

Pandit Deendayal Energy University (PDEU)

Cloud Computing Lab (20CP322P)

B.Tech-Computer Science & Engineering (Sem-VI)

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19BCP138

DIVISION – 2 (G4)

Experiment – 3

Cloud Analyst

❖ **Aim:** Study of Load Balancing using **Cloud Analyst**.

❖ **Introduction:**

In cloud computing, load balancing is considered one of the most important topics. Load Balancing means, distributing the workload of multiple network links to achieve maximum throughput and minimum response time. Using various load balancing techniques, we can avoid the overloading that may occur in the cloud due to heavy workloads. There are mainly three aspects (performance, time, and cost) considering which, three different load balancing algorithms can be used.

Cloud Analyst is a tool developed at the University of Melbourne whose goal is to support the evaluation of social networks according to the geographical

distribution of users and data centers. In this tool, communities of users (User Bases) and data centers supporting the social networks are characterized and based on their location; parameters such as user experience while using the social network application and load on the data center is obtained/logged. Cloud Analyst is used to model and analyze real-world problems through case studies of social networking applications deployed on the cloud.

❖ Instructions:

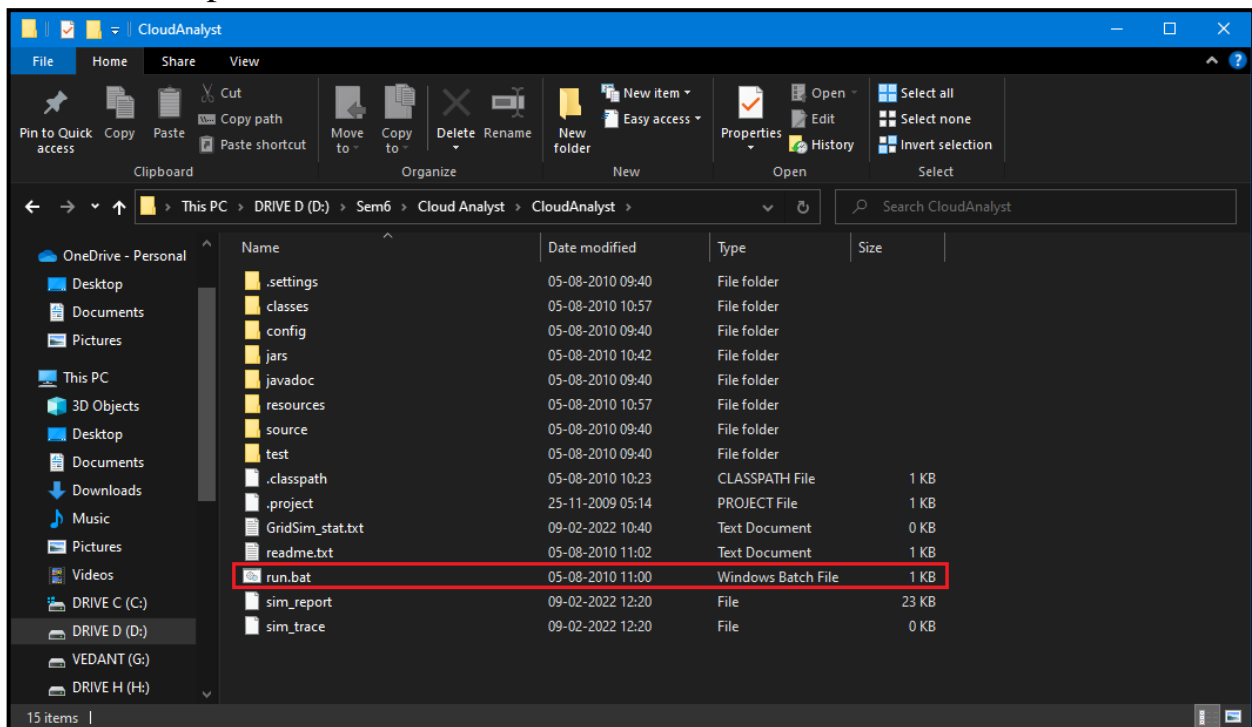
➤ Installing of Cloud Analyst Simulator:

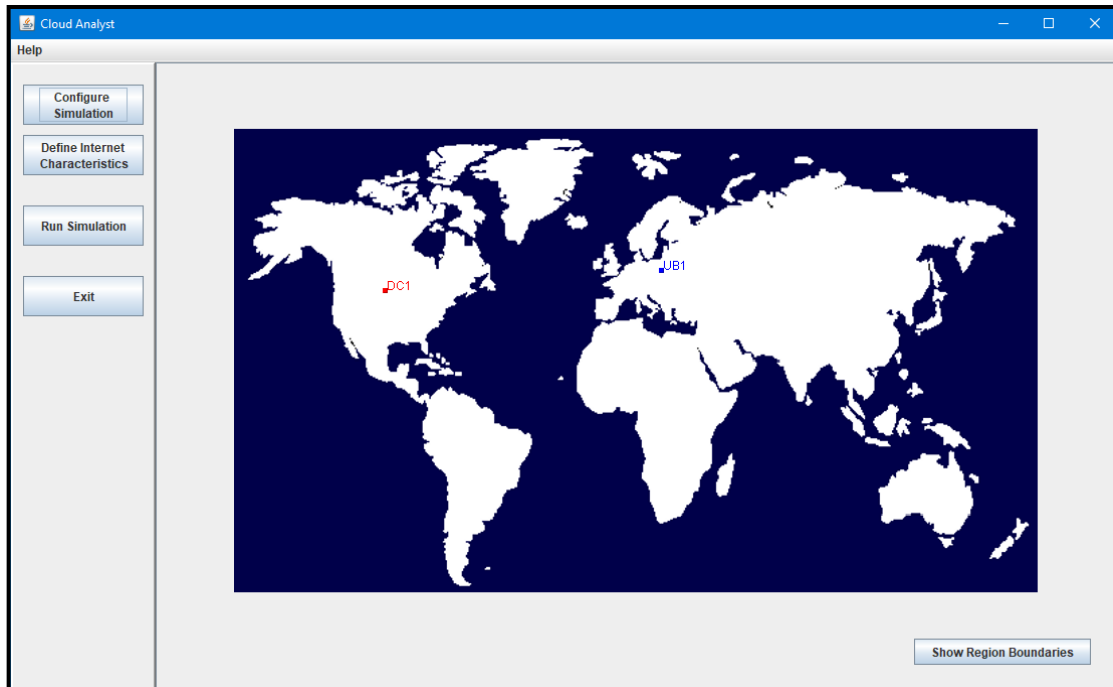
Step-1: To install Cloud Analyst Simulator, first go to this site (<http://www.cloudbus.org/cloudsim/CloudAnalyst.zip>).

Step-2: Open the page, scroll down and you will find Cloud Analyst. Download the .zip file present there.

Step-3: Once the download is complete, extract this zip file.

Step-4: In the extracted files you will find, batch file named run.bat. Running this file will open the simulator.





Simulation Screen

Configure the DataCenter and Userbases according to the requirements-
Scenarios to be completed: R0 – North America, R1 – South America, R2 – Europe, R3 – Asia, R4 – Africa, R5 – Australia.

