



**Experiment No.: 08**

**Title: Cloud simulation using CloudSim**



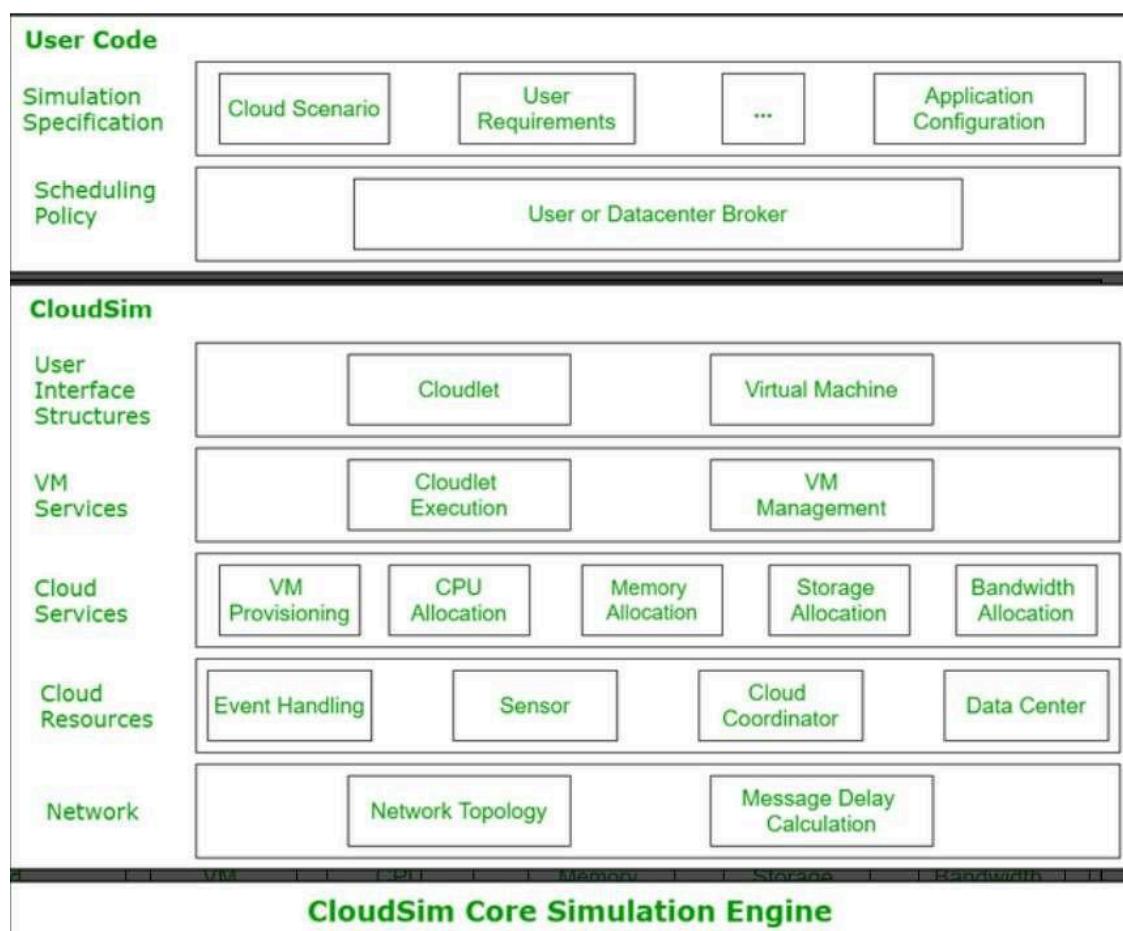
**Aim:** Cloud simulation using CloudSim

**Resources needed:** CloudSim Simulator

### Theory:

CloudSim is a framework for modeling and simulation of cloud computing infrastructures and services. Originally built primarily at the Cloud Computing and Distributed Systems (CLOUDS) Laboratory, The University of Melbourne, Australia, CloudSim has become one of the most popular open source cloud simulators in research and academia. CloudSim is completely written in Java.

### CloudSim Architecture:



**Procedure:**

1. Refer: [STEP BY STEP INSTALLATION OF CLOUDSIM INTO NETBEANS](#)
  2. Run all the examples and observe the results.
  3. Add more VM/ Cloudlets in any one example and observe the results.
-

