**Experiment No. 07**

**Title:** Monitor performance of existing algorithms using Cloud Analyst

**Batch: B–1** **Roll No.: 16010422234** **Experiment No.: 07**

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**Title:** Monitor performance of existing algorithms using Cloud Analyst

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**Resources needed: Cloudsim toolkit**

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**Theory:**

There are several extremely good toolkits that can be used to model a simulated environment to study the behavior of a large scaled application on the Internet. But it became apparent that having an easy to use tool with a level of visualization capability is even better than just a toolkit. Such a tool separates the simulation experiment set up exercise from a programming exercise and enables a modeler to concentrate on the simulation parameters rather than the technicalities of programming. It also enables the modeler to execute simulations repeatedly with modifications to the parameters quickly and easily. A graphical output of the simulation results enables the results to be analyzed more easily and more efficiently and it may also help in quickly highlighting any problems with the performance and accuracy of the simulation logic.

**Technologies used to develop cloud analyst tool**

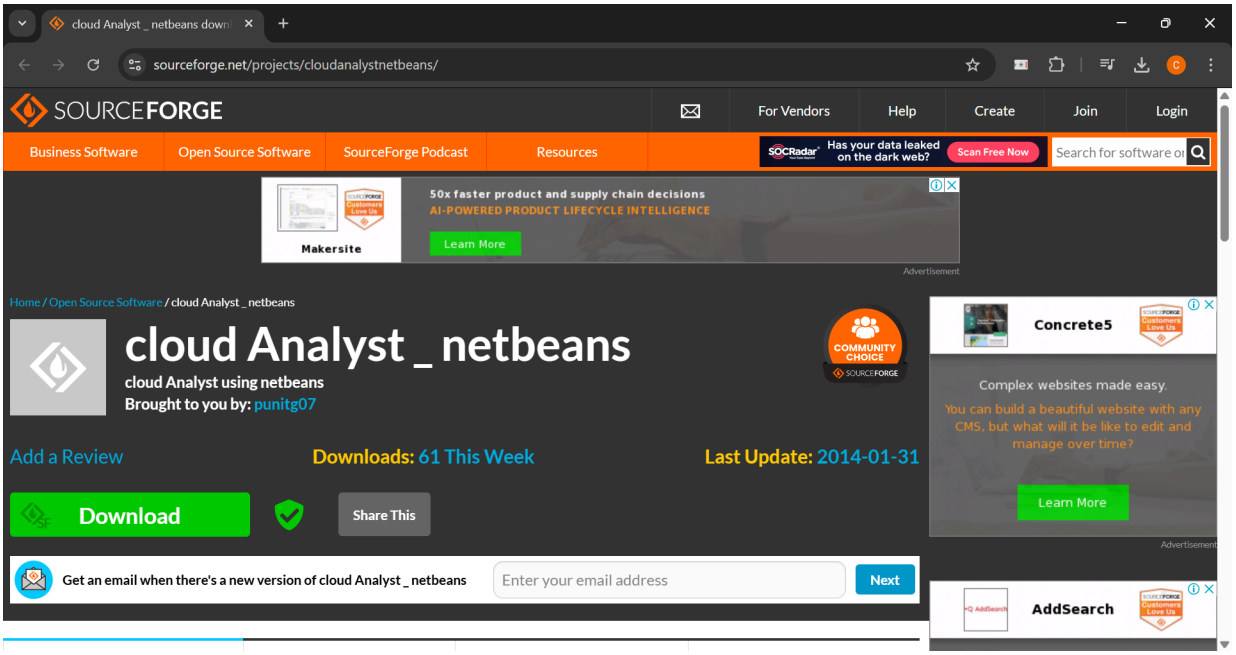
- Java – The simulator is developed 100% on the Java platform, using Java SE 1.6.
- Java Swing – The GUI component is built using Swing components.
- CloudSim – CloudSim features for modelling data centers is used in CloudAnalyst.
- SimJava – Sim Java is the underlying simulation framework of CloudSim and some features of SimJava are used directly in CloudAnalyst.

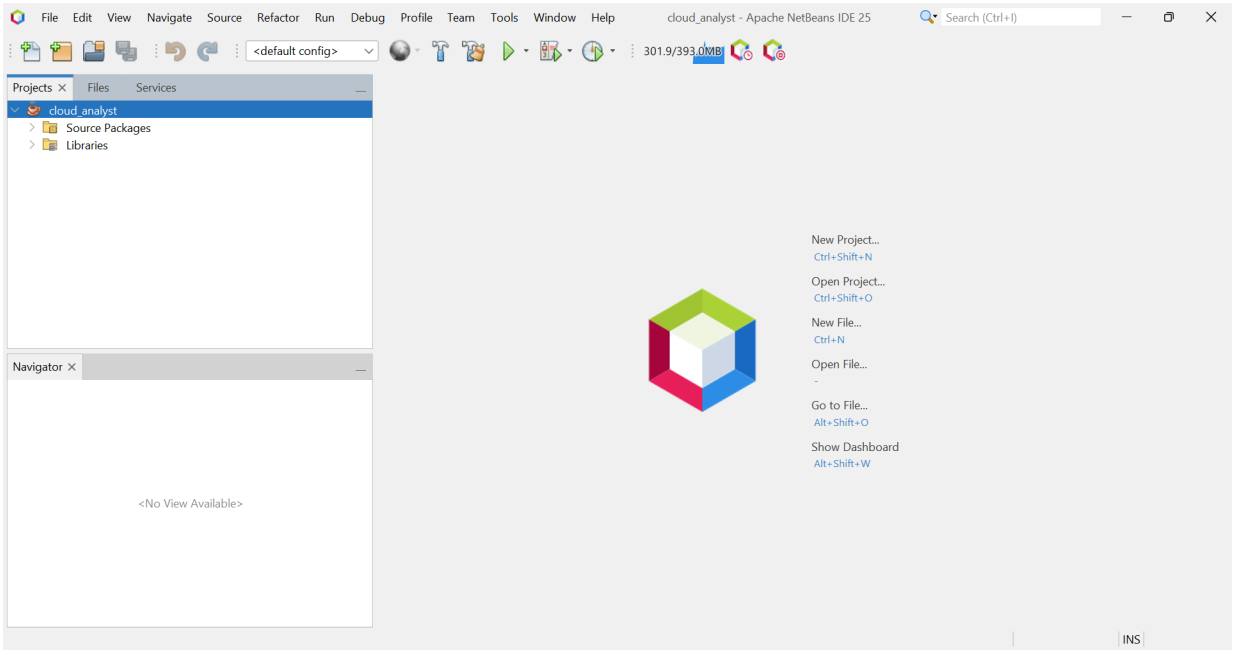
**Simulation Output / What is being Measured**

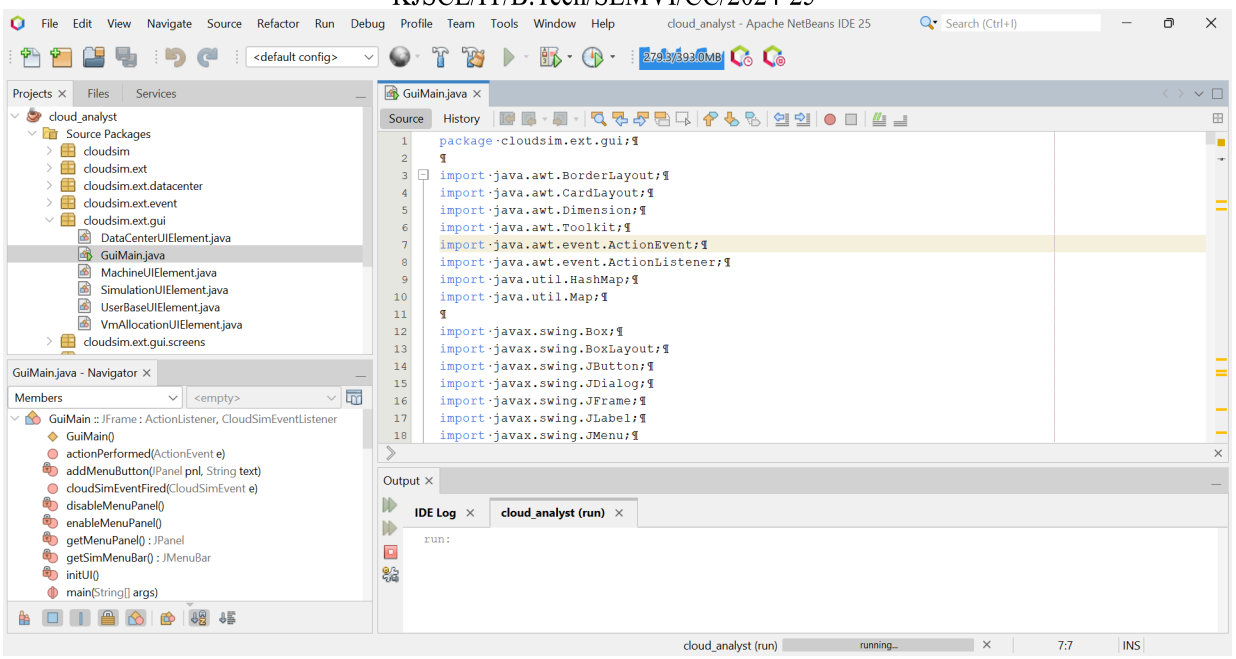
Following are the statistical measures produced as output of the simulation in the initial version of the simulator.