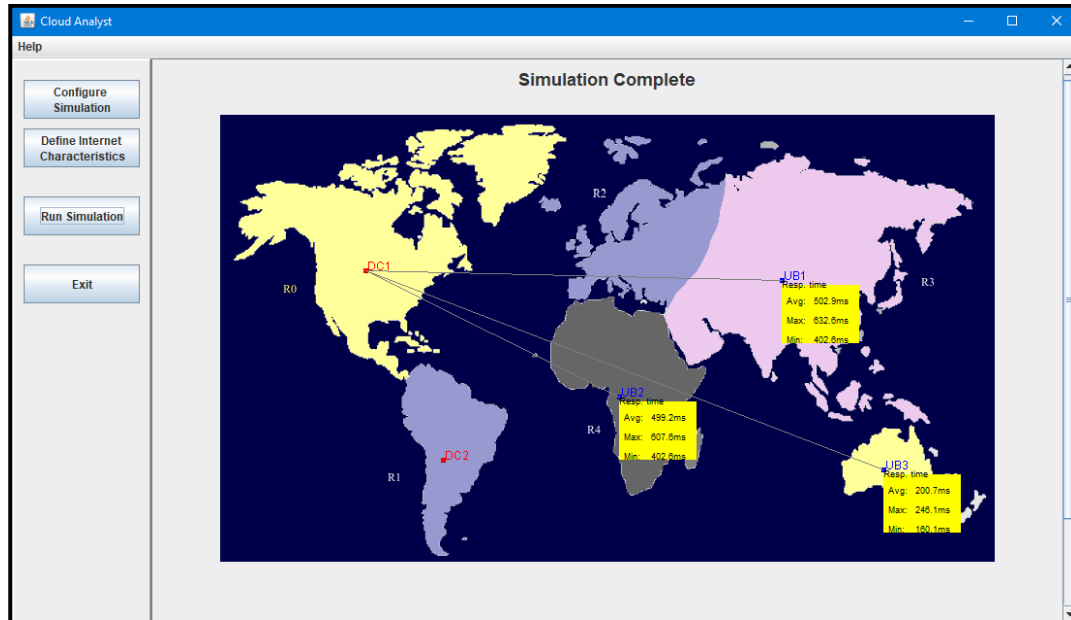
❖ Exercise:

- **Exercise - 1:** 02 Datacenters in R0 and R1 and Userbases in R3, R4 and R5.

Plot the graphs as shown above:

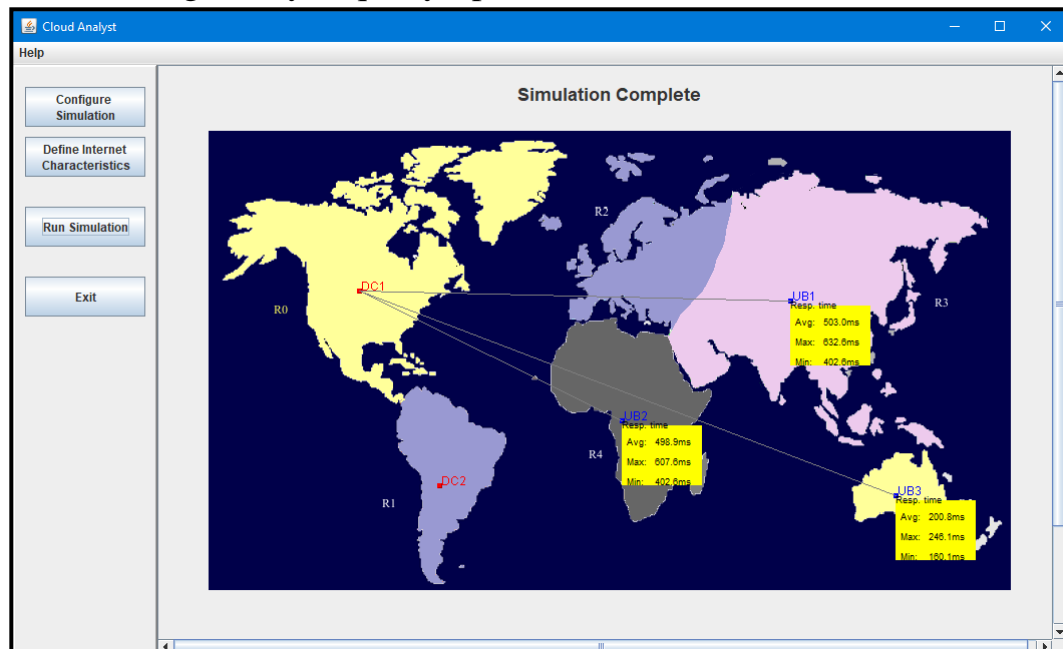
1. Server Broker Policy: Closest Data Center