## Results: (Steps with commands and screenshots)

### Command Prompt

```
Command Prompt
Microsoft Windows [Version 10.0.22631.4751]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>cd C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars

C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars>java -classpath cloudsim-3.0.3.jar;cloudsim-examples-3.0.3.jar org.cloudbus.cloudsim.examples.CloudSimExample1
Starting CloudSimExample1...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Broker is starting...
Entities started
0.0: Broker: Cloud Resource List received with 1 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.1: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: Sending cloudlet 0 to VM #0
0.0: Broker: Cloudlet 0 received
0.0: Broker: All Cloudlets executed. Finishing...
0.0: Broker: Destroying VM #0
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT ======
Cloudlet ID STATUS Data center ID VM ID Time Start Time Finish Time
 0   SUCCESS      2       0    400     0.1      400.1
CloudSimExample1 finished!
```

```
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars>java -classpath cloudsim-3.0.3.jar;cloudsim-examples-3.0.3.jar org.cloudbus.cloudsim.examples.CloudSimExample2
Starting CloudSimExample2...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Broker is starting...
Entities started
0.0: Broker: Cloud Resource List received with 1 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.0: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: VM #1 has been created in Datacenter #2, Host #0
0.1: Broker: Sending cloudlet 0 to VM #0
0.1: Broker: Sending cloudlet 1 to VM #1
0.0: Broker: Cloudlet 0 received
0.0: Broker: Cloudlet 1 received
0.0: Broker: All Cloudlets executed. Finishing...
0.0: Broker: Destroying VM #0
0.0: Broker: Destroying VM #1
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT ======
Cloudlet ID STATUS Data center ID VM ID Time Start Time Finish Time
 0   SUCCESS      2       0    1000    0.1      1000.1
 1   SUCCESS      2       1    1000    0.1      1000.1
CloudSimExample2 finished!
```

```
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars>java -classpath cloudsim-3.0.3.jar;cloudsim-examples-3.0.3.jar org.cloudbus.cloudsim.examples.CloudSimExample3
Starting CloudSimExample3...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Broker is starting...
Entities started
0.0: Broker: Cloud Resource List received with 1 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.0: Broker: Trying to Create VM #1 in Datacenter_0
0.1: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: VM #1 has been created in Datacenter #2, Host #1
0.1: Broker: Sending cloudlet 0 to VM #0
0.1: Broker: Sending cloudlet 1 to VM #1
0.0: Broker: Cloudlet 0 received
0.0: Broker: All Cloudlets executed. Finishing...
0.0: Broker: Destroying VM #0
0.0: Broker: Destroying VM #1
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT ======
Cloudlet ID STATUS Data center ID VM ID Time Start Time Finish Time
 1   SUCCESS      2       1    80      0.1      80.1
 0   SUCCESS      2       0    160     0.1      160.1
CloudSimExample3 finished!
```

```
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars>java -classpath cloudsim-3.0.3.jar;cloudsim-examples-3.0.3.jar org.cloudbus.cloudsim.examples.CloudSimExample4
Starting CloudSimExample4...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker is starting...
Entities started.
0:0: Broker: Cloud Resource List received with 2 resource(s)
0:0: Broker: Trying to Create VM #0 in Datacenter_0
0:0: Broker: Trying to Create VM #1 in Datacenter_0
[VmScheduler.vmCreate] Allocation of VM #1 to Host #0 failed by MIPS
0:1: Broker: VM #0 has been created in Datacenter #2, Host #0
0:1: Broker: Creation of VM #1 failed in Datacenter #2
0:1: Broker: Trying to Create VM #1 in Datacenter_1
0:2: Broker: VM #1 has been created in Datacenter #3, Host #0
0:2: Broker: Sending cloudlet 1 to VM #0
0:2: Broker: Sending cloudlet 1 to VM #1
160:2: Broker: Cloudlet #0 received
160:2: Broker: Cloudlet 1 received
160:2: Broker: All Cloudlets executed. Finishing...
160:2: Broker: Destroying VM #0
160:2: Broker: Destroying VM #1
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT =====
Cloudlet ID  STATUS  Data center ID  VM ID  Time  Start Time  Finish Time
  0        SUCCESS      2            0     160    0.2       160.2
  1        SUCCESS      3            1     160    0.2       160.2
CloudSimExample4 finished!
```

```
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars>java -classpath cloudsim-3.0.3.jar;cloudsim-examples-3.0.3.jar org.cloudbus.cloudsim.examples.CloudSimExample5
Starting CloudSimExample5...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker1 is starting...
Broker2 is starting...
Entities started.
0:0: Broker1: Cloud Resource List received with 2 resource(s)
0:0: Broker2: Cloud Resource List received with 2 resource(s)
0:0: Broker1: Trying to Create VM #0 in Datacenter_0
0:0: Broker2: Trying to Create VM #0 in Datacenter_0
[VmScheduler.vmCreate] Allocation of VM #0 to Host #0 failed by MIPS
0:1: Broker1: VM #0 has been created in Datacenter #2, Host #0
0:1: Broker1: Sending cloudlet 0 to VM #0
0:1: Broker2: Creation of VM #0 failed in Datacenter #2
0:1: Broker2: Trying to Create VM #0 in Datacenter_1
0:2: Broker2: VM #0 has been created in Datacenter #3, Host #0
0:2: Broker2: Sending cloudlet 0 to VM #0
160:1: Broker1: Cloudlet 0 received
160:1: Broker1: All cloudlets executed. Finishing...
160:1: Broker1: Destroying VM #0
Broker1 is shutting down...
160:2: Broker2: Cloudlet 0 received
160:2: Broker2: All cloudlets executed. Finishing...
160:2: Broker2: Destroying VM #0
Broker2 is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker1 is shutting down...
Broker2 is shutting down...
Simulation completed.
Simulation completed.

===== User 4 =====
===== OUTPUT =====
Cloudlet ID  STATUS  Data center ID  VM ID  Time  Start Time  Finish Time
  0        SUCCESS      2            0     160    0.1       160.1
===== User 5 =====
===== OUTPUT =====
Cloudlet ID  STATUS  Data center ID  VM ID  Time  Start Time  Finish Time
  0        SUCCESS      3            0     160    0.2       160.2
CloudSimExample5 finished!
```

```
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars>java -classpath cloudsim-3.0.3.jar;cloudsim-examples-3.0.3.jar org.cloudbus.cloudsim.examples.CloudSimExample6
Starting CloudSimExample6...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker is starting...
Entities started.
0:0: Broker: Cloud Resource List received with 2 resource(s)
0:0: Broker: Trying to Create VM #0 in Datacenter_0
0:0: Broker: Trying to Create VM #1 in Datacenter_0
0:0: Broker: Trying to Create VM #2 in Datacenter_0
0:0: Broker: Trying to Create VM #3 in Datacenter_0
0:0: Broker: Trying to Create VM #4 in Datacenter_0
0:0: Broker: Trying to Create VM #5 in Datacenter_0
0:0: Broker: Trying to Create VM #6 in Datacenter_0
0:0: Broker: Trying to Create VM #7 in Datacenter_0
0:0: Broker: Trying to Create VM #8 in Datacenter_0
0:0: Broker: Trying to Create VM #9 in Datacenter_0
0:0: Broker: Trying to Create VM #10 in Datacenter_0
0:0: Broker: Trying to Create VM #11 in Datacenter_0
0:0: Broker: Trying to Create VM #12 in Datacenter_0
0:0: Broker: Trying to Create VM #13 in Datacenter_0
0:0: Broker: Trying to Create VM #14 in Datacenter_0
0:0: Broker: Trying to Create VM #15 in Datacenter_0
0:0: Broker: Trying to Create VM #16 in Datacenter_0
0:0: Broker: Trying to Create VM #17 in Datacenter_0
0:0: Broker: Trying to Create VM #18 in Datacenter_0
0:0: Broker: Trying to Create VM #19 in Datacenter_0
[VmScheduler.vmCreate] Allocation of VM #6 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #6 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #7 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #7 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #8 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #8 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #9 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #9 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #10 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #10 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #11 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #11 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #12 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #12 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #13 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #13 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #14 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #14 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #15 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #15 to Host #1 failed by MIPS
```



```

0.2: Broker: Sending cloudlet 21 to VM #9
0.2: Broker: Sending cloudlet 22 to VM #10
0.2: Broker: Sending cloudlet 23 to VM #11
0.2: Broker: Sending cloudlet 24 to VM #0
0.2: Broker: Sending cloudlet 25 to VM #1
0.2: Broker: Sending cloudlet 26 to VM #2
0.2: Broker: Sending cloudlet 27 to VM #3
0.2: Broker: Sending cloudlet 28 to VM #4
0.2: Broker: Sending cloudlet 29 to VM #5
0.2: Broker: Sending cloudlet 30 to VM #6
0.2: Broker: Sending cloudlet 31 to VM #7
0.2: Broker: Sending cloudlet 32 to VM #8
0.2: Broker: Sending cloudlet 33 to VM #9
0.2: Broker: Sending cloudlet 34 to VM #10
0.2: Broker: Sending cloudlet 35 to VM #11
0.2: Broker: Sending cloudlet 36 to VM #0
0.2: Broker: Sending cloudlet 37 to VM #1
0.2: Broker: Sending cloudlet 38 to VM #2
0.2: Broker: Sending cloudlet 39 to VM #3
0.2: Broker: Sending cloudlet 40 to VM #2
3.1980000000000004: Broker: Cloudlet 4 received
3.1980000000000004: Broker: Cloudlet 16 received
3.1980000000000004: Broker: Cloudlet 28 received
3.1980000000000004: Broker: Cloudlet 5 received
3.1980000000000004: Broker: Cloudlet 17 received
3.1980000000000004: Broker: Cloudlet 29 received
3.1980000000000004: Broker: Cloudlet 6 received
3.1980000000000004: Broker: Cloudlet 18 received
3.1980000000000004: Broker: Cloudlet 30 received
3.1980000000000004: Broker: Cloudlet 7 received
3.1980000000000004: Broker: Cloudlet 19 received
3.1980000000000004: Broker: Cloudlet 31 received
3.1980000000000004: Broker: Cloudlet 3 received
3.1980000000000004: Broker: Cloudlet 20 received
3.1980000000000004: Broker: Cloudlet 32 received
3.1980000000000004: Broker: Cloudlet 10 received
3.1980000000000004: Broker: Cloudlet 22 received
3.1980000000000004: Broker: Cloudlet 34 received
3.1980000000000004: Broker: Cloudlet 9 received
3.1980000000000004: Broker: Cloudlet 21 received
3.1980000000000004: Broker: Cloudlet 33 received
3.1980000000000004: Broker: Cloudlet 11 received
3.1980000000000004: Broker: Cloudlet 23 received
3.1980000000000004: Broker: Cloudlet 35 received
4.198: Broker: Cloudlet 0 received
4.198: Broker: Cloudlet 12 received
4.198: Broker: Cloudlet 24 received
4.198: Broker: Cloudlet 36 received
4.198: Broker: Cloudlet 14 received
4.198: Broker: Cloudlet 13 received
4.198: Broker: Cloudlet 25 received
4.198: Broker: Cloudlet 37 received

```

```

4.198: Broker: Cloudlet 2 received
4.198: Broker: Cloudlet 14 received
4.198: Broker: Cloudlet 26 received
4.198: Broker: Cloudlet 38 received
4.198: Broker: Cloudlet 3 received
4.198: Broker: Cloudlet 15 received
4.198: Broker: Cloudlet 27 received
4.198: Broker: Cloudlet 39 received
4.198: Broker: All cloudlets executed. Finishing...
4.198: Broker: Destroying VM #0
4.198: Broker: Destroying VM #1
4.198: Broker: Destroying VM #2
4.198: Broker: Destroying VM #3
4.198: Broker: Destroying VM #4
4.198: Broker: Destroying VM #5
4.198: Broker: Destroying VM #6
4.198: Broker: Destroying VM #7
4.198: Broker: Destroying VM #8
4.198: Broker: Destroying VM #9
4.198: Broker: Destroying VM #10
4.198: Broker: Destroying VM #11
Broker is shutting down...
Simulation: No more future events
CloudSimEngine@127.0.0.1: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker is shutting down...
Simulation completed
Simulation completed.

===== OUTPUT =====

```

Cloudlet ID	Status	Data center ID	VM ID	Time	Start Time	Finish Time
4	SUCCESS	2	4	3	0.2	3.2
16	SUCCESS	2	4	3	0.2	3.2
28	SUCCESS	2	4	3	0.2	3.2
5	SUCCESS	2	5	3	0.2	3.2
17	SUCCESS	2	5	3	0.2	3.2
29	SUCCESS	2	5	3	0.2	3.2
6	SUCCESS	3	6	3	0.2	3.2
18	SUCCESS	3	6	3	0.2	3.2
30	SUCCESS	3	6	3	0.2	3.2
7	SUCCESS	3	7	3	0.2	3.2
19	SUCCESS	3	7	3	0.2	3.2
31	SUCCESS	3	7	3	0.2	3.2
8	SUCCESS	3	8	3	0.2	3.2
20	SUCCESS	3	8	3	0.2	3.2
32	SUCCESS	3	8	3	0.2	3.2
10	SUCCESS	3	10	3	0.2	3.2
22	SUCCESS	3	10	3	0.2	3.2
34	SUCCESS	3	10	3	0.2	3.2
9	SUCCESS	3	9	3	0.2	3.2

9	SUCCESS	3	9	3	0.2	3.2
21	SUCCESS	3	9	3	0.2	3.2
33	SUCCESS	3	9	3	0.2	3.2
11	SUCCESS	3	11	3	0.2	3.2
23	SUCCESS	3	11	3	0.2	3.2
35	SUCCESS	3	11	3	0.2	3.2
0	SUCCESS	2	0	4	0.2	4.2
12	SUCCESS	2	0	4	0.2	4.2
24	SUCCESS	2	0	4	0.2	4.2
36	SUCCESS	2	0	4	0.2	4.2
1	SUCCESS	2	1	4	0.2	4.2
13	SUCCESS	2	1	4	0.2	4.2
25	SUCCESS	2	1	4	0.2	4.2
37	SUCCESS	2	1	4	0.2	4.2
2	SUCCESS	2	2	4	0.2	4.2
14	SUCCESS	2	2	4	0.2	4.2
26	SUCCESS	2	2	4	0.2	4.2
38	SUCCESS	2	2	4	0.2	4.2
3	SUCCESS	2	3	4	0.2	4.2
15	SUCCESS	2	3	4	0.2	4.2
27	SUCCESS	2	3	4	0.2	4.2
39	SUCCESS	2	3	4	0.2	4.2