- Response time of the simulated application
- Overall average, minimum and maximum response time of all user requests simulated o The response time broken down by user groups, located within geographical regions
- The response time further broken down by the time showing the pattern of change over the duration of a day
- The usage patterns of the application o How many users use the application at what time from different regions of the world, and the overall effect of that usage on the data centers hosting the application
- The time taken by data centers to service a user request o The overall request processing time for the entire simulation o The average, minimum and maximum request processing time by each data center o The response time variation pattern during the day as the load changes
- The cost of operation

**Results: Attach the snapshots of execution**




File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
cloud_analyst - Apache NetBeans IDE 25
Search (Ctrl+I)
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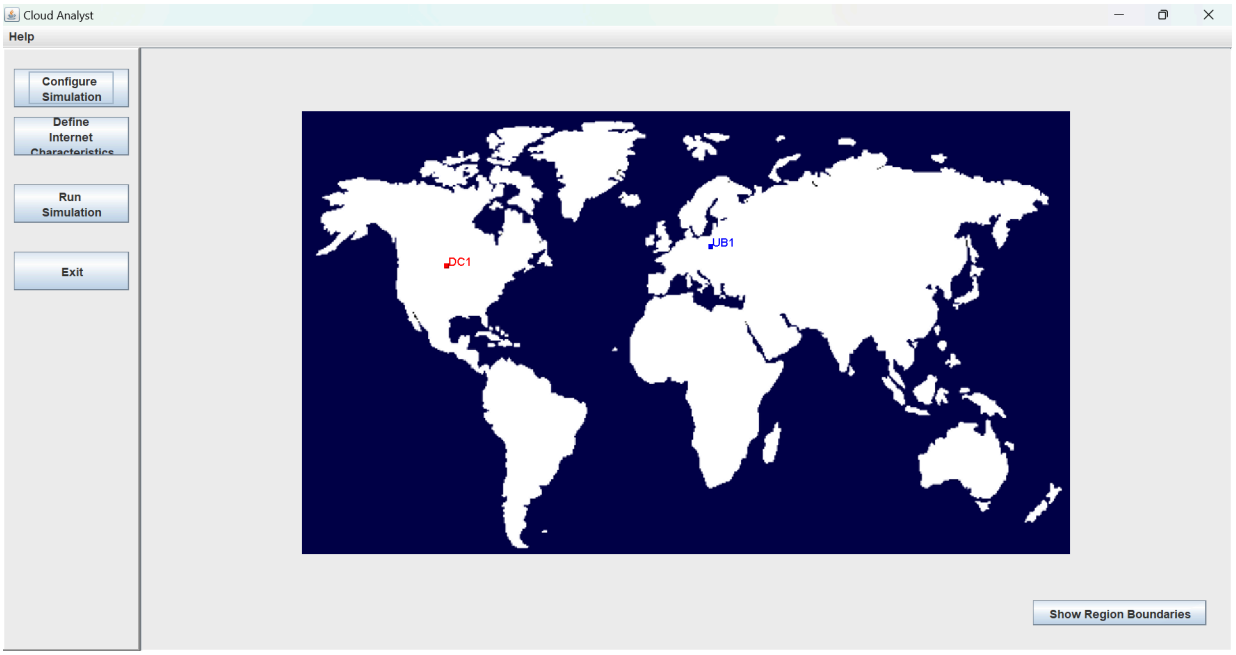
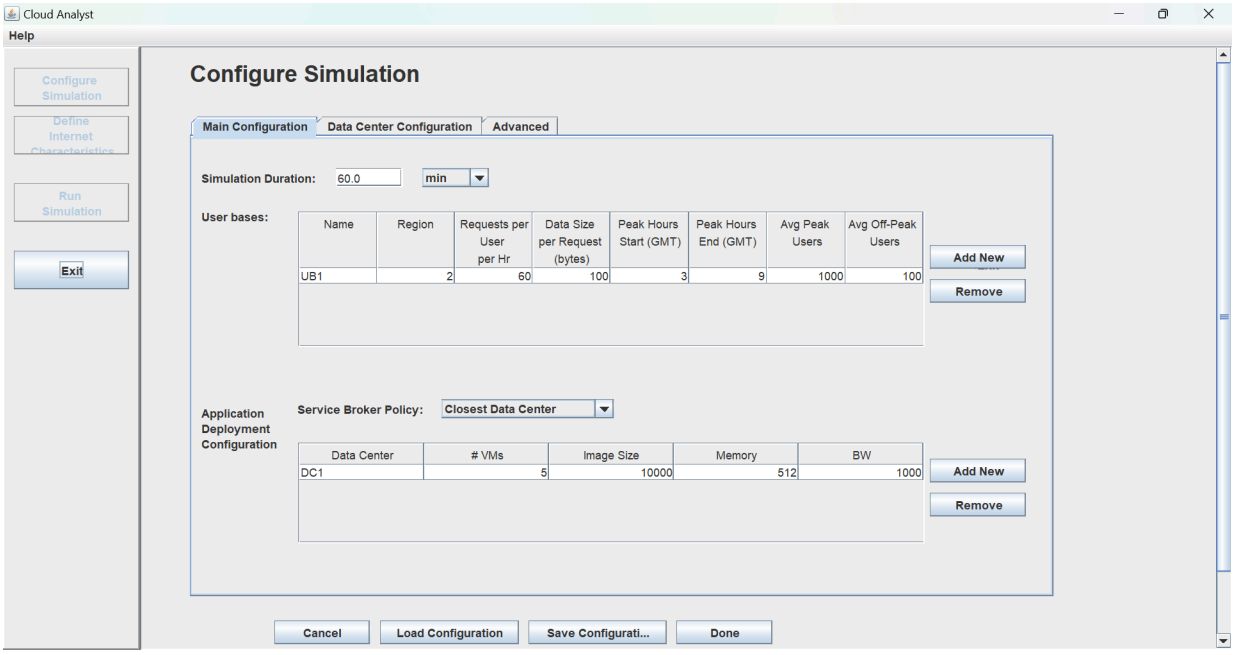
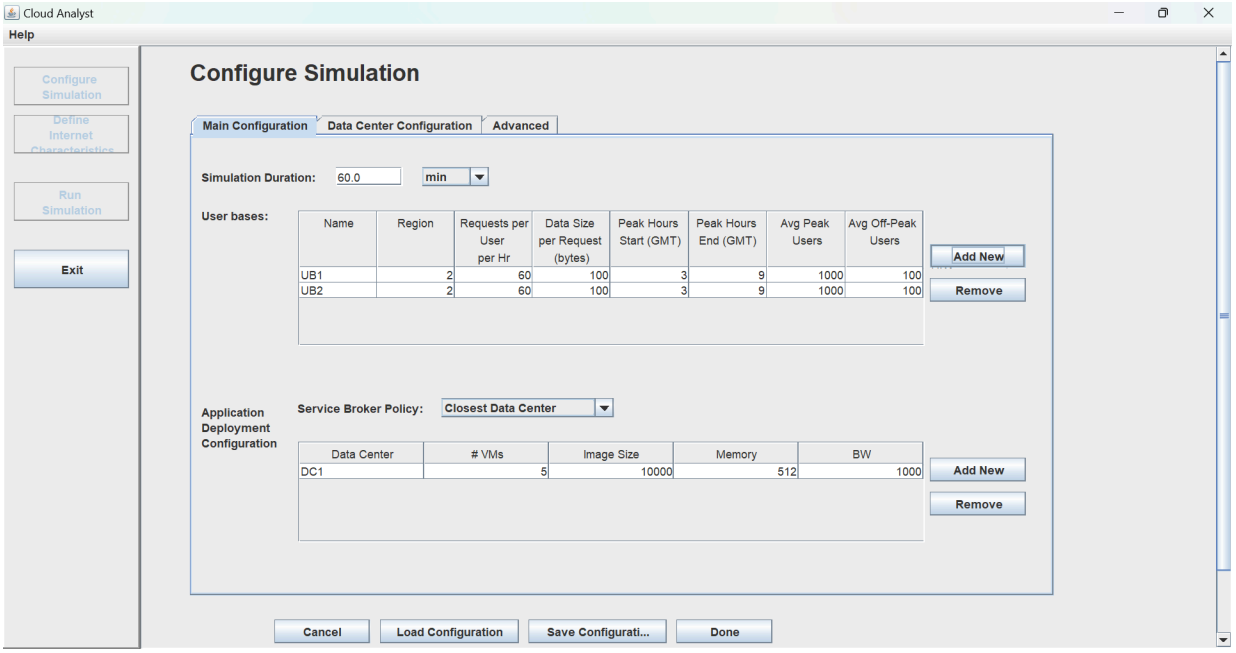
Projects
Files
Services
cloud_analyst
Source Packages
cloudsim
cloudsim.ext
cloudsim.ext.datacenter
cloudsim.ext.event
cloudsim.ext.gui
DataCenterUIElement.java
GuiMain.java
MachineUIElement.java
SimulationUIElement.java
UserBaseUIElement.java
VmAllocationUIElement.java
cloudsim.ext.gui.screens
GuiMain.java - Navigator
Members
GuiMain :: JFrame : ActionListener, CloudSimEventListener
GuiMain()
actionPerformed(ActionEvent e)
addMenuButton(JPanel pnl, String text)
cloudSimEventFired(CloudSimEvent e)
disableMenuPanel()
enableMenuPanel()
getMenuPanel() : JPanel
getSimMenuBar() : JMenuBar
initUI()
main(String[] args)
GuiMain.java
Source
History
package cloudsim.ext.gui;
import java.awt.BorderLayout;
import java.awt.CardLayout;
import java.awt.Dimension;
import java.awt.Toolkit;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.util.HashMap;
import java.util.Map;
import javax.swing.Box;
import javax.swing.BoxLayout;
import javax.swing.JButton;
import javax.swing.JDialog;
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JMenu;
Output
IDE Log
cloud_analyst (run)
run:
cloud_analyst (run)
running...
7:7
INS


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
DC1
UB1
Show Region Boundaries


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
Simulation Duration:
60.0
min
User bases:
Name
Region
Requests per User per Hr
Data Size per Request (bytes)
Peak Hours Start (GMT)
Peak Hours End (GMT)
Avg Peak Users
Avg Off-Peak Users
UB1
2
60
100
3
9
1000
100
Add New
Remove
Application Deployment Configuration
Service Broker Policy:
Closest Data Center
Data Center
# VMs
Image Size
Memory
BW
DC1
5
10000
512
1000
Add New
Remove
Cancel
Load Configuration
Save Configurati...
Done


Cloud Analyst
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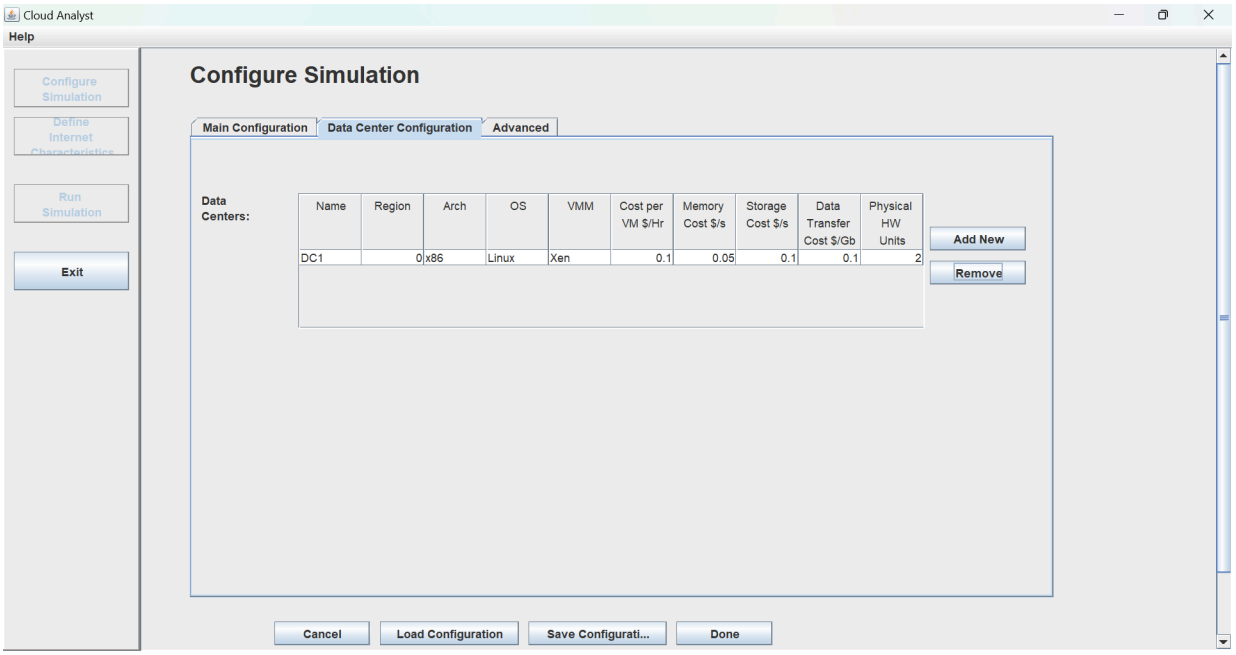
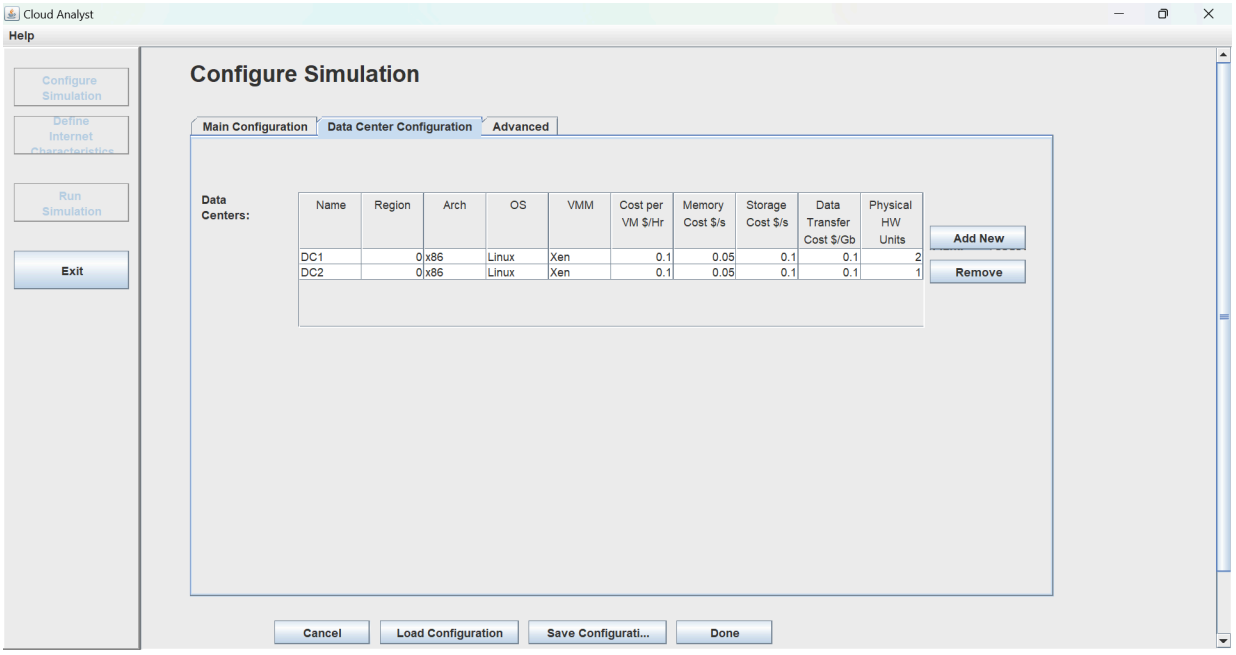
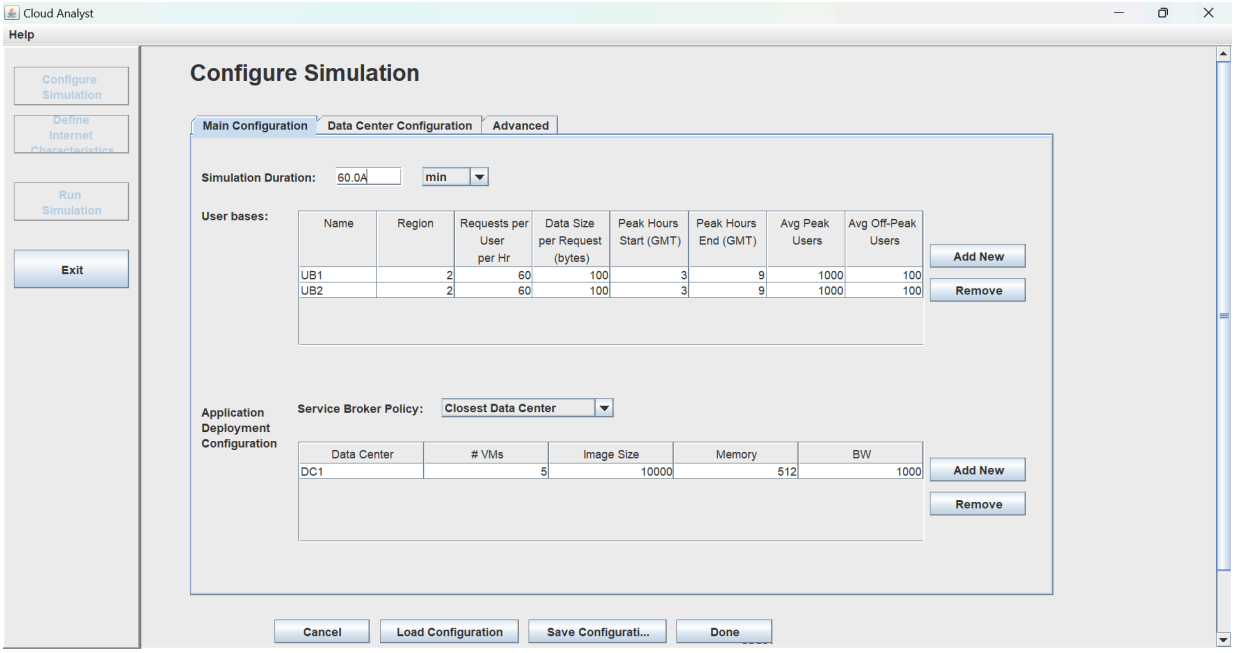
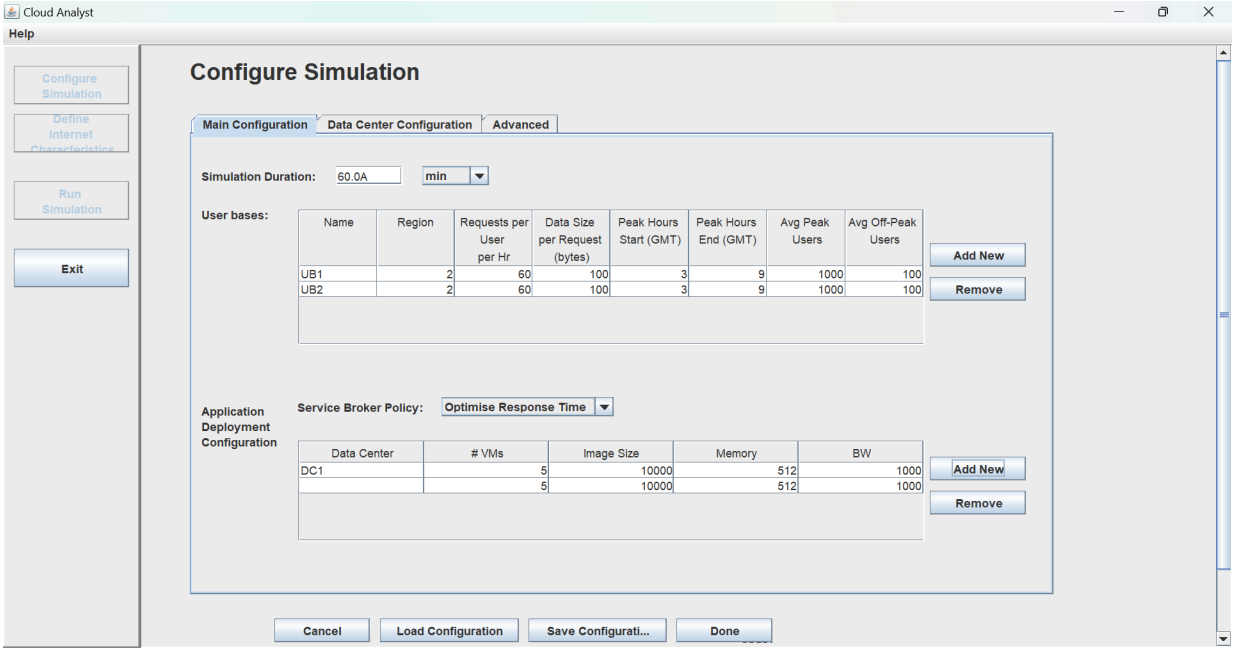
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
Simulation Duration:
60.0
min
User bases:
Name
Region
Requests per User per Hr
Data Size per Request (bytes)
Peak Hours Start (GMT)
Peak Hours End (GMT)
Avg Peak Users
Avg Off-Peak Users
UB1 2 60 100 3 9 1000 100
UB2 2 60 100 3 9 1000 100
Add New
Remove
Application Deployment Configuration
Service Broker Policy:
Closest Data Center
Data Center
# VMs
Image Size
Memory
BW
DC1 5 10000 512 1000
Add New
Remove
Cancel
Load Configuration
Save Configurati...
Done


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
Data Centers:
Name
Region
Arch
OS
VMM
Cost per VM $/Hr
Memory Cost $/s
Storage Cost $/s
Data Transfer Cost $/Gb
Physical HW Units
DC1 0 x86 Linux Xen 0.1 0.05 0.1 0.1 2
Add New
Remove
Cancel
Load Configuration
Save Configurati...
Done


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
Data Centers:
Name
Region
Arch
OS
VMM
Cost per VM $/Hr
Memory Cost $/s
Storage Cost $/s
Data Transfer Cost $/Gb
Physical HW Units
DC1 0 x86 Linux Xen 0.1 0.05 0.1 0.1 2
DC2 0 x86 Linux Xen 0.1 0.05 0.1 0.1 1
Add New
Remove
Cancel
Load Configuration
Save Configurati...
Done


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
Simulation Duration: 60.0A min
User bases:
Name | Region | Requests per User per Hr | Data Size per Request (bytes) | Peak Hours Start (GMT) | Peak Hours End (GMT) | Avg Peak Users | Avg Off-Peak Users
UB1 | 2 | 60 | 100 | 3 | 9 | 1000 | 100
UB2 | 2 | 60 | 100 | 3 | 9 | 1000 | 100
Add New
Remove
Application Deployment Configuration
Service Broker Policy: Closest Data Center
Data Center | # VMs | Image Size | Memory | BW
DC1 | 5 | 10000 | 512 | 1000
Add New
Remove
Cancel
Load Configuration
Save Configurati...
Done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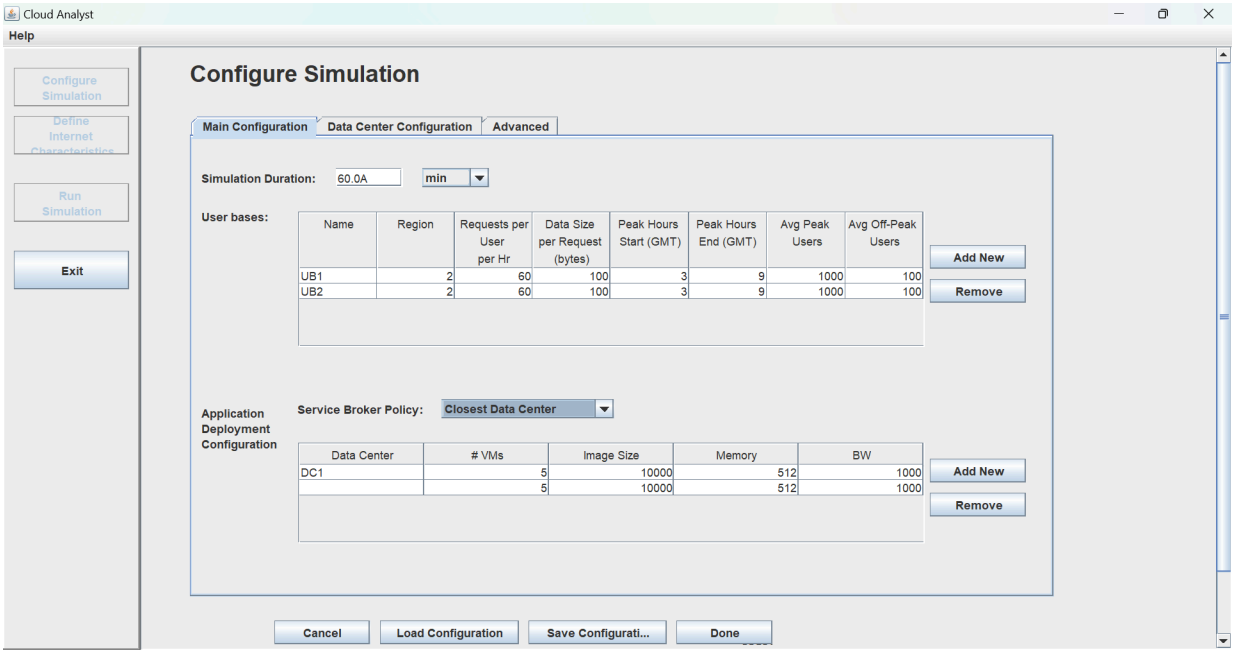
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
Simulation Duration: 60.0A min
User bases:
Name | Region | Requests per User per Hr | Data Size per Request (bytes) | Peak Hours Start (GMT) | Peak Hours End (GMT) | Avg Peak Users | Avg Off-Peak Users
UB1 | 2 | 60 | 100 | 3 | 9 | 1000 | 100
UB2 | 2 | 60 | 100 | 3 | 9 | 1000 | 100
Add New
Remove
Application Deployment Configuration
Service Broker Policy: Optimise Response Time
Data Center | # VMs | Image Size | Memory | BW
DC1 | 5 | 10000 | 512 | 1000
5 | 10000 | 512 | 1000
Add New
Remove
Cancel
Load Configuration
Save Configurati...
Done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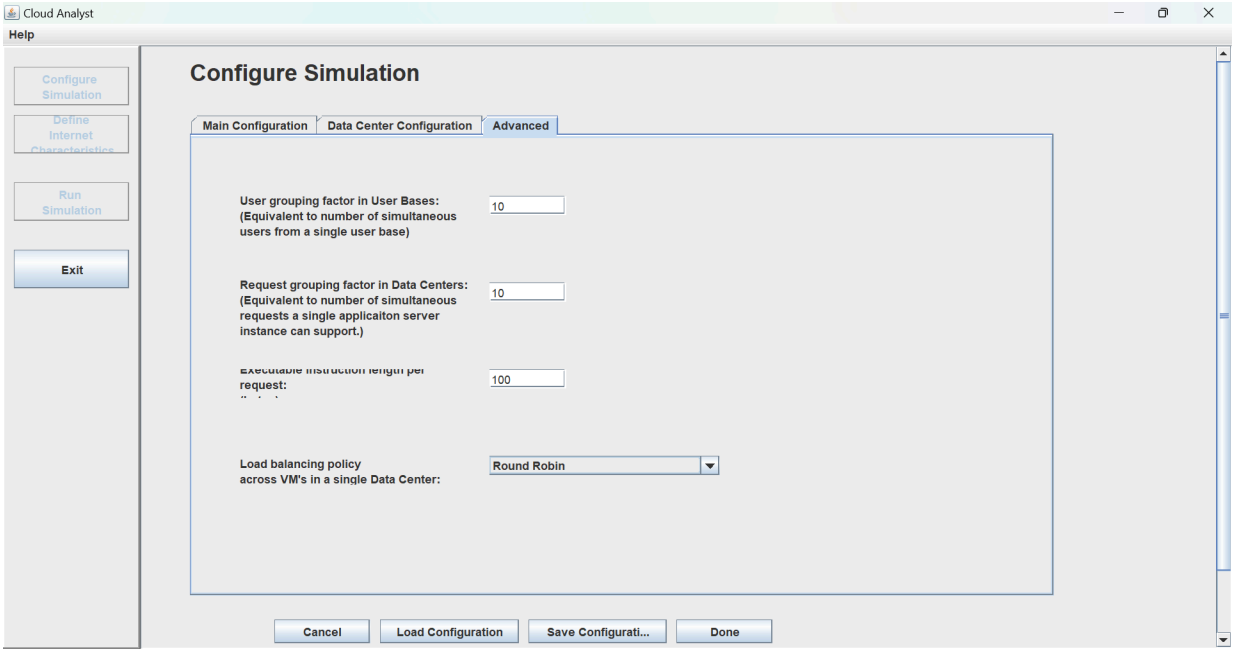
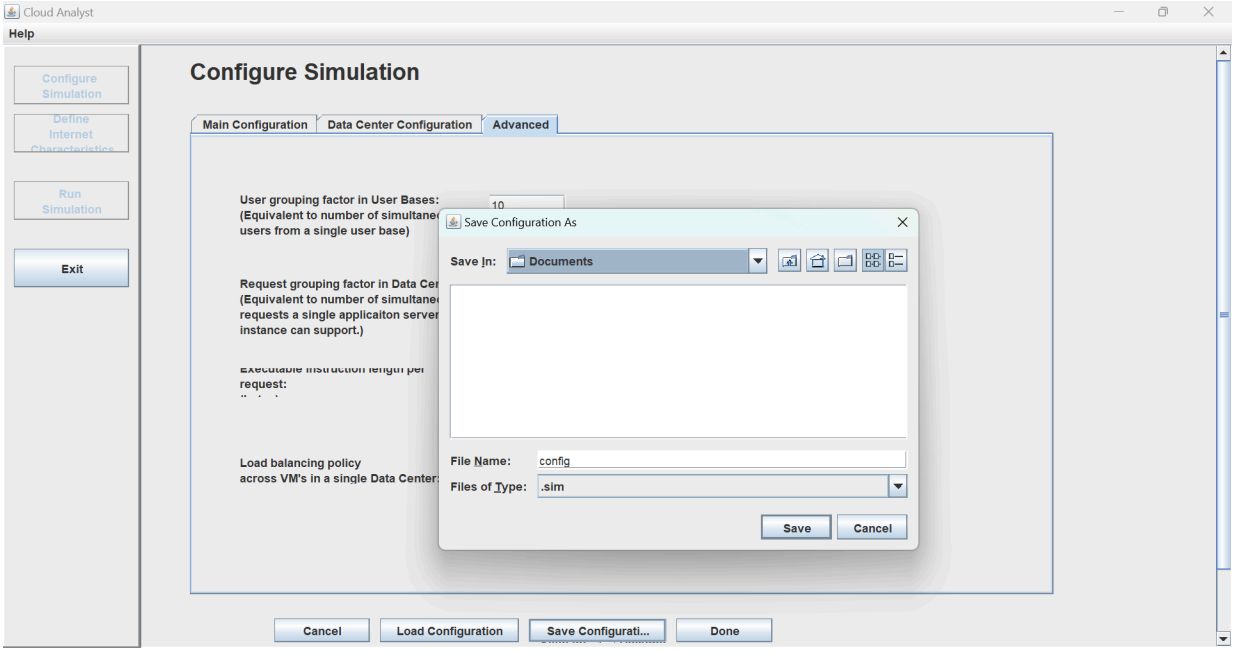
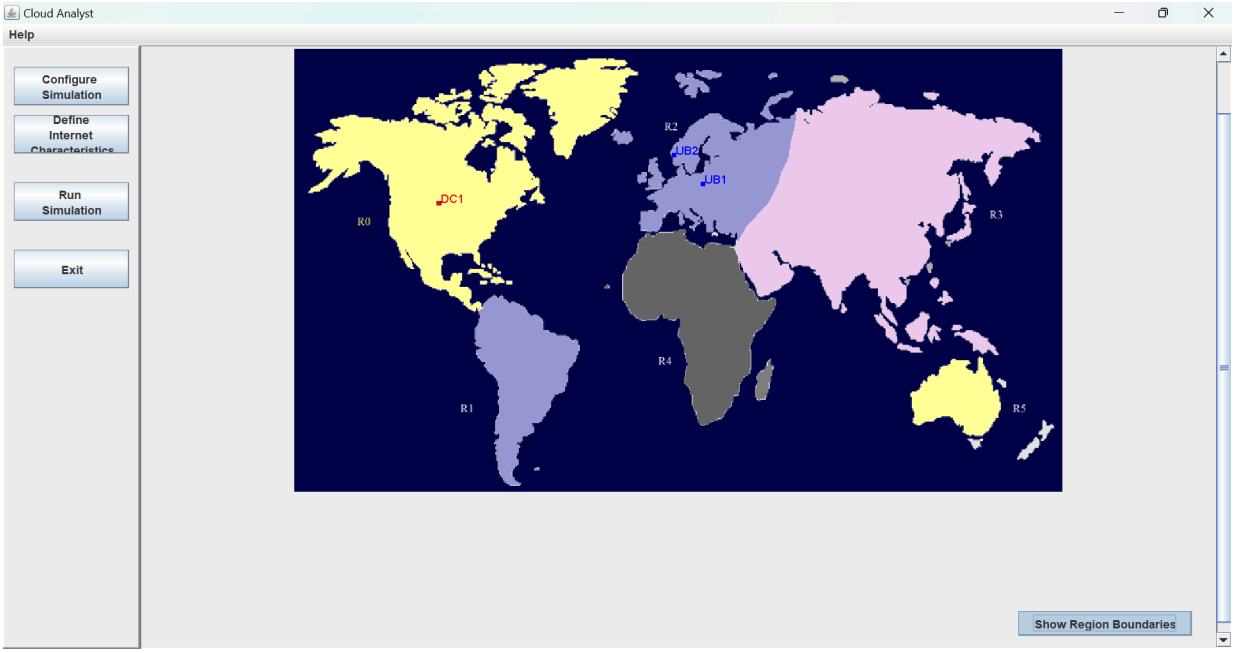
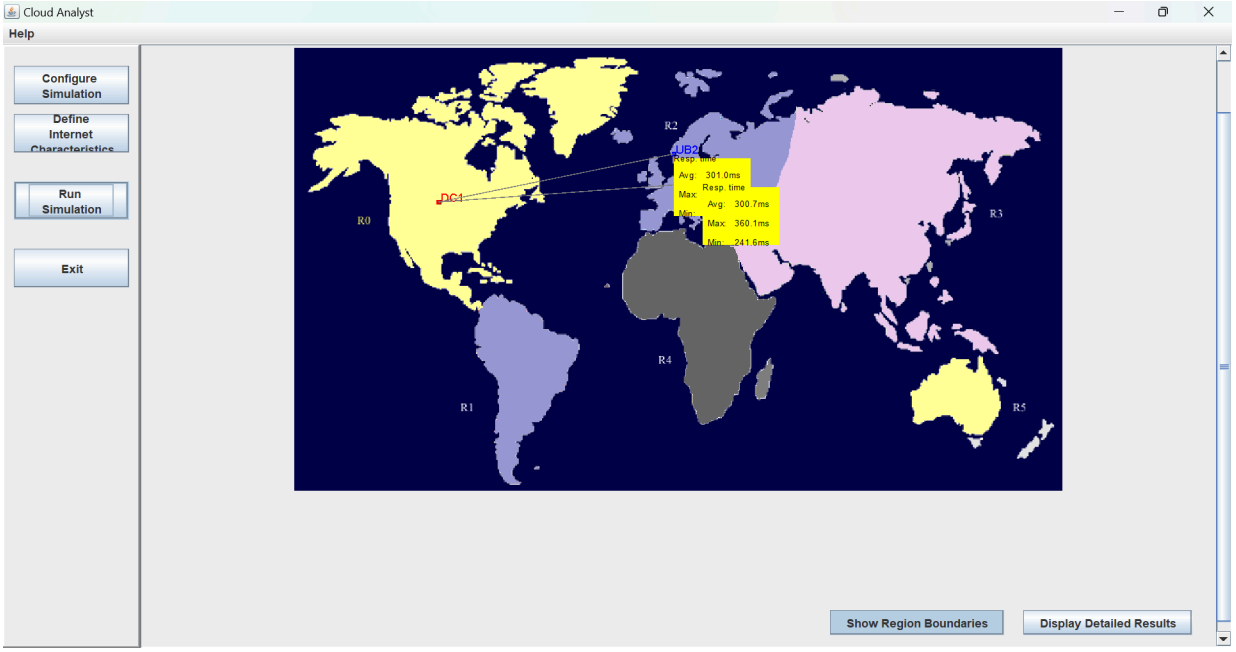
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
Simulation Duration: 60.0A min
User bases:
Name | Region | Requests per User per Hr | Data Size per Request (bytes) | Peak Hours Start (GMT) | Peak Hours End (GMT) | Avg Peak Users | Avg Off-Peak Users
UB1 | 2 | 60 | 100 | 3 | 9 | 1000 | 100
UB2 | 2 | 60 | 100 | 3 | 9 | 1000 | 100
Add New
Remove
Application Deployment Configuration
Service Broker Policy: Closest Data Center
Data Center | # VMs | Image Size | Memory | BW
DC1 | 5 | 10000 | 512 | 1000
5 | 10000 | 512 | 1000
Add New
Remove
Cancel
Load Configuration
Save Configurati...
Done

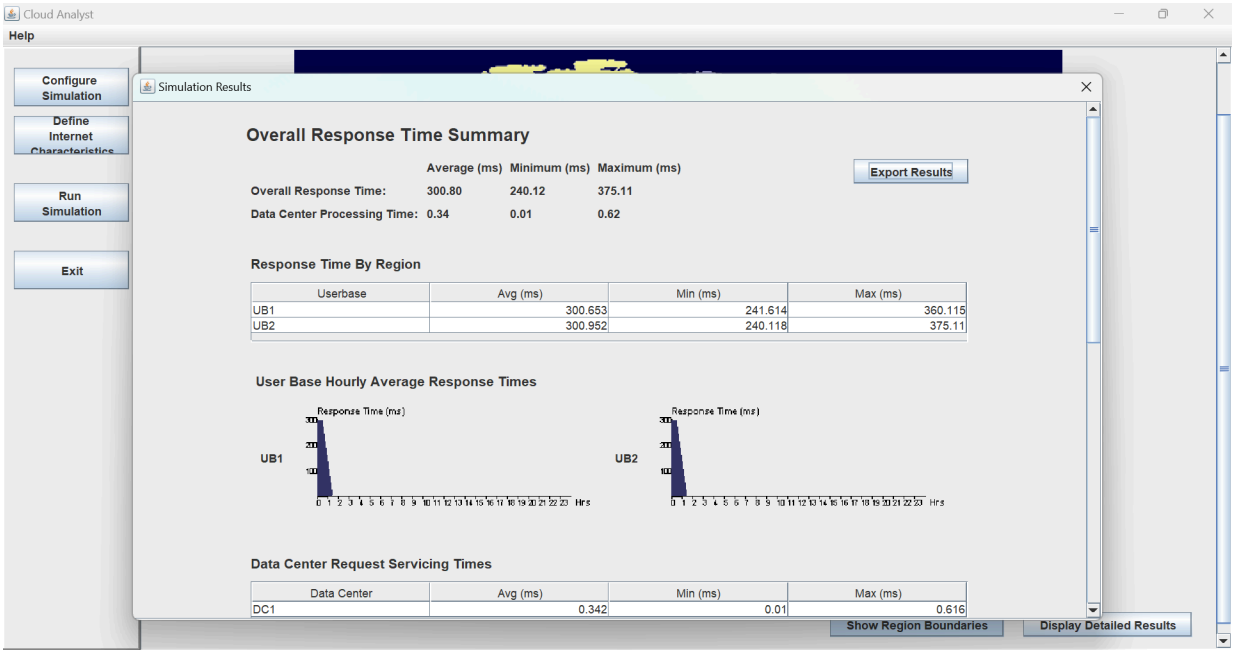

Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
User grouping factor in User Bases:
(Equivalent to number of simultaneous users from a single user base)
10
Request grouping factor in Data Centers:
(Equivalent to number of simultaneous requests a single applicaiton server instance can support.)
10
request:
100
Load balancing policy across VM's in a single Data Center:
Round Robin
Cancel
Load Configuration
Save Configurati...
Done

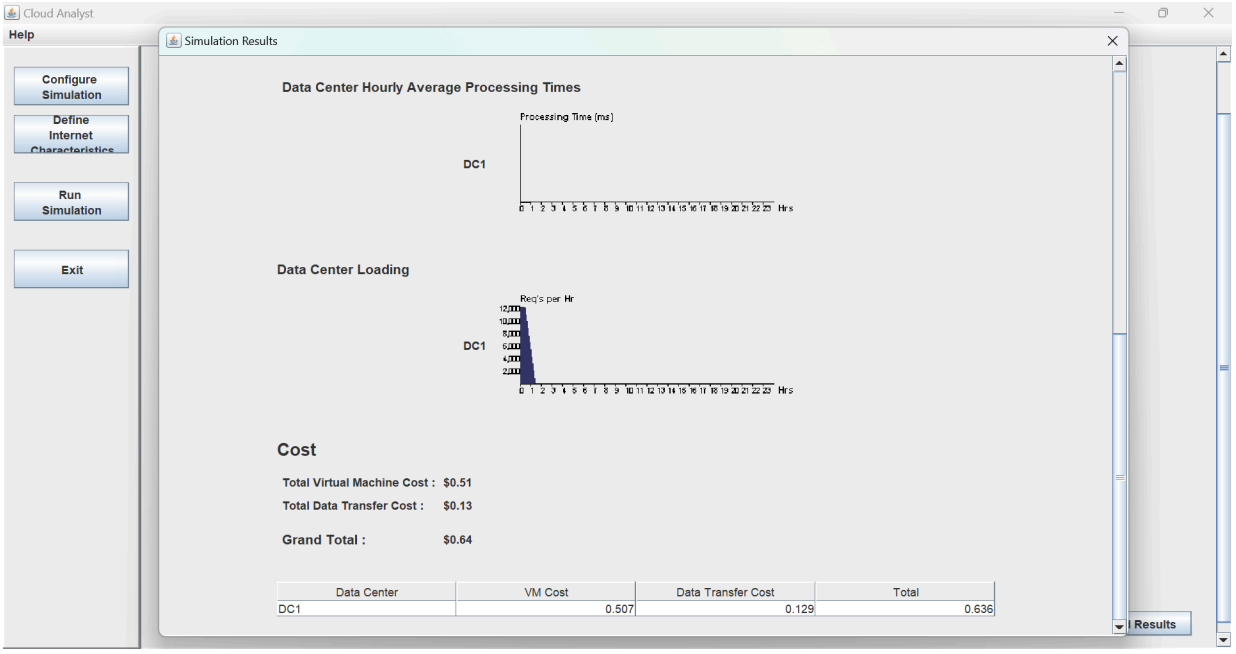

Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Configure Simulation
Main Configuration
Data Center Configuration
Advanced
User grouping factor in User Bases:
(Equivalent to number of simultaneous users from a single user base)
Request grouping factor in Data Center:
(Equivalent to number of simultaneous requests a single applicaiton server instance can support.)
request:
Load balancing policy across VM's in a single Data Center:
Save Configuration As
Save In:
Documents
File Name:
config
Files of Type:
.sim
Save
Cancel
Cancel
Load Configuration
Save Configurati...
Done

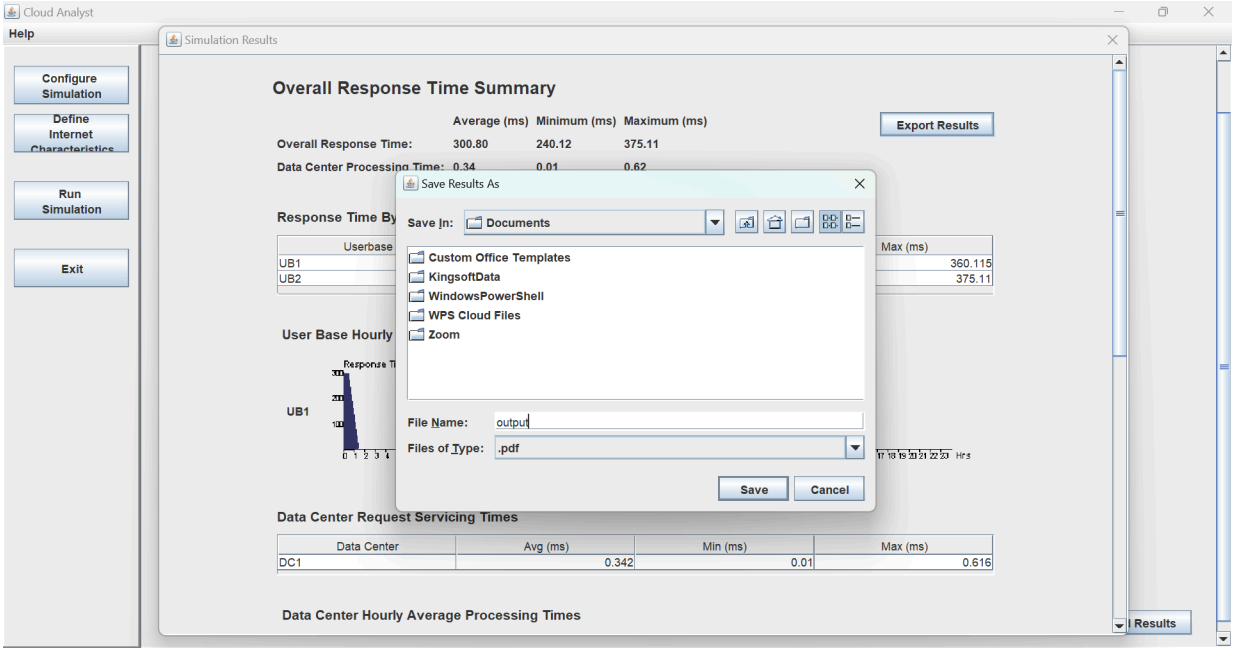

Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
UB2
UB1
DC1
Show Region Boundaries

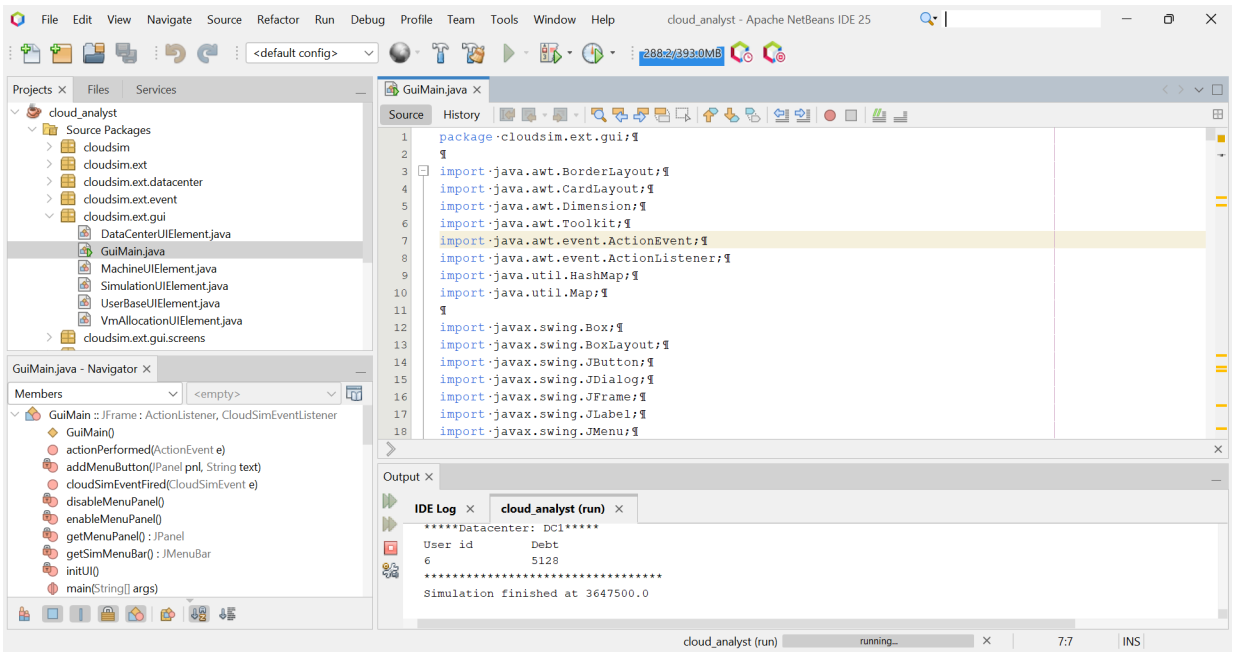

Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
R0
R1
R2
R3
R4
R5
DC1
UB2
UB1
Show Region Boundaries


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
R0
R1
R2
R3
R4
R5
DC1
UB2
Avg: 301.0ms
Max: 360.1ms
Min: 241.6ms
Avg: 300.7ms
Show Region Boundaries
Display Detailed Results


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Simulation Results
Overall Response Time Summary
Average (ms) Minimum (ms) Maximum (ms)
Overall Response Time: 300.80 240.12 375.11
Data Center Processing Time: 0.34 0.01 0.62
Export Results
Response Time By Region
Userbase Avg (ms) Min (ms) Max (ms)
UB1 300.653 241.614 360.115
UB2 300.952 240.118 375.11
User Base Hourly Average Response Times
UB1
UB2
Response Time (ms)
Hrs
Data Center Request Servicing Times
Data Center Avg (ms) Min (ms) Max (ms)
DC1 0.342 0.01 0.616
Show Region Boundaries
Display Detailed Results


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Simulation Results
Data Center Hourly Average Processing Times
Processing Time (ms)
DC1
Hrs
Data Center Loading
Req's per Hr
DC1
Hrs
Cost
Total Virtual Machine Cost : $0.51
Total Data Transfer Cost : $0.13
Grand Total : $0.64
Data Center | VM Cost | Data Transfer Cost | Total
DC1 | 0.507 | 0.129 | 0.636
Results


Cloud Analyst
Help
Configure Simulation
Define Internet Characteristics
Run Simulation
Exit
Simulation Results
Overall Response Time Summary
Average (ms) Minimum (ms) Maximum (ms)
Overall Response Time: 300.80 240.12 375.11
Data Center Processing Time: 0.34 0.01 0.62
Export Results
Response Time By
Userbase
Max (ms)
UB1 360.115
UB2 375.11
User Base Hourly
UB1
Save Results As
Save In: Documents
Custom Office Templates
KingsoftData
WindowsPowerShell
WPS Cloud Files
Zoom
File Name: output
Files of Type: .pdf
Save
Cancel
Data Center Request Servicing Times
Data Center | Avg (ms) | Min (ms) | Max (ms)
DC1 | 0.342 | 0.01 | 0.616
Data Center Hourly Average Processing Times
Results


File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
cloud_analyst - Apache NetBeans IDE 25
Projects Files Services
cloud_analyst
Source Packages
cloudsim
cloudsim.ext
cloudsim.ext.datacenter
cloudsim.ext.event
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import java.awt.event.ActionListener;
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import java.util.Map;
import javax.swing.Box;
import javax.swing.BoxLayout;
import javax.swing.JButton;
import javax.swing.JDialog;
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JMenu;
Output
IDE Log
cloud_analyst (run)
*****Datacenter: DC1*****
User id Debt
6 5128
Simulation finished at 3647500.0
cloud_analyst (run) running...
7:7
INS

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**Steps:**
Download cloud analyst from https://sourceforge.net/projects/cloudanalystnetbeans/
Extract cloud analyst in lib folder in C drive
…
…
Complete it by putting snapshots of execution and executing RR algorithm
Configure Cloud analyst
Show simulator output for any one algorithm.

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**Post Lab Questions:**

1) **Explain Cloud Analyst Design with a neat diagram.**
The Cloud Analyst architecture is based on CloudSim and consists of multiple layers:

**User Code (Simulation Setup)**
- Defines cloud scenarios, user requirements, and application configurations.
- The User DataCenter Broker manages resource allocation.

**CloudSim Layer**
- Simulates cloud components like Cloudlets (tasks) and Virtual Machines (VMs).

**VM Services**
- Handles cloudlet execution and VM management.

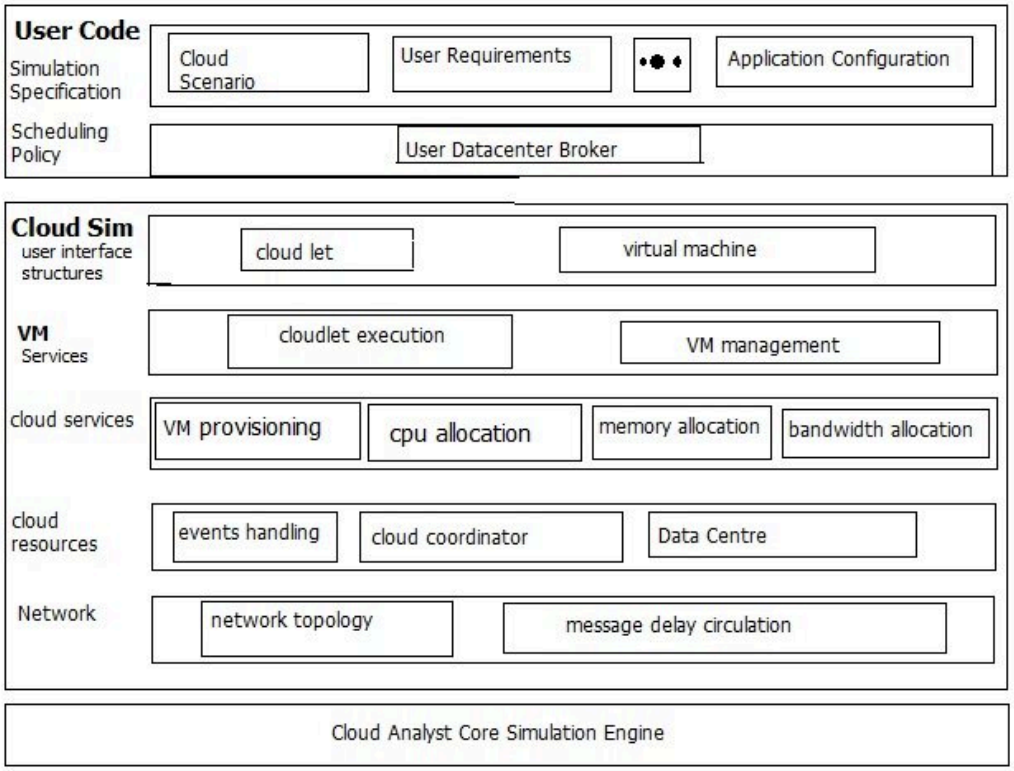
**Cloud Services**
- Manages VM provisioning, CPU, memory, and bandwidth allocation.

**Cloud Resources**
- Includes events handling, cloud coordination, and data centers.

**Network Layer**
- Simulates network topology and message delay for real-world accuracy.

**Core Simulation Engine**
- The backbone that executes, manages, and analyzes cloud performance simulations.

This design helps in analyzing response time, workload distribution, and network performance to optimize cloud computing strategies.

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**Outcomes: CO3 – Analyze different cloud architectures and IOT cloud**

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

The experiment successfully demonstrated the use of Cloud Analyst to simulate and evaluate cloud-based application performance. By configuring user bases, data centers, and network parameters, we analyzed key performance metrics such as response time, request processing time, and resource utilization. The graphical output helped in understanding workload distribution and the impact of different scheduling policies on cloud efficiency. This simulation reinforced the importance of cloud architecture, load balancing, and resource allocation in optimizing cloud performance. It provided valuable insights into how user requests are handled, the effect of geographical distribution, and cost implications in cloud computing environments.

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

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

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**References:**

**Books/ Journals/ Websites:**

**Cloud Computing Practical 2**

https://www.youtube.com/watch?v=V6ORsr8Mj4U

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