Load Balancing Policy: Round Robin

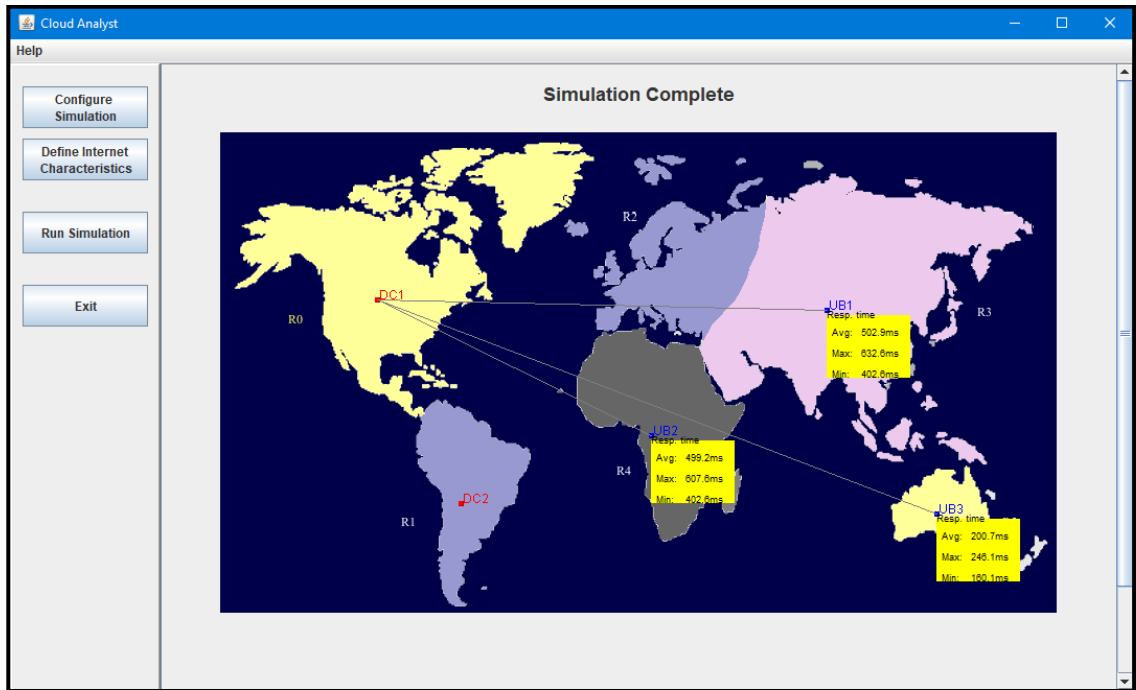


2. Server Broker Policy: Closest Data Center

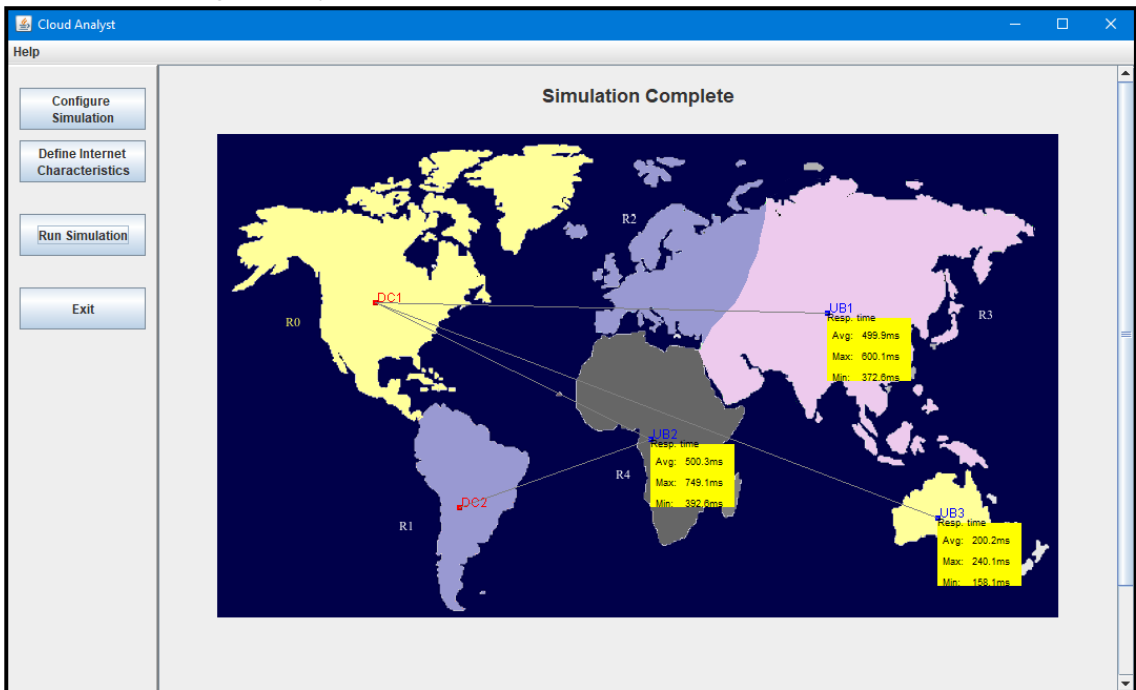
Load Balancing Policy: Equally Spread Current Execution Load



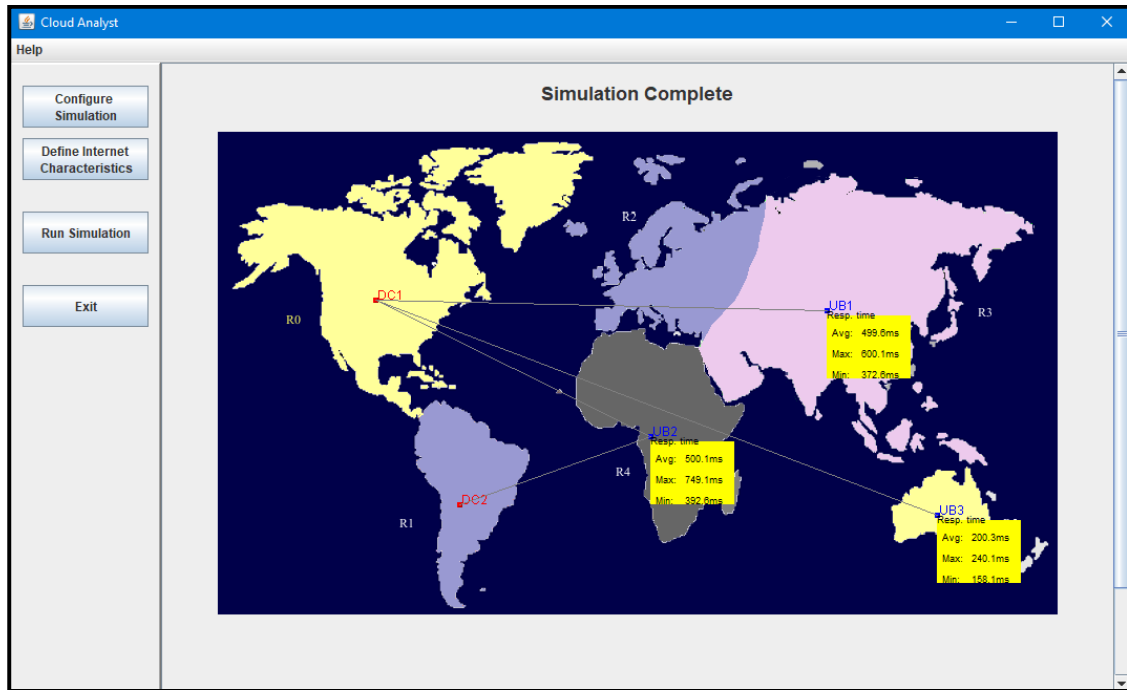
3. Server Broker Policy: Closest Data Center Load Balancing Policy: Throttled



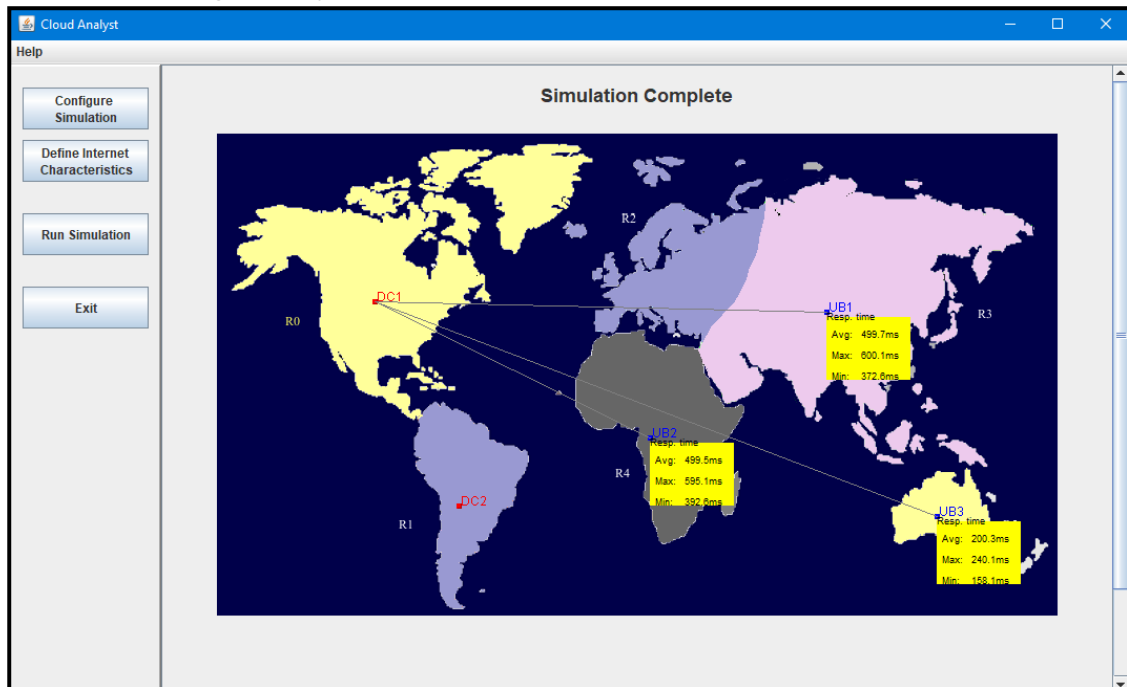
4. Server Broker Policy: Optimise Response Time Load Balancing Policy: Round Robin



5. Server Broker Policy: Optimise Response Time
Load Balancing Policy: Equally Spread Current Execution Load

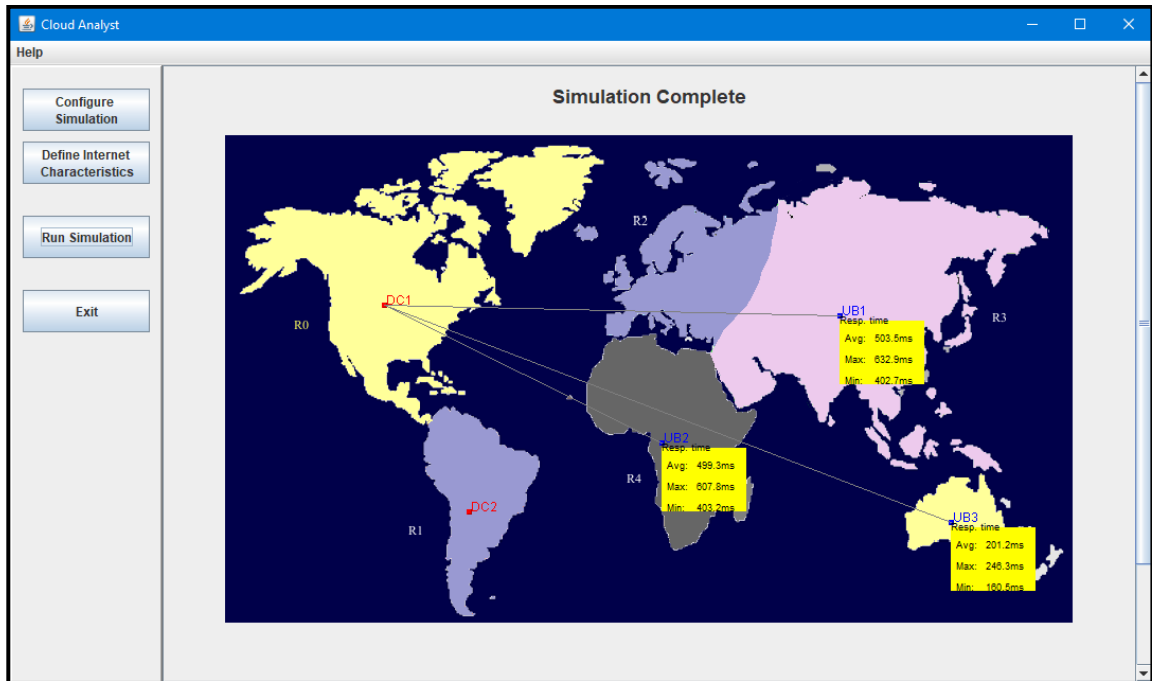


6. Server Broker Policy: Optimise Response Time
Load Balancing Policy: Throttled



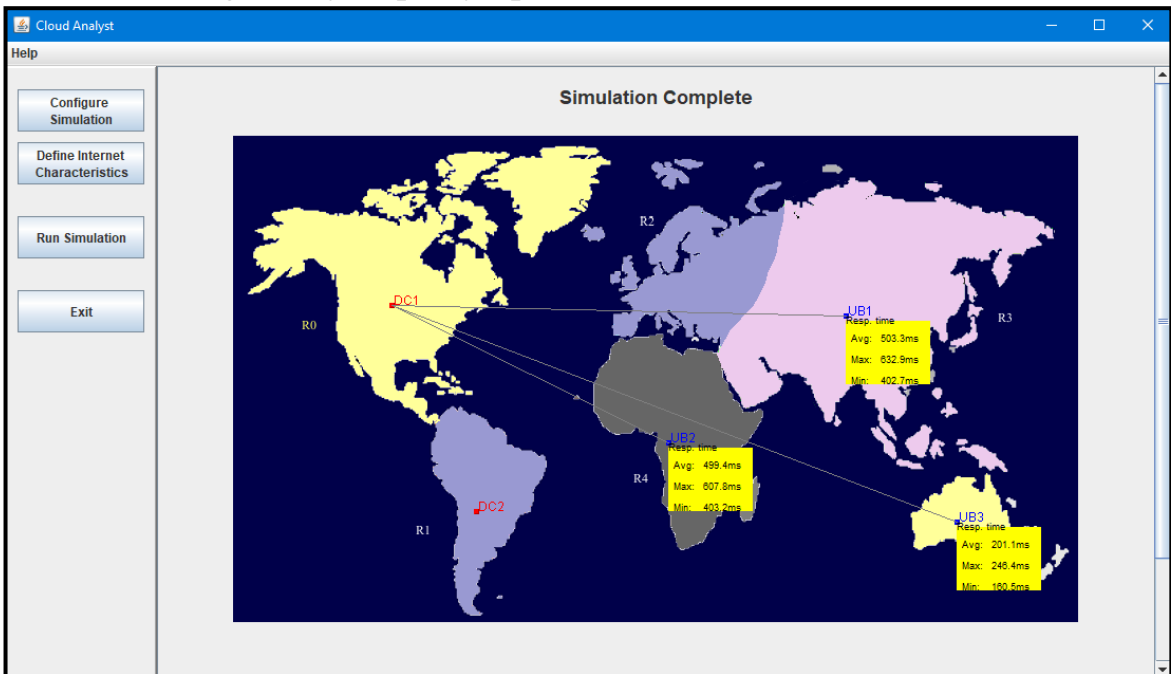
7. Server Broker Policy: Reconfigure dynamically...

Load Balancing Policy: Round Robin



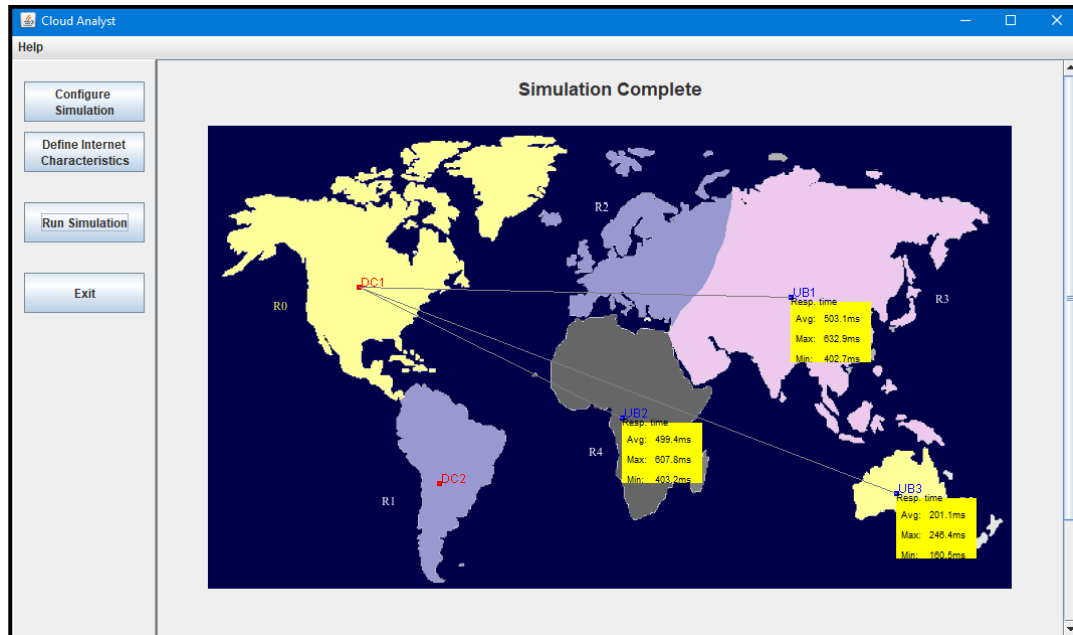
8. Server Broker Policy: Reconfigure dynamically...

Load Balancing Policy: Equally Spread Current Execution Load

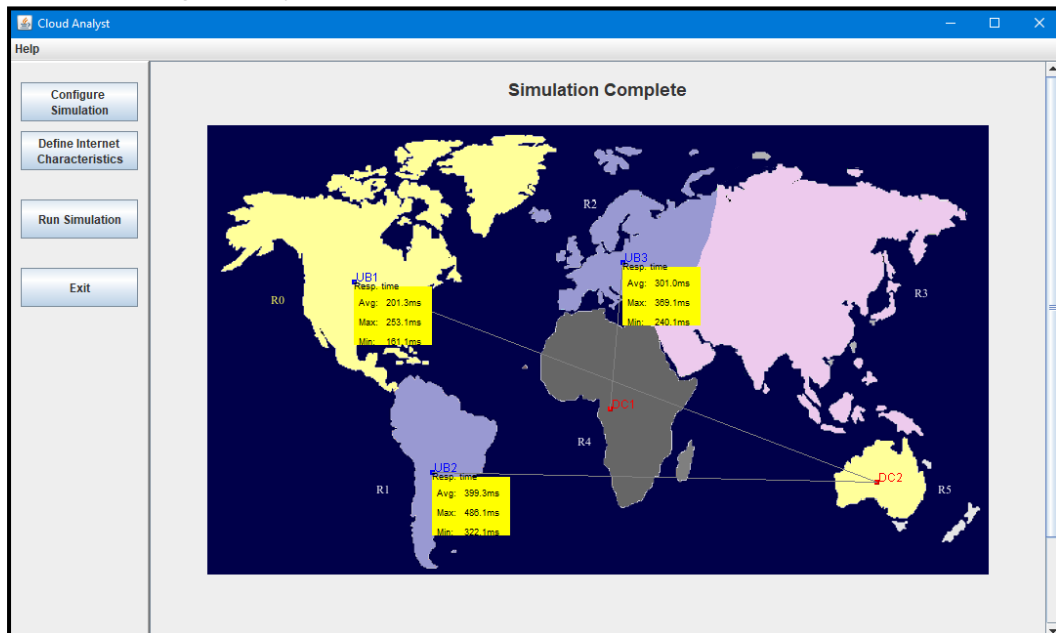


9. Server Broker Policy: Reconfigure dynamically...

Load Balancing Policy: Throttled

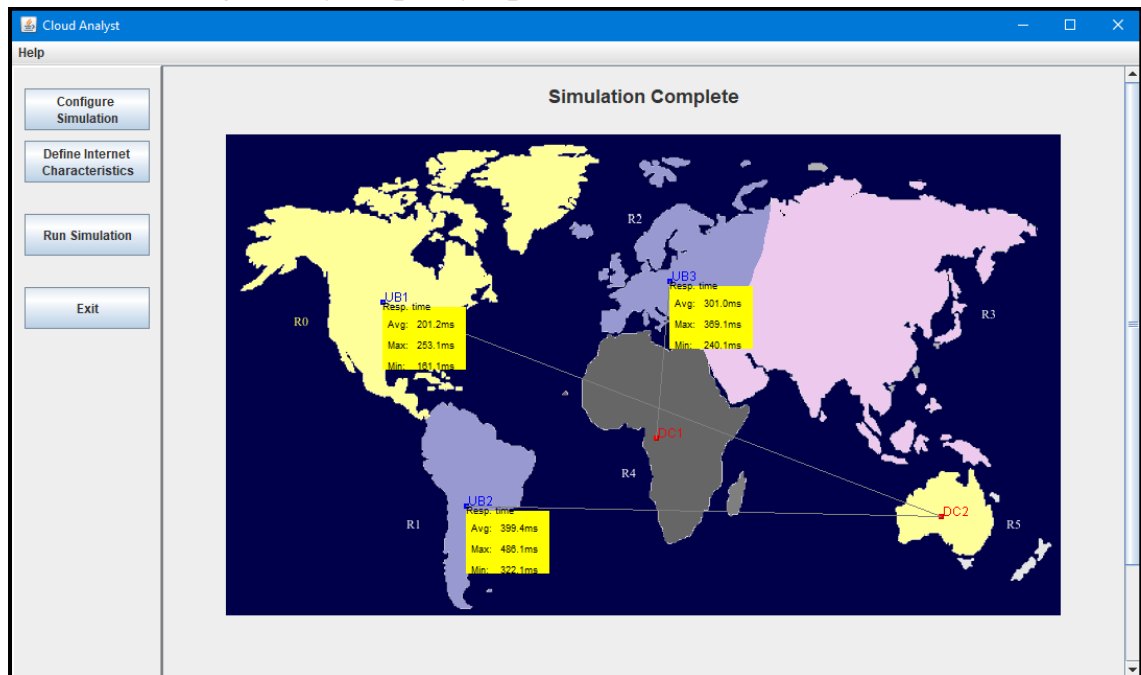


- **Exercise - 2:** 02 Datacenters in R4 and R5 and Userbases in R0, R1 and R2.
 Plot the graphs as shown above:
1. Server Broker Policy: Closest Data Center
 Load Balancing Policy: Round Robin



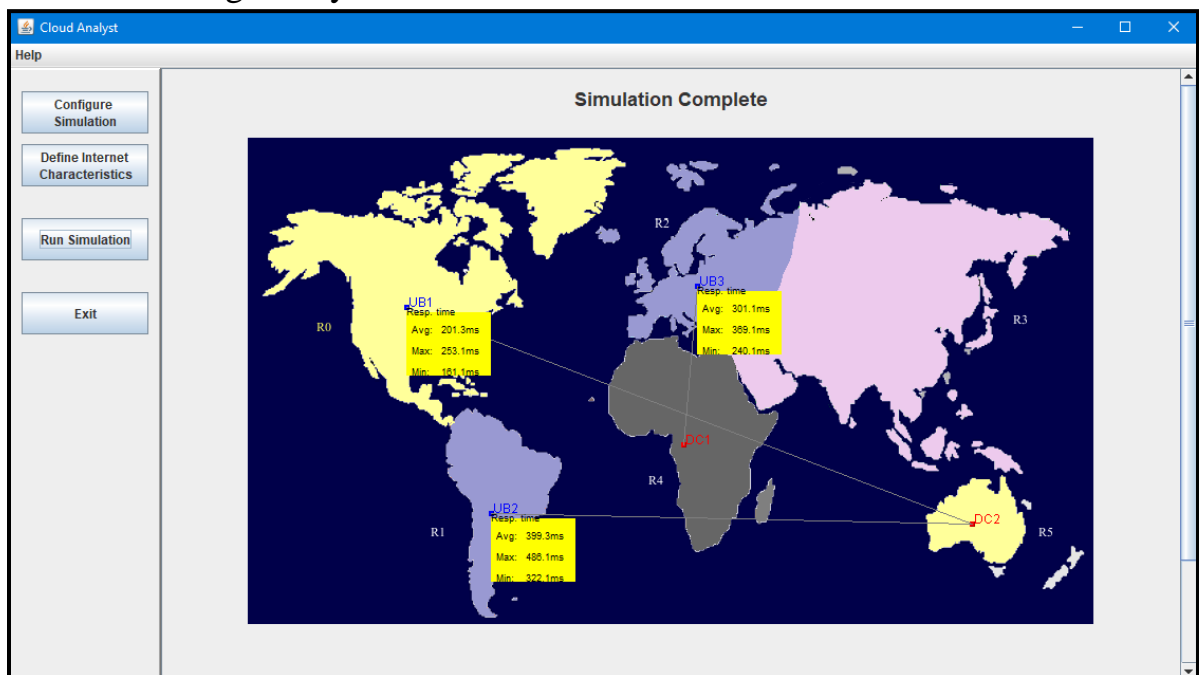
2. Server Broker Policy: Closest Data Center

Load Balancing Policy: Equally Spread Current Execution Load

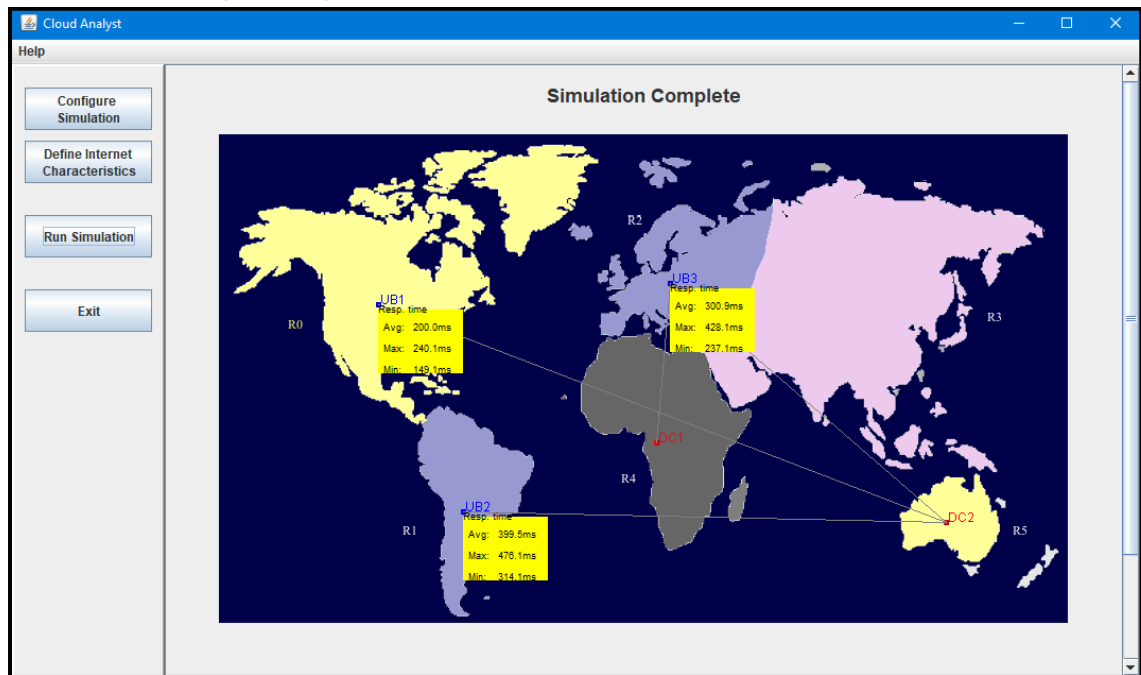


3. Server Broker Policy: Closest Data Center

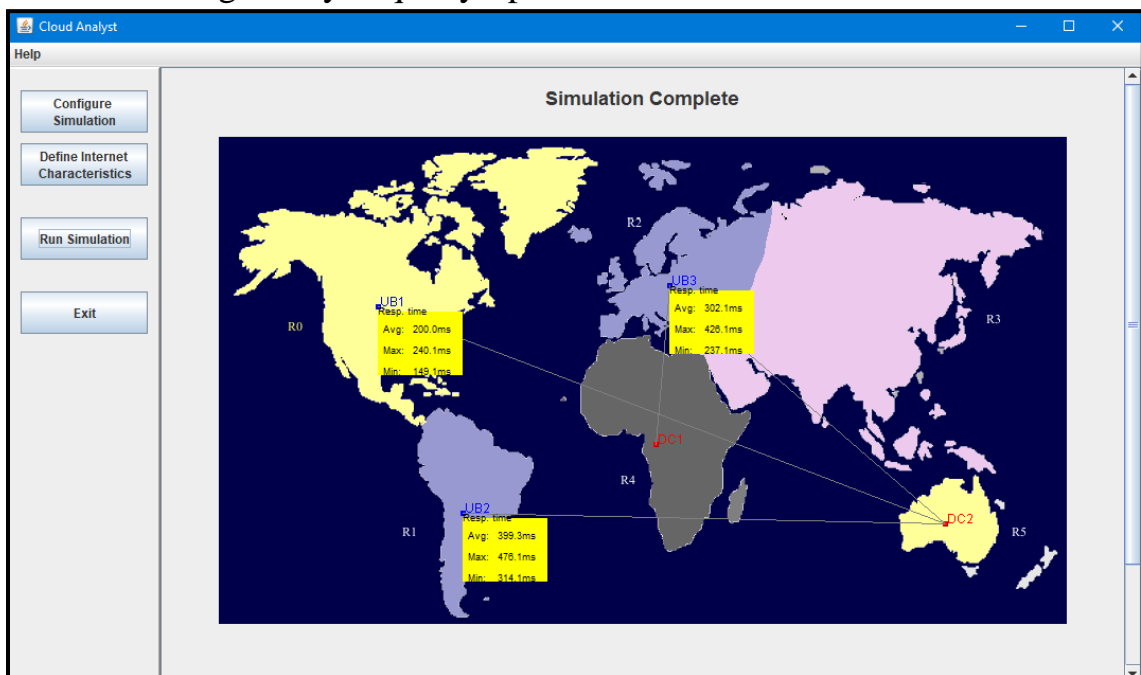
Load Balancing Policy: Throttled



4. Server Broker Policy: Optimise Response Time Load Balancing Policy: Round Robin

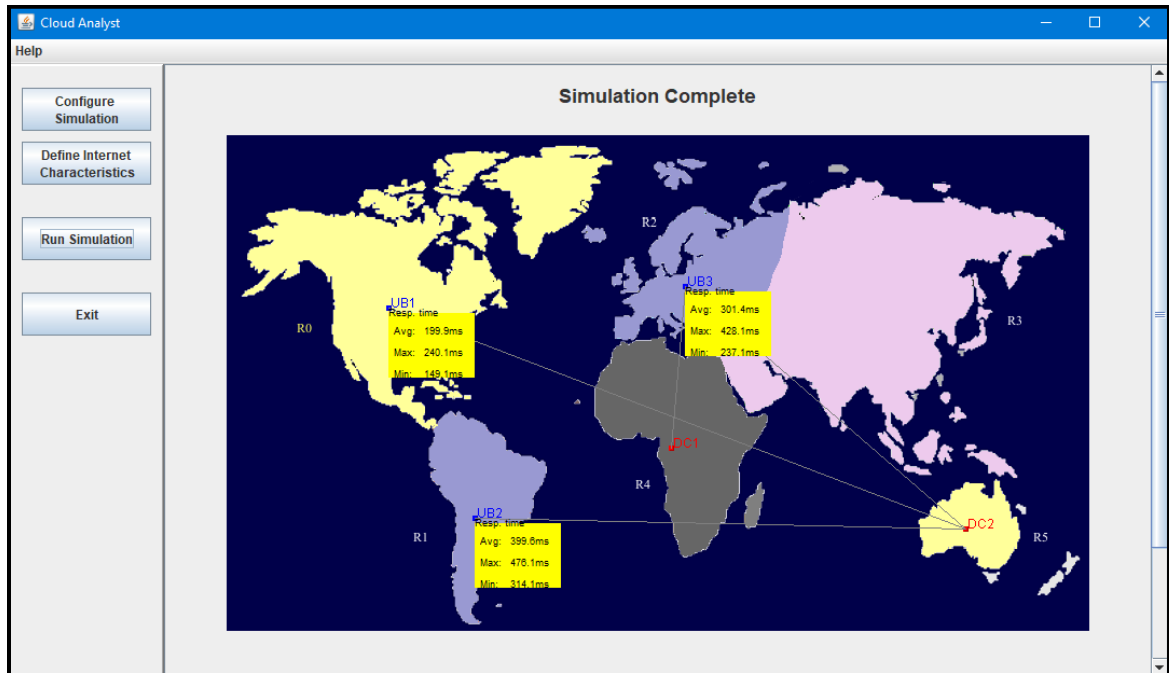


5. Server Broker Policy: Optimise Response Time Load Balancing Policy: Equally Spread Current Execution Load



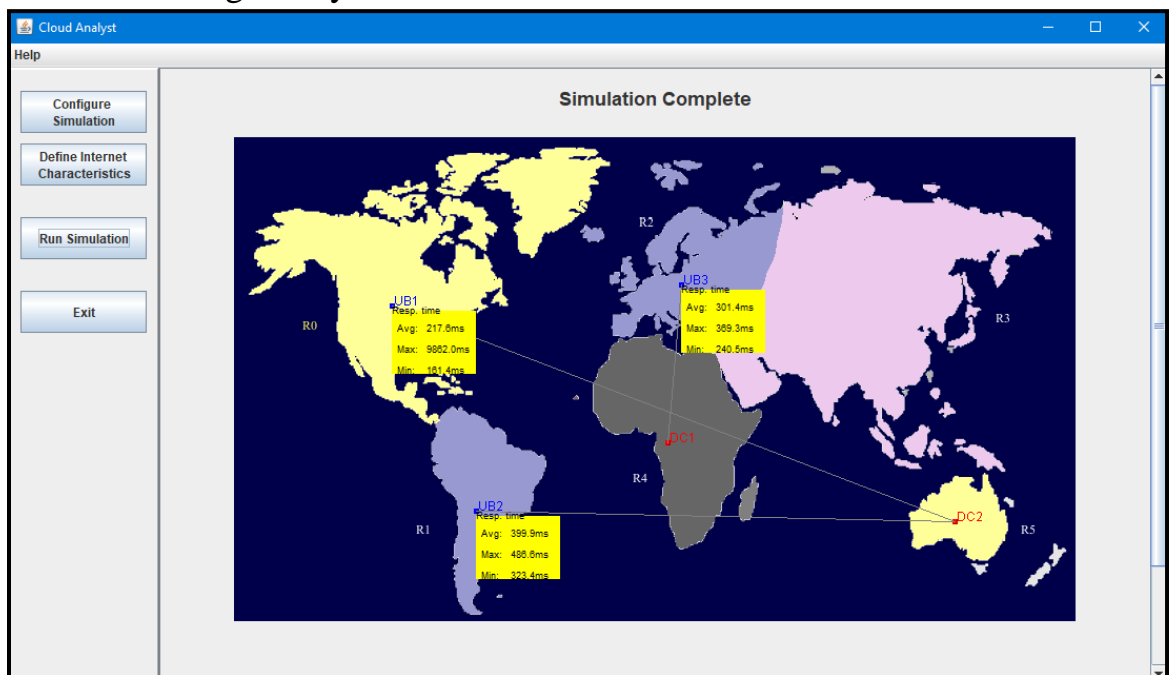
6. Server Broker Policy: Optimise Response Time

Load Balancing Policy: Throttled



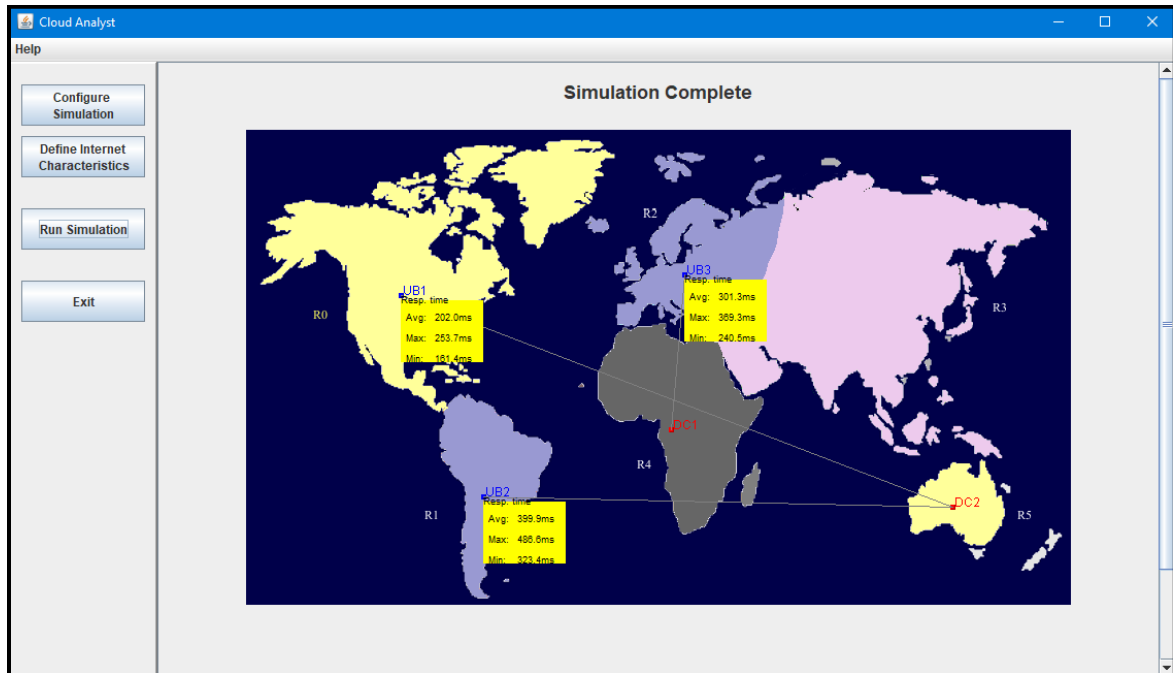
7. Server Broker Policy: Reconfigure dynamically...

Load Balancing Policy: Round Robin



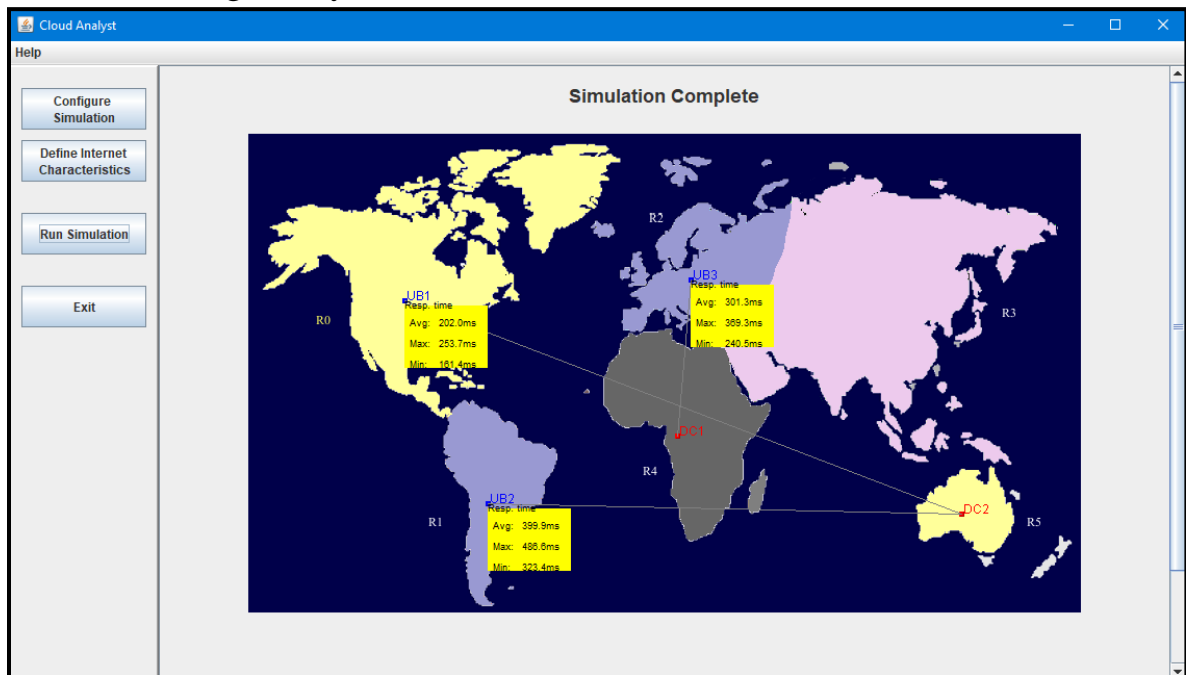
8. Server Broker Policy: Reconfigure dynamically...

Load Balancing Policy: Equally Spread Current Execution Load



9. Server Broker Policy: Reconfigure dynamically...

Load Balancing Policy: Throttled



- **Exercise - 3:** Find out the best-case scenario for average time, minimum time and maximum time for given setup. User base in R0 to R5 (each User base having at least 10 applications), at least 2 Data Centres:

Configure Simulation

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	0	60	100	3	9	1000	100
UB2	1	60	100	3	9	1000	100
UB3	2	60	100	3	9	1000	100
UB4	3	60	100	3	9	1000	100
UB5	4	60	100	3	9	1000	100
UB6	5	60	100	3	9	1000	100

Service Broker Policy: Closest Data Center

Application Deployment Configuration:

Data Center	# VMs	Image Size	Memory	BW
DC1	5	10000	512	1000
DC2	5	10000	512	1000

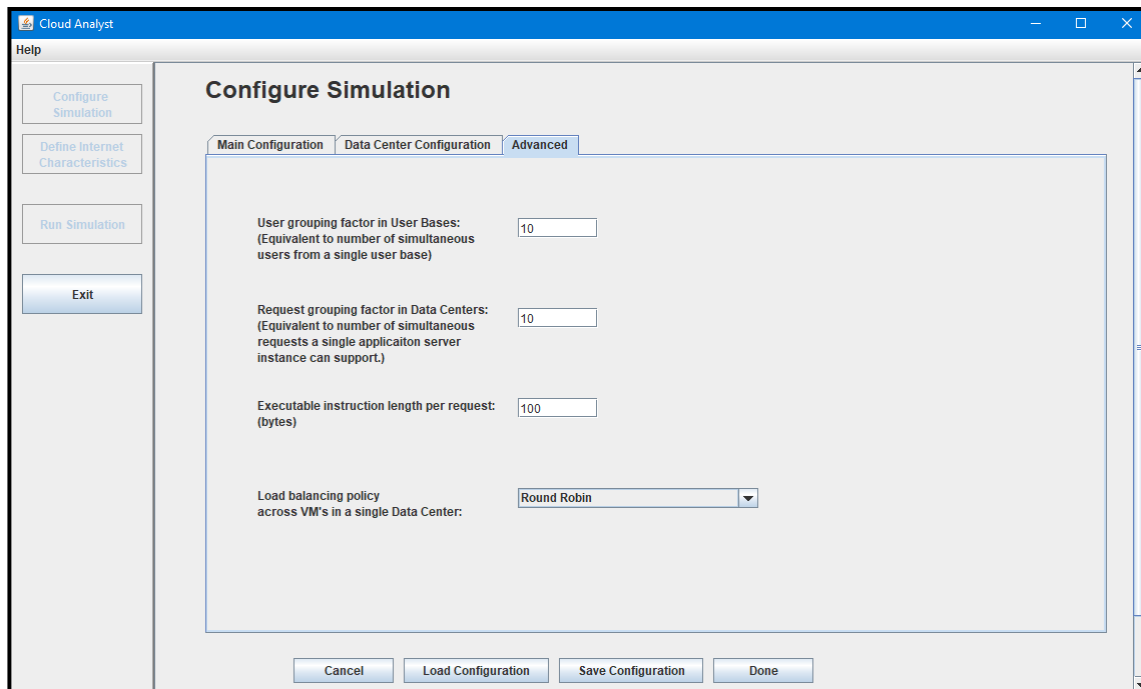
Configure Simulation

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	2	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

Physical Hardware Details of Data Center : DC1

Id	Memory (Mb)	Storage (Mb)	Available BW	Number of Processors	Processor Speed	VM Policy
0	204800	100000000	1000000	4	10000	TIME_SHARED
1	204800	100000000	1000000	4	10000	TIME_SHARED



The least average response time, least minimum response time and least maximum response time, while using **Closest Data Center** as Service Broker Policy and **Round Robin** as Load Balancing technique. Here is the table of response time of the same setup:

Overall Response Time Summary			
	Average (ms)	Minimum (ms)	Maximum (ms)
Overall Response Time:	184.34	37.63	358.61
Data Center Processing Time:	0.31	0.01	0.88

❖ Observation & Learning:

We learned the Load Balancing topic of Cloud Computing. Also, learned about the simulator known as Cloud Analyst, which is used to simulate various load balancing algorithms and service broker policy. Also, learned about three widely used load balancing strategies (Round Robin, Equally Spread Current Execution Load, and Throttled). Using Cloud Analyst, one can also estimate various things, for example, the cost of VM's that are running on the datacenters for a particular period.

❖ Conclusion:

There are different Load Balancing Algorithms in Cloud Computing, