 0 & 70 \\ 200 & 100 & 40 & 70 & 0 \end{bmatrix}$$

Cloudsim - Network latency behavior

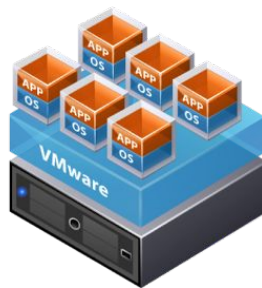


Components of Virtualized Infrastructure



Cloudsim - Component model classes

- CloudInformationService.java
- Datacenter.java, Host.java, Pe.java
- Vm.java, Cloudlet.java
- DatacenterBroker.java
- Storage.java, HarddriveStorage.java, SanStorage.java



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

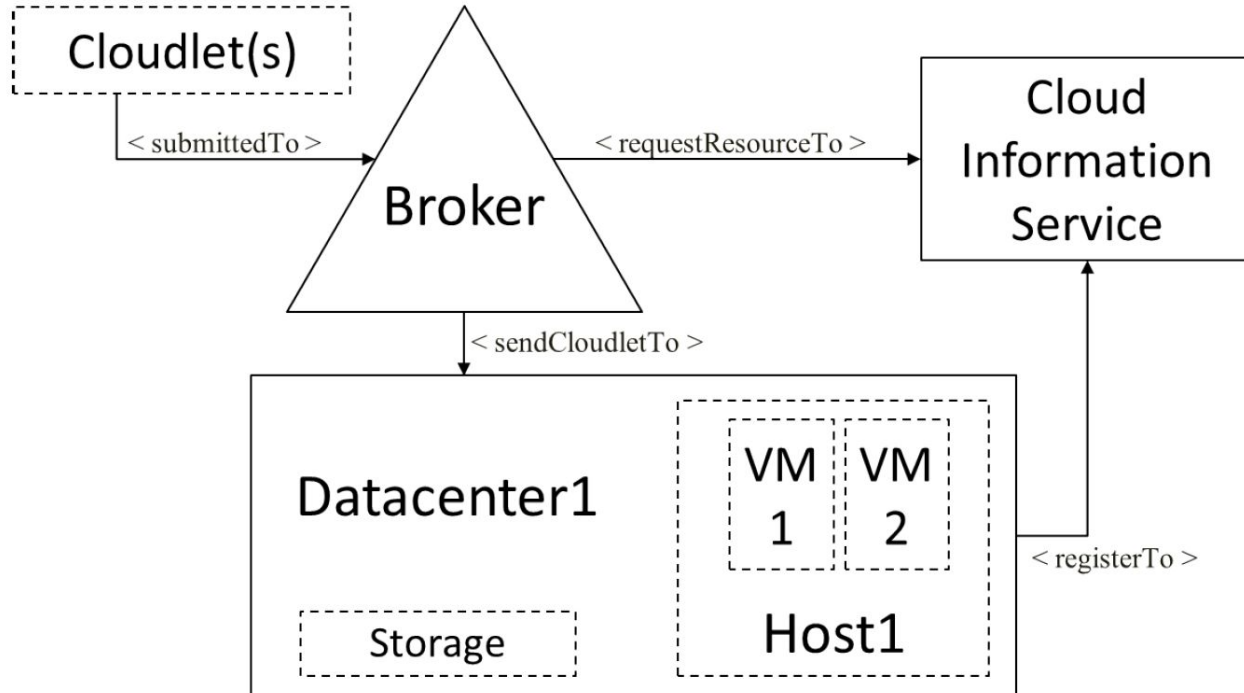
— — —

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

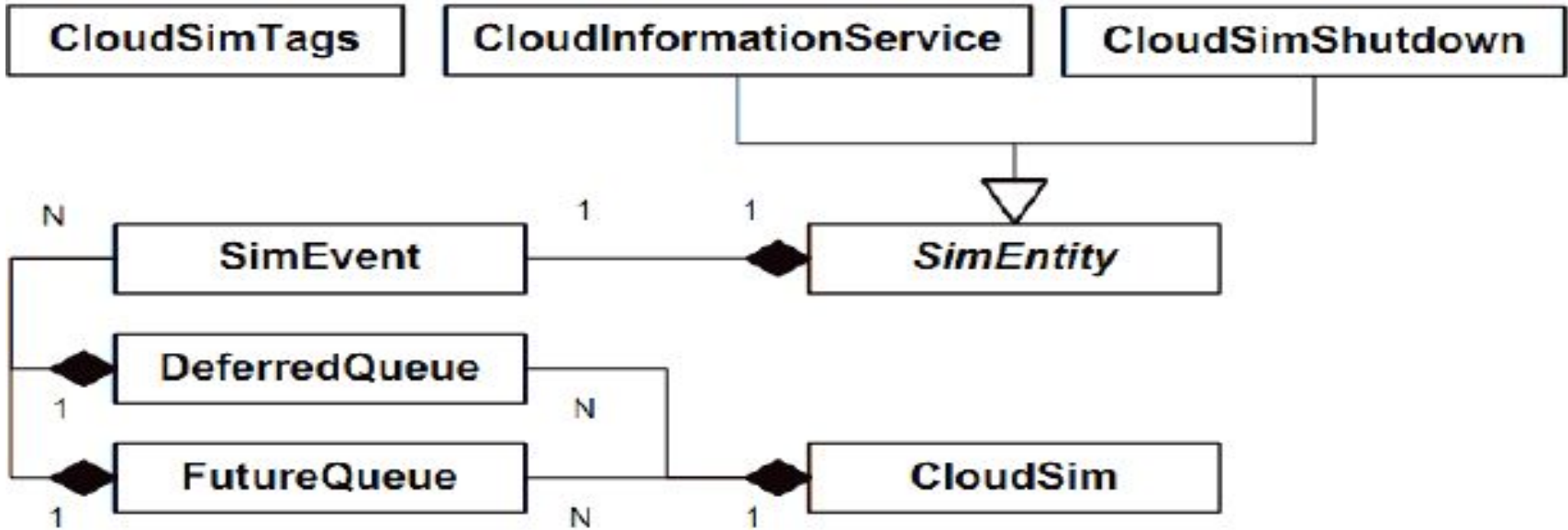
Ok... so how exactly this system works?



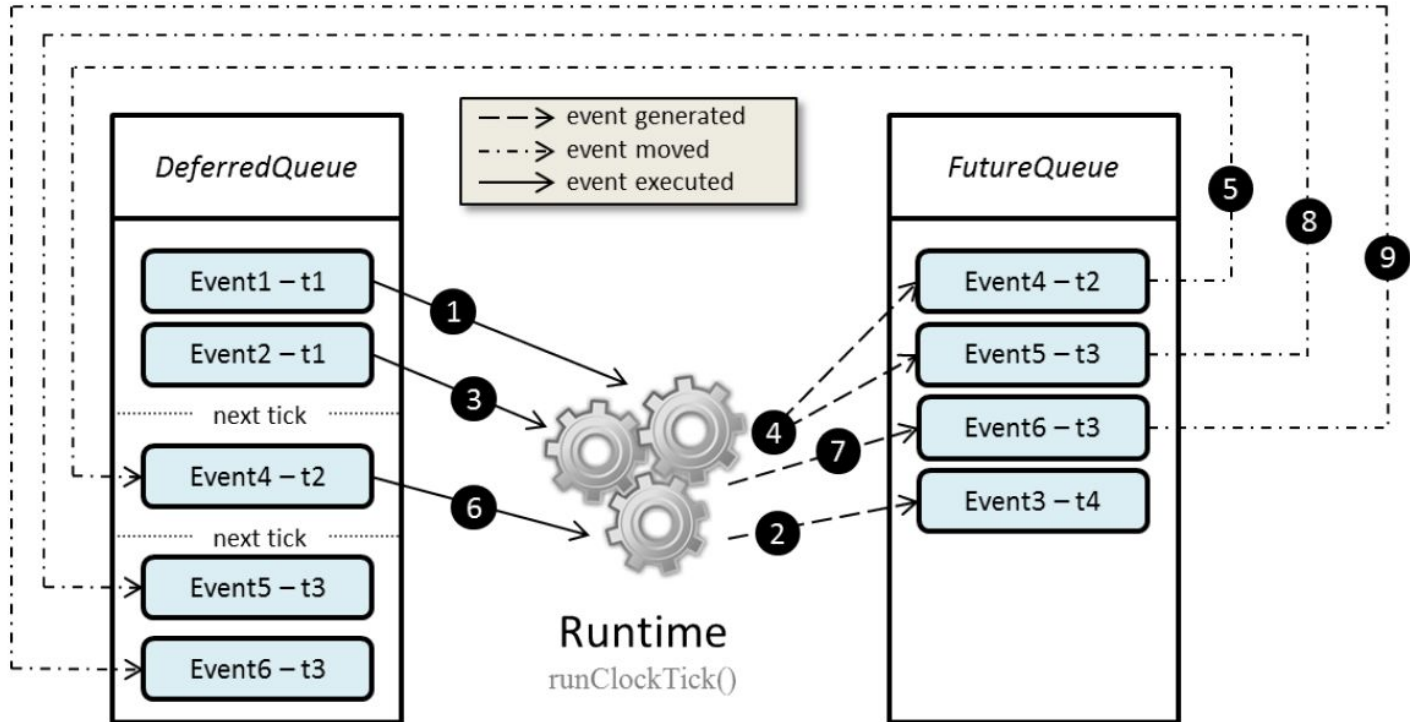
Simulation flow for basic scenario



Cloudsim - Core simulation framework



Task execution Queue management



Cloudsim - General steps to follow

- 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.

To Work on Cloudsim only thing you require is to know

Computers cannot think for themselves or assume anything.
They can do exactly what you tell them to do.


So think like a programmer and model your work in Cloudsim

Cloudsim - Quick look inside



Cloudsim - Q & A



- @anupinder 
- anupindersingh@superwits.com

- Share your feedback at:
<http://tinyurl.com/CloudSimJNUDec16>