CloudSimExample6 finished!

```
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars>java -classpath cloudsim-3.0.3.jar;cloudsim-examples-3.0.3.jar org.cloudbus.cloudsim.examples.CloudSimExample7
Starting CloudSimExample7...
Initialising...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker_0 is starting...
Entities started.
0.0: Broker_0: Cloud Resource List received with 2 resource(s)
0.0: Broker_0: Trying to Create VM #0 in Datacenter_0
0.0: Broker_0: Trying to Create VM #1 in Datacenter_0
0.0: Broker_0: Trying to Create VM #2 in Datacenter_0
0.0: Broker_0: Trying to Create VM #3 in Datacenter_0
0.0: Broker_0: Trying to Create VM #4 in Datacenter_0
0.1: Broker_0: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #1 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #2 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #3 has been created in Datacenter #2, Host #1
0.1: Broker_0: VM #4 has been created in Datacenter #2, Host #0
0.1: Broker_0: Sending cloudlet 0 to VM #0
0.1: Broker_0: Sending cloudlet 1 to VM #1
0.1: Broker_0: Sending cloudlet 2 to VM #2
0.1: Broker_0: Sending cloudlet 3 to VM #3
0.1: Broker_0: Sending cloudlet 4 to VM #4
0.1: Broker_0: Sending cloudlet 5 to VM #0
0.1: Broker_0: Sending cloudlet 6 to VM #1
0.1: Broker_0: Sending cloudlet 7 to VM #2
0.1: Broker_0: Sending cloudlet 8 to VM #3
0.1: Broker_0: Sending cloudlet 9 to VM #4

200.0: The simulation is paused for 5 sec

Adding: Broker_1
Broker_1 is starting...
200.0: Broker_1: Cloud Resource List received with 2 resource(s)
200.0: Broker_1: Trying to Create VM #100 in Datacenter_0
200.0: Broker_1: Trying to Create VM #101 in Datacenter_0
200.0: Broker_1: Trying to Create VM #102 in Datacenter_0
200.0: Broker_1: Trying to Create VM #103 in Datacenter_0
200.0: Broker_1: Trying to Create VM #104 in Datacenter_0
200.1: Broker_1: VM #100 has been created in Datacenter #2, Host #1
200.1: Broker_1: VM #101 has been created in Datacenter #2, Host #0
200.1: Broker_1: VM #102 has been created in Datacenter #2, Host #1
200.1: Broker_1: VM #103 has been created in Datacenter #2, Host #0
200.1: Broker_1: VM #104 has been created in Datacenter #2, Host #1
200.1: Broker_1: Sending cloudlet 100 to VM #100
200.1: Broker_1: Sending cloudlet 101 to VM #101
```

```
200.1: Broker_1: Sending cloudlet 102 to VM #102
200.1: Broker_1: Sending cloudlet 103 to VM #103
200.1: Broker_1: Sending cloudlet 104 to VM #104
200.1: Broker_1: Sending cloudlet 105 to VM #100
200.1: Broker_1: Sending cloudlet 106 to VM #101
200.1: Broker_1: Sending cloudlet 107 to VM #102
200.1: Broker_1: Sending cloudlet 108 to VM #103
200.1: Broker_1: Sending cloudlet 109 to VM #104
320.096: Broker_0: Cloudlet 0 received
320.096: Broker_0: Cloudlet 5 received
320.096: Broker_0: Cloudlet 6 received
320.096: Broker_0: Cloudlet 7 received
320.096: Broker_0: Cloudlet 2 received
320.096: Broker_0: Cloudlet 7 received
320.096: Broker_0: Cloudlet 4 received
320.096: Broker_0: Cloudlet 9 received
320.096: Broker_0: Cloudlet 3 received
320.096: Broker_0: Cloudlet 8 received
320.096: Broker_0: All Cloudlets executed. Finishing...
320.096: Broker_0: Destroying VM #0
320.096: Broker_0: Destroying VM #1
320.096: Broker_0: Destroying VM #2
320.096: Broker_0: Destroying VM #3
320.096: Broker_0: Destroying VM #4
Broker_0 is shutting down...
510.096: Broker_1: Cloudlet 101 received
510.096: Broker_1: Cloudlet 106 received
510.096: Broker_1: Cloudlet 103 received
510.096: Broker_1: Cloudlet 108 received
510.096: Broker_1: Cloudlet 100 received
510.096: Broker_1: Cloudlet 105 received
510.096: Broker_1: Cloudlet 102 received
510.096: Broker_1: Cloudlet 107 received
510.096: Broker_1: Cloudlet 104 received
510.096: Broker_1: Cloudlet 109 received
510.096: Broker_1: All Cloudlets executed. Finishing...
510.096: Broker_1: Destroying VM #100
510.096: Broker_1: Destroying VM #101
510.096: Broker_1: Destroying VM #102
510.096: Broker_1: Destroying VM #103
510.096: Broker_1: Destroying VM #104
Broker_1 is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker_0 is shutting down...
Broker_1 is shutting down...
Simulation completed.
Simulation completed.
```

```
===== OUTPUT =====
Cloudlet ID  STATUS  Data center ID  VM ID  Time  Start Time  Finish Time
0  SUCCESS  2        0        320  0.1    320.1
5  SUCCESS  2        0        320  0.1    320.1
1  SUCCESS  2        1        320  0.1    320.1
6  SUCCESS  2        1        320  0.1    320.1
2  SUCCESS  2        2        320  0.1    320.1
7  SUCCESS  2        2        320  0.1    320.1
4  SUCCESS  2        4        320  0.1    320.1
9  SUCCESS  2        4        320  0.1    320.1
3  SUCCESS  2        3        320  0.1    320.1
8  SUCCESS  2        3        320  0.1    320.1
CloudSimExample7 finished!
```

```
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3\jars>java -classpath cloudsim-3.0.3.jar;cloudsim-examples-3.0.3.jar org.cloudbus.cloudsim.examples.CloudSimExample8
Starting CloudSim Example8...
Initialising...
Starting CloudSim version 3.0
GlobalBroker is starting...
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker_0 is starting...
Entities started.
0.0: Broker_0: Cloud Resource List received with 2 resource(s)
0.0: Broker_0: Trying to Create VM #0 in Datacenter_0
0.0: Broker_0: Trying to Create VM #1 in Datacenter_0
0.0: Broker_0: Trying to Create VM #2 in Datacenter_0
0.0: Broker_0: Trying to Create VM #3 in Datacenter_0
0.0: Broker_0: Trying to Create VM #4 in Datacenter_0
0.1: Broker_0: VM #1 has been created in Datacenter #3, Host #0
0.1: Broker_0: VM #2 has been created in Datacenter #3, Host #0
0.1: Broker_0: VM #3 has been created in Datacenter #3, Host #1
0.1: Broker_0: VM #4 has been created in Datacenter #3, Host #0
0.1: Broker_0: Sending cloudlet 0 to VM #0
0.1: Broker_0: Sending cloudlet 1 to VM #1
0.1: Broker_0: Sending cloudlet 2 to VM #2
0.1: Broker_0: Sending cloudlet 3 to VM #3
0.1: Broker_0: Sending cloudlet 4 to VM #4
0.1: Broker_0: Sending cloudlet 5 to VM #0
0.1: Broker_0: Sending cloudlet 6 to VM #1
0.1: Broker_0: Sending cloudlet 7 to VM #2
0.1: Broker_0: Sending cloudlet 8 to VM #3
0.1: Broker_0: Sending cloudlet 9 to VM #4
Additional Information:
GlobalBroker_0 is starting...
200.0: GlobalBroker_0: Cloud Resource List received with 2 resource(s)
200.0: GlobalBroker_0: Trying to Create VM #100 in Datacenter_0
200.0: GlobalBroker_0: Trying to Create VM #101 in Datacenter_0
200.0: GlobalBroker_0: Trying to Create VM #102 in Datacenter_0
200.0: GlobalBroker_0: Trying to Create VM #103 in Datacenter_0
200.0: GlobalBroker_0: Trying to Create VM #104 in Datacenter_0
200.1: GlobalBroker_0: VM #100 has been created in Datacenter #3, Host #1
200.1: GlobalBroker_0: VM #101 has been created in Datacenter #3, Host #0
200.1: GlobalBroker_0: VM #102 has been created in Datacenter #3, Host #1
200.1: GlobalBroker_0: VM #103 has been created in Datacenter #3, Host #0
200.1: GlobalBroker_0: VM #104 has been created in Datacenter #3, Host #1
200.1: GlobalBroker_0: Sending cloudlet 100 to VM #100
200.1: GlobalBroker_0: Sending cloudlet 101 to VM #101
200.1: GlobalBroker_0: Sending cloudlet 102 to VM #102
200.1: GlobalBroker_0: Sending cloudlet 103 to VM #103
200.1: GlobalBroker_0: Sending cloudlet 104 to VM #104
200.1: GlobalBroker_0: Sending cloudlet 105 to VM #100
```

```
200.1: GlobalBroker_0: Sending cloudlet 106 to VM #101
200.1: GlobalBroker_0: Sending cloudlet 107 to VM #102
200.1: GlobalBroker_0: Sending cloudlet 108 to VM #103
200.1: GlobalBroker_0: Sending cloudlet 109 to VM #104
320.1: Broker_0: Cloudlet 0 received
320.1: Broker_0: Cloudlet 5 received
320.1: Broker_0: Cloudlet 1 received
320.1: Broker_0: Cloudlet 6 received
320.1: Broker_0: Cloudlet 2 received
320.1: Broker_0: Cloudlet 7 received
320.1: Broker_0: Cloudlet 4 received
320.1: Broker_0: Cloudlet 9 received
320.1: Broker_0: Cloudlet 3 received
320.1: Broker_0: Cloudlet 8 received
320.1: Broker_0: All Cloudlets executed. Finishing...
320.1: Broker_0: Destroying VM #0
320.1: Broker_0: Destroying VM #1
320.1: Broker_0: Destroying VM #2
320.1: Broker_0: Destroying VM #3
320.1: Broker_0: Destroying VM #4
Broker_0 is shutting down...
520.1: GlobalBroker_0: Cloudlet 101 received
520.1: GlobalBroker_0: Cloudlet 106 received
520.1: GlobalBroker_0: Cloudlet 108 received
520.1: GlobalBroker_0: Cloudlet 109 received
520.1: GlobalBroker_0: Cloudlet 100 received
520.1: GlobalBroker_0: Cloudlet 105 received
520.1: GlobalBroker_0: Cloudlet 102 received
520.1: GlobalBroker_0: Cloudlet 107 received
520.1: GlobalBroker_0: Cloudlet 104 received
520.1: GlobalBroker_0: Cloudlet 109 received
520.1: GlobalBroker_0: All Cloudlets executed. Finishing...
520.1: GlobalBroker_0: Destroying VM #100
520.1: GlobalBroker_0: Destroying VM #101
520.1: GlobalBroker_0: Destroying VM #102
520.1: GlobalBroker_0: Destroying VM #103
520.1: GlobalBroker_0: Destroying VM #104
globalBroker_0 is shutting down...
Simulation: No more events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker_0 is shutting down...
GlobalBroker_0 is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT =====
Cloudlet ID STATUS Data center ID VM ID Time Start Time Finish Time
0 SUCCESS 3 0 320 0.1 320.1
5 SUCCESS 3 0 320 0.1 320.1
```

Cloudlet ID	Status	Data center ID	VM ID	Time	Start Time	Finish Time
1	SUCCESS	3	1	320	0.1	320.1
6	SUCCESS	3	1	320	0.1	320.1
2	SUCCESS	3	2	320	0.1	320.1
7	SUCCESS	3	2	320	0.1	320.1
4	SUCCESS	3	4	320	0.1	320.1
9	SUCCESS	3	4	320	0.1	320.1
3	SUCCESS	3	3	320	0.1	320.1
8	SUCCESS	3	3	320	0.1	320.1
101	SUCCESS	3	101	320	200.1	520.1
106	SUCCESS	3	101	320	200.1	520.1
103	SUCCESS	3	103	320	200.1	520.1
108	SUCCESS	3	103	320	200.1	520.1
100	SUCCESS	3	100	320	200.1	520.1
105	SUCCESS	3	100	320	200.1	520.1
102	SUCCESS	3	102	320	200.1	520.1
107	SUCCESS	3	102	320	200.1	520.1
104	SUCCESS	3	104	320	200.1	520.1
109	SUCCESS	3	104	320	200.1	520.1

CloudSimExample8 finished!

```
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3>javac -classpath jars\cloudsim-3.0.3.jar;jars\flanagan.jar;examples examples\org.cloudbus.cloudsim\examples\power\planetlab\LrMc.java
C:\Users\Admin\307B softwares\cloudsim-3.0.3\cloudsim-3.0.3>java -classpath jars\cloudsim-3.0.3.jar;jars\flanagan.jar;examples org.cloudbus.cloudsim.examples.power.planetlab.LrMc
Initialising...
java.lang.NullPointerException: Cannot read the array length because "<local9>" is null
    at org.cloudbus.cloudsim.examples.power.planetLab.PlanetTableHelper.createCloudletListPlanetLab(PlanetLabHelper.java:49)
    at org.cloudbus.cloudsim.examples.power.planetLab.PlanetLabRunner.init(PlanetLabRunner.java:71)
    at org.cloudbus.cloudsim.examples.power.Runner$1.<init>(Runner$Abstract.java:95)
    at org.cloudbus.cloudsim.examples.power.planetLab.PlanetLabRunner.<init>(PlanetLabRunner.java:47)
    at org.cloudbus.cloudsim.examples.power.planetLab.PlanetLabRunner.main(LrMc.java:42)

The simulation has been terminated due to an unexpected error
```

CloudSimExample1.java : shows how to create a datacenter with one host and run one cloudlet on it.

CloudSimExample2.java : shows how to create a datacenter with one host and run two cloudlets on it. The cloudlets run in VMs with the same MIPS requirements. The cloudlets will take the same time to complete the execution.

CloudSimExample3.java : shows how to create a datacenter with two hosts and run two cloudlets on it. The cloudlets run in VMs with different MIPS requirements. The cloudlets will take different time to complete the execution depending on the requested VM performance.

CloudSimExample4.java : shows how to create two datacenters with one host each and run two cloudlets on them.

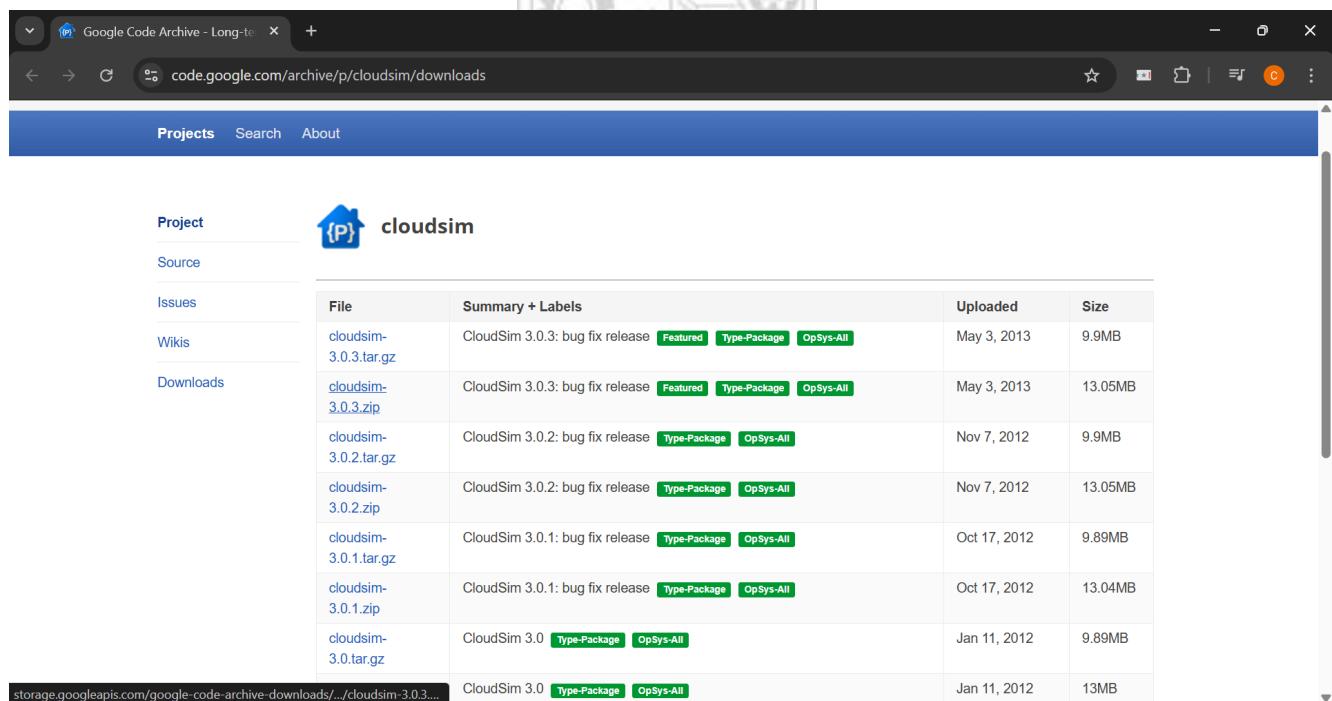
CloudSimExample5.java : shows how to create two datacenters with one host each and run cloudlets of two users on them.

CloudSimExample6.java : shows how to create scalable simulations.

CloudSimExample7.java : shows how to pause simulations.

CloudSimExample8.java : shows how to add entities in run time.

## NetBeans IDE



The screenshot shows the NetBeans IDE interface with the following details:

- Toolbar:** Standard NetBeans toolbar with icons for file operations, search, and project navigation.
- Project Explorer:** Shows the "cloudsim" project selected under the "Projects" tab.
- Code Editor:** A large code editor window showing Java code, likely the CloudSimExample1.java file.
- Properties:** A panel showing properties for the selected file, including the package name "cloudsim" and the class name "CloudSimExample1".
- Output:** A panel showing the build output, which includes the command "javac -d build src/main/java/CloudSimExample1.java" and the resulting bytecode file "build/classes/main/CloudSimExample1.class".

```

1 //package .cloudsim1;
2 /**
3  * @author chandanagalgalgi
4  */
5
6
7 import java.text.DecimalFormat;
8 import java.util.ArrayList;
9 import java.util.Calendar;
10 import java.util.LinkedList;
11 import java.util.List;
12
13 import org.cloudbus.cloudsim.Cloudlet;
14 import org.cloudbus.cloudsim.CloudletSchedulerTimeShared;
15 import org.cloudbus.cloudsim.Datacenter;
16 import org.cloudbus.cloudsim.DatacenterBroker;
17 import org.cloudbus.cloudsim.DatacenterCharacteristics;
18 import org.cloudbus.cloudsim.Host;
19 import org.cloudbus.cloudsim.Log;
20 import org.cloudbus.cloudsim.Pe;
21 import org.cloudbus.cloudsim.Storage;
22 import org.cloudbus.cloudsim.UtilizationModel;
23 import org.cloudbus.cloudsim.UtilizationModelFull;
24 import org.cloudbus.cloudsim.Vm;
25 import org.cloudbus.cloudsim.VmAllocationPolicySimple;
26 import org.cloudbus.cloudsim.VmSchedulerTimeShared;
27 import org.cloudbus.cloudsim.core.CloudSim;

```

```

Starting CloudSimExample1...
Initializing...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Broker is starting...
Entities started.
0.0: Broker: Cloud Resource List received with 1 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.1: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: Sending cloudlet 0 to VM #0
400.1: Broker: Cloudlet 0 received
400.1: Broker: All Cloudlets executed. Finishing...
400.1: Broker: Destroying VM #0
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT =====
Cloudlet ID STATUS Data center ID VM ID Time Start Time Finish Time
 0   SUCCESS      2     0    400    0.1      400.1
CloudSimExample1 finished!

```

```

Starting CloudSimExample2...
Initializing...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Broker is starting...
Entities started.
0.0: Broker: Cloud Resource List received with 1 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.0: Broker: Trying to Create VM #1 in Datacenter_0
0.1: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: VM #1 has been created in Datacenter #2, Host #0
0.1: Broker: Sending cloudlet 0 to VM #0
0.1: Broker: Sending cloudlet 1 to VM #1
1000.1: Broker: Cloudlet 0 received
1000.1: Broker: Cloudlet 1 received
1000.1: Broker: All Cloudlets executed. Finishing...
1000.1: Broker: Destroying VM #0
1000.1: Broker: Destroying VM #1
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT =====
Cloudlet ID STATUS Data center ID VM ID Time Start Time Finish Time
 0   SUCCESS      2     0    1000   0.1     1000.1
 1   SUCCESS      2     1    1000   0.1     1000.1
CloudSimExample2 finished!

```

```

Starting CloudSimExample3...
Initializing...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Broker is starting...
Entities started.
0.0: Broker: Cloud Resource List received with 1 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.0: Broker: Trying to Create VM #1 in Datacenter_0
0.1: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: VM #1 has been created in Datacenter #2, Host #1
0.1: Broker: Sending cloudlet 0 to VM #0
0.1: Broker: Sending cloudlet 1 to VM #1
0.1: Broker: Cloudlet 0 received
160.1: Broker: All Cloudlets executed. Finishing...
160.1: Broker: Destroying VM #0
160.1: Broker: Destroying VM #1
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT =====
Cloudlet ID  STATUS  Data center ID  VM ID  Time  Start Time  Finish Time
    1      SUCCESS        2          1     80      0.1       80.1
    0      SUCCESS        2          0    160      0.1      160.1
CloudSimExample3 finished!

```

```

Starting CloudSimExample4...
Initializing...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker is starting...
Entities started.
0.0: Broker: Cloud Resource List received with 2 resource(s)
0.0: Broker: Trying to Create VM #0 in Datacenter_0
0.0: Broker: Trying to Create VM #1 in Datacenter_0
[VmScheduler:vmCreate] Allocation of VM #1 to Host #0 failed by MIPS
0.1: Broker: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker: Creation of VM #1 failed in Datacenter #2
0.1: Broker: Trying to Create VM #1 in Datacenter_1
0.2: Broker: VM #1 has been created in Datacenter #3, Host #0
0.2: Broker: Sending cloudlet 0 to VM #0
0.2: Broker: Sending cloudlet 1 to VM #1
0.2: Broker: Cloudlet 0 received
160.2: Broker: All Cloudlets executed. Finishing...
160.2: Broker: Destroying VM #0
160.2: Broker: Destroying VM #1
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT =====
Cloudlet ID  STATUS  Data center ID  VM ID  Time  Start Time  Finish Time
    0      SUCCESS        2          0     160      0.2      160.2
    1      SUCCESS        3          1     160      0.2      160.2
CloudSimExample4 finished!

```

```

Starting CloudSimExample5...
Initializing...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker1 is starting...
Broker2 is starting...
Entities started.
0.0: Broker1: Cloud Resource List received with 2 resource(s)
0.0: Broker2: Cloud Resource List received with 2 resource(s)
0.0: Broker1: Trying to Create VM #0 in Datacenter_0
0.0: Broker2: Trying to Create VM #0 in Datacenter_0
[VmScheduler:vmCreate] Allocation of VM #0 to Host #0 failed by MIPS
0.1: Broker1: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker1: Sending cloudlet 0 to VM #0
0.1: Broker2: Creation of VM #0 failed in Datacenter #2
0.1: Broker2: Trying to Create VM #0 in Datacenter_1
0.2: Broker2: VM #0 has been created in Datacenter #3, Host #0
0.2: Broker2: Sending cloudlet 0 to VM #0
0.2: Broker1: Cloudlet 0 received
160.1: Broker1: All Cloudlets executed. Finishing...
160.1: Broker1: Destroying VM #0
Broker1 is shutting down...
160.2: Broker2: Cloudlet 0 received
160.2: Broker2: All Cloudlets executed. Finishing...
160.2: Broker2: Destroying VM #0
Broker2 is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker1 is shutting down...
Broker2 is shutting down...
Simulation completed.
Simulation completed.

=====> User 4
=====> Output =====
Cloudlet ID  STATUS  Data center ID  VM ID  Time  Start Time  Finish Time
    0      SUCCESS        2          0     160      0.1      160.1
=====> User 5
=====> Output =====
Cloudlet ID  STATUS  Data center ID  VM ID  Time  Start Time  Finish Time
    0      SUCCESS        3          0     160      0.2      160.2
CloudSimExample5 finished!

```



```
[VmScheduler.vmCreate] Allocation of VM #18 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #18 to Host #1 failed by MIPS
[VmScheduler.vmCreate] Allocation of VM #19 to Host #0 failed by RAM
[VmScheduler.vmCreate] Allocation of VM #19 to Host #1 failed by MIPS
0.2: Broker: VM #6 has been created in Datacenter #3, Host #0
0.2: Broker: VM #7 has been created in Datacenter #3, Host #0
0.2: Broker: VM #8 has been created in Datacenter #3, Host #0
0.2: Broker: VM #9 has been created in Datacenter #3, Host #1
0.2: Broker: VM #10 has been created in Datacenter #3, Host #0
0.2: Broker: VM #11 has been created in Datacenter #3, Host #1
0.2: Broker: Creation of VM #12 failed in Datacenter #3
0.2: Broker: Creation of VM #13 failed in Datacenter #3
0.2: Broker: Creation of VM #14 failed in Datacenter #3
0.2: Broker: Creation of VM #15 failed in Datacenter #3
0.2: Broker: Creation of VM #16 failed in Datacenter #3
0.2: Broker: Creation of VM #17 failed in Datacenter #3
0.2: Broker: Creation of VM #18 failed in Datacenter #3
0.2: Broker: Creation of VM #19 failed in Datacenter #3
0.2: Broker: Sending cloudlet 0 to VM #0
0.2: Broker: Sending cloudlet 1 to VM #1
0.2: Broker: Sending cloudlet 2 to VM #2
0.2: Broker: Sending cloudlet 3 to VM #3
0.2: Broker: Sending cloudlet 4 to VM #4
0.2: Broker: Sending cloudlet 5 to VM #5
0.2: Broker: Sending cloudlet 6 to VM #6
0.2: Broker: Sending cloudlet 7 to VM #7
0.2: Broker: Sending cloudlet 8 to VM #8
0.2: Broker: Sending cloudlet 9 to VM #9
0.2: Broker: Sending cloudlet 10 to VM #10
0.2: Broker: Sending cloudlet 11 to VM #11
0.2: Broker: Sending cloudlet 12 to VM #0
0.2: Broker: Sending cloudlet 13 to VM #1
0.2: Broker: Sending cloudlet 14 to VM #2
0.2: Broker: Sending cloudlet 15 to VM #3
0.2: Broker: Sending cloudlet 16 to VM #4
0.2: Broker: Sending cloudlet 17 to VM #5
0.2: Broker: Sending cloudlet 18 to VM #6
0.2: Broker: Sending cloudlet 19 to VM #7
0.2: Broker: Sending cloudlet 20 to VM #8
0.2: Broker: Sending cloudlet 21 to VM #9
0.2: Broker: Sending cloudlet 22 to VM #10
0.2: Broker: Sending cloudlet 23 to VM #11
0.2: Broker: Sending cloudlet 24 to VM #0
0.2: Broker: Sending cloudlet 25 to VM #1
0.2: Broker: Sending cloudlet 26 to VM #2
0.2: Broker: Sending cloudlet 27 to VM #3
0.2: Broker: Sending cloudlet 28 to VM #4
0.2: Broker: Sending cloudlet 29 to VM #5
0.2: Broker: Sending cloudlet 30 to VM #6
0.2: Broker: Sending cloudlet 31 to VM #7
0.2: Broker: Sending cloudlet 32 to VM #8
0.2: Broker: Sending cloudlet 33 to VM #9
0.2: Broker: Sending cloudlet 34 to VM #10
0.2: Broker: Sending cloudlet 35 to VM #11
0.2: Broker: Sending cloudlet 36 to VM #0
0.2: Broker: Sending cloudlet 37 to VM #1
0.2: Broker: Sending cloudlet 38 to VM #2
0.2: Broker: Sending cloudlet 39 to VM #3
3.198000000000004: Broker: Cloudlet 4 received
3.198000000000004: Broker: Cloudlet 16 received
3.198000000000004: Broker: Cloudlet 28 received
3.198000000000004: Broker: Cloudlet 5 received
3.198000000000004: Broker: Cloudlet 17 received
3.198000000000004: Broker: Cloudlet 29 received
3.198000000000004: Broker: Cloudlet 6 received
3.198000000000004: Broker: Cloudlet 18 received
3.198000000000004: Broker: Cloudlet 30 received
3.198000000000004: Broker: Cloudlet 7 received
3.198000000000004: Broker: Cloudlet 19 received
3.198000000000004: Broker: Cloudlet 31 received
3.198000000000004: Broker: Cloudlet 1 received
3.198000000000004: Broker: Cloudlet 20 received
3.198000000000004: Broker: Cloudlet 32 received
3.198000000000004: Broker: Cloudlet 18 received
3.198000000000004: Broker: Cloudlet 22 received
3.198000000000004: Broker: Cloudlet 34 received
3.198000000000004: Broker: Cloudlet 9 received
3.198000000000004: Broker: Cloudlet 21 received
3.198000000000004: Broker: Cloudlet 33 received
3.198000000000004: Broker: Cloudlet 11 received
3.198000000000004: Broker: Cloudlet 23 received
3.198000000000004: Broker: Cloudlet 35 received
4.198: Broker: Cloudlet 0 received
4.198: Broker: Cloudlet 12 received
4.198: Broker: Cloudlet 24 received
4.198: Broker: Cloudlet 16 received
4.198: Broker: Cloudlet 14 received
4.198: Broker: Cloudlet 13 received
4.198: Broker: Cloudlet 25 received
4.198: Broker: Cloudlet 37 received
```

```

4.198: Broker: Cloudlet 2 received
4.198: Broker: Cloudlet 14 received
4.198: Broker: Cloudlet 26 received
4.198: Broker: Cloudlet 38 received
4.198: Broker: Cloudlet 3 received
4.198: Broker: Cloudlet 15 received
4.198: Broker: Cloudlet 27 received
4.198: Broker: Cloudlet 39 received
4.198: Broker: All Cloudlets executed. Finishing...
4.198: Broker: Destroying VM #0
4.198: Broker: Destroying VM #1
4.198: Broker: Destroying VM #2
4.198: Broker: Destroying VM #3
4.198: Broker: Destroying VM #4
4.198: Broker: Destroying VM #5
4.198: Broker: Destroying VM #6
4.198: Broker: Destroying VM #7
4.198: Broker: Destroying VM #8
4.198: Broker: Destroying VM #9
4.198: Broker: Destroying VM #10
4.198: Broker: Destroying VM #11
Broker is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down.
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker is shutting down...
Simulation completed.
Simulation completed.

```

```

===== OUTPUT =====
Cloudlet ID STATUS Data center ID VM ID Time Start Time Finish Time
4 SUCCESS 2 4 3 0.2 3.2
16 SUCCESS 2 4 3 0.2 3.2
28 SUCCESS 2 4 3 0.2 3.2
5 SUCCESS 2 5 3 0.2 3.2
17 SUCCESS 2 5 3 0.2 3.2
29 SUCCESS 2 5 3 0.2 3.2
6 SUCCESS 3 6 3 0.2 3.2
18 SUCCESS 3 6 3 0.2 3.2
30 SUCCESS 3 6 3 0.2 3.2
7 SUCCESS 3 7 3 0.2 3.2
19 SUCCESS 3 7 3 0.2 3.2
31 SUCCESS 3 7 3 0.2 3.2
8 SUCCESS 3 8 3 0.2 3.2
20 SUCCESS 3 8 3 0.2 3.2
32 SUCCESS 3 8 3 0.2 3.2
10 SUCCESS 3 10 3 0.2 3.2
22 SUCCESS 3 10 3 0.2 3.2
34 SUCCESS 3 10 3 0.2 3.2
9 SUCCESS 3 9 3 0.2 3.2

```

```

9 SUCCESS 3 9 3 0.2 3.2
21 SUCCESS 3 9 3 0.2 3.2
33 SUCCESS 3 9 3 0.2 3.2
11 SUCCESS 3 11 3 0.2 3.2
23 SUCCESS 3 11 3 0.2 3.2
35 SUCCESS 3 11 3 0.2 3.2
0 SUCCESS 2 0 4 0.2 4.2
12 SUCCESS 2 0 4 0.2 4.2
24 SUCCESS 2 0 4 0.2 4.2
36 SUCCESS 2 0 4 0.2 4.2
1 SUCCESS 2 1 4 0.2 4.2
13 SUCCESS 2 1 4 0.2 4.2
25 SUCCESS 2 1 4 0.2 4.2
37 SUCCESS 2 1 4 0.2 4.2
2 SUCCESS 2 2 4 0.2 4.2
14 SUCCESS 2 2 4 0.2 4.2
26 SUCCESS 2 2 4 0.2 4.2
38 SUCCESS 2 2 4 0.2 4.2
3 SUCCESS 2 3 4 0.2 4.2
15 SUCCESS 2 3 4 0.2 4.2
27 SUCCESS 2 3 4 0.2 4.2
39 SUCCESS 2 3 4 0.2 4.2

```

CloudSimExample6 finished!

```

Starting CloudSimExample7...
Initializing...
Starting CloudSim version 3.0
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker_0 is starting...
Entitites started
0.0: Broker_0: Cloud Resource List received with 2 resource(s)
0.0: Broker_0: Trying to Create VM #0 in Datacenter_0
0.0: Broker_0: Trying to Create VM #1 in Datacenter_0
0.0: Broker_0: Trying to Create VM #2 in Datacenter_0
0.0: Broker_0: Trying to Create VM #3 in Datacenter_0
0.0: Broker_0: Trying to Create VM #4 in Datacenter_0
0.1: Broker_0: VM #0 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #1 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #2 has been created in Datacenter #2, Host #0
0.1: Broker_0: VM #3 has been created in Datacenter #2, Host #1
0.1: Broker_0: VM #4 has been created in Datacenter #2, Host #0
0.1: Broker_0: Sending cloudlet 0 to VM #0
0.1: Broker_0: Sending cloudlet 1 to VM #0
0.1: Broker_0: Sending cloudlet 2 to VM #2
0.1: Broker_0: Sending cloudlet 3 to VM #3
0.1: Broker_0: Sending cloudlet 4 to VM #4
0.1: Broker_0: Sending cloudlet 5 to VM #0
0.1: Broker_0: Sending cloudlet 6 to VM #1
0.1: Broker_0: Sending cloudlet 7 to VM #2
0.1: Broker_0: Sending cloudlet 8 to VM #3
0.1: Broker_0: Sending cloudlet 9 to VM #4

```

200.0: The simulation is paused for 5 sec

```

Adding: Broker_1
Broker_1 is starting...
200.0: Broker_1: Cloud Resource List received with 2 resource(s)
200.0: Broker_1: Trying to Create VM #100 in Datacenter_0
200.0: Broker_1: Trying to Create VM #101 in Datacenter_0
200.0: Broker_1: Trying to Create VM #102 in Datacenter_0
200.0: Broker_1: Trying to Create VM #103 in Datacenter_0
200.0: Broker_1: Trying to Create VM #104 in Datacenter_0
200.0: Broker_1: Trying to Create VM #105 in Datacenter_0
200.1: Broker_1: VM #100 has been created in Datacenter #2, Host #1
200.1: Broker_1: VM #101 has been created in Datacenter #2, Host #0
200.1: Broker_1: VM #102 has been created in Datacenter #2, Host #1
200.1: Broker_1: VM #103 has been created in Datacenter #2, Host #0
200.1: Broker_1: VM #104 has been created in Datacenter #2, Host #1
200.1: Broker_1: Sending cloudlet 100 to VM #100
200.1: Broker_1: Sending cloudlet 101 to VM #101

```

===== OUTPUT =====							
Cloudlet ID	Status	Data center ID	VM ID	Time	Start Time	Finish Time	
0	SUCCESS	2	0	320	0.1	320.1	
5	SUCCESS	2	0	320	0.1	320.1	
1	SUCCESS	2	1	320	0.1	320.1	
6	SUCCESS	2	1	320	0.1	320.1	
2	SUCCESS	2	2	320	0.1	320.1	
7	SUCCESS	2	2	320	0.1	320.1	
4	SUCCESS	2	4	320	0.1	320.1	
9	SUCCESS	2	4	320	0.1	320.1	
3	SUCCESS	2	3	320	0.1	320.1	
8	SUCCESS	2	3	320	0.1	320.1	

CloudSimExample7 finished!

```
Starting CloudSimExample8...
Initialising...
Starting Cloudsim version 3.0
GlobalBroker is starting...
Datacenter_0 is starting...
Datacenter_1 is starting...
Broker_0 is starting...
Entities started.
0:0: Broker_0: Cloud Resource List received with 2 resource(s)
0:0: Broker_0: Trying to Create VM #0 in Datacenter_0
0:0: Broker_0: Trying to Create VM #1 in Datacenter_0
0:0: Broker_0: Trying to Create VM #2 in Datacenter_0
0:0: Broker_0: Trying to Create VM #3 in Datacenter_0
0:0: Broker_0: Trying to Create VM #4 in Datacenter_0
0:1: Broker_0: VM #0 has been created in Datacenter #3, Host #0
0:1: Broker_0: VM #1 has been created in Datacenter #3, Host #0
0:1: Broker_0: VM #2 has been created in Datacenter #3, Host #0
0:1: Broker_0: VM #3 has been created in Datacenter #3, Host #1
0:1: Broker_0: VM #4 has been created in Datacenter #3, Host #0
0:1: Broker_0: Sending cloudlet 0 to VM #0
0:1: Broker_0: Sending cloudlet 1 to VM #1
0:1: Broker_0: Sending cloudlet 2 to VM #2
0:1: Broker_0: Sending cloudlet 3 to VM #3
0:1: Broker_0: Sending cloudlet 4 to VM #4
0:1: Broker_0: Sending cloudlet 5 to VM #0
0:1: Broker_0: Sending cloudlet 6 to VM #1
0:1: Broker_0: Sending cloudlet 7 to VM #2
0:1: Broker_0: Sending cloudlet 8 to VM #3
0:1: Broker_0: Sending cloudlet 9 to VM #4
Adding: GlobalBroker
GlobalBroker is starting...
200:0: GlobalBroker.: Cloud Resource List received with 2 resource(s)
200:0: GlobalBroker.: Trying to Create VM #100 in Datacenter_0
200:0: GlobalBroker.: Trying to Create VM #101 in Datacenter_0
200:0: GlobalBroker.: Trying to Create VM #102 in Datacenter_0
200:0: GlobalBroker.: Trying to Create VM #103 in Datacenter_0
200:0: GlobalBroker.: Trying to Create VM #104 in Datacenter_0
200:1: GlobalBroker.: VM #100 has been created in Datacenter #3, Host #1
200:1: GlobalBroker.: VM #101 has been created in Datacenter #3, Host #0
200:1: GlobalBroker.: VM #102 has been created in Datacenter #3, Host #1
200:1: GlobalBroker.: VM #103 has been created in Datacenter #3, Host #0
200:1: GlobalBroker.: VM #104 has been created in Datacenter #3, Host #1
200:1: GlobalBroker.: Sending cloudlet 100 to VM #100
200:1: GlobalBroker.: Sending cloudlet 101 to VM #101
200:1: GlobalBroker.: Sending cloudlet 102 to VM #102
200:1: GlobalBroker.: Sending cloudlet 103 to VM #103
200:1: GlobalBroker.: Sending cloudlet 104 to VM #104
200:1: GlobalBroker.: Sending cloudlet 105 to VM #100
```

```

200.1: GlobalBroker_0: Sending cloudlet 106 to VM #101
200.1: GlobalBroker_0: Sending cloudlet 107 to VM #102
200.1: GlobalBroker_0: Sending cloudlet 108 to VM #103
200.1: GlobalBroker_0: Sending cloudlet 109 to VM #104
320.1: Broker_0: Cloudlet 0 received
320.1: Broker_0: Cloudlet 5 received
320.1: Broker_0: Cloudlet 1 received
320.1: Broker_0: Cloudlet 6 received
320.1: Broker_0: Cloudlet 2 received
320.1: Broker_0: Cloudlet 7 received
320.1: Broker_0: Cloudlet 4 received
320.1: Broker_0: Cloudlet 9 received
320.1: Broker_0: Cloudlet 3 received
320.1: Broker_0: Cloudlet 8 received
320.1: Broker_0: All Cloudlets executed. Finishing...
320.1: Broker_0: Destroying VM #1
320.1: Broker_0: Destroying VM #2
320.1: Broker_0: Destroying VM #3
320.1: Broker_0: Destroying VM #4
Broker_0 is shutting down...
520.1: GlobalBroker_0: Cloudlet 101 received
520.1: GlobalBroker_0: Cloudlet 106 received
520.1: GlobalBroker_0: Cloudlet 103 received
520.1: GlobalBroker_0: Cloudlet 108 received
520.1: GlobalBroker_0: Cloudlet 100 received
520.1: GlobalBroker_0: Cloudlet 105 received
520.1: GlobalBroker_0: Cloudlet 102 received
520.1: GlobalBroker_0: Cloudlet 107 received
520.1: GlobalBroker_0: Cloudlet 104 received
520.1: GlobalBroker_0: All Cloudlets executed
520.1: GlobalBroker_0: Destroying VM #100
520.1: GlobalBroker_0: Destroying VM #101
520.1: GlobalBroker_0: Destroying VM #102
520.1: GlobalBroker_0: Destroying VM #103
520.1: GlobalBroker_0: Destroying VM #104
GlobalBroker_0 is shutting down...
Simulation: No more future events
CloudInformationService: Notify all CloudSim entities for shutting down...
Datacenter_0 is shutting down...
Datacenter_1 is shutting down...
Broker_0 is shutting down...
GlobalBroker_0 is shutting down...
Simulation completed.
Simulation completed.

===== OUTPUT =====
Cloudlet ID STATUS Data center ID VM ID Time Start Time Finish Time
 0 SUCCESS   3     0    320   0.1      320.1
  5 SUCCESS   3     0    320   0.1      320.1

 1  SUCCESS   3     1    320   0.1      320.1
 6  SUCCESS   3     1    320   0.1      320.1
 2  SUCCESS   3     2    320   0.1      320.1
 7  SUCCESS   3     2    320   0.1      320.1
 4  SUCCESS   3     4    320   0.1      320.1
 9  SUCCESS   3     4    320   0.1      320.1
 3  SUCCESS   3     3    320   0.1      320.1
 8  SUCCESS   3     3    320   0.1      320.1
101 SUCCESS   3    101   320   200.1    520.1
106 SUCCESS   3    101   320   200.1    520.1
103 SUCCESS   3    103   320   200.1    520.1
108 SUCCESS   3    103   320   200.1    520.1
100 SUCCESS   3    100   320   200.1    520.1
105 SUCCESS   3    100   320   200.1    520.1
102 SUCCESS   3    102   320   200.1    520.1
107 SUCCESS   3    102   320   200.1    520.1
104 SUCCESS   3    104   320   200.1    520.1
109 SUCCESS   3    104   320   200.1    520.1
CloudSimExample8 finished!

```

## Questions:

### What are cloudlets?

Cloudlets in CloudSim are lightweight computational tasks that represent user applications or workloads submitted to the cloud for execution. They model the processing requirements of real-world applications, including factors like execution time, file size, and resource utilization. Cloudlets are assigned to Virtual Machines (VMs) in a data center, where they get executed based on scheduling policies.

## Outcomes: CO3 — Analyze different cloud architectures and IOT cloud

### Conclusion: (Conclusion to be based on the objectives and outcomes achieved)

CloudSim is a powerful simulation framework that enables researchers and developers to model and analyze cloud computing environments without deploying actual infrastructure. Through various predefined examples, it demonstrates how cloud resources such as data centers, hosts, VMs, and cloudlets interact. By modifying configurations like the number of cloudlets, VMs, or data centers, users can observe the impact on performance, efficiency, and resource allocation. CloudSim is a valuable tool for studying cloud computing scenarios, optimizing resource

management, and improving cloud-based services.

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**Grade: AA / AB / BB / BC / CC / CD / DD**

**Signature of faculty in-charge with date**

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<https://www.youtube.com/watch?v=YYTrlyUYpRU>  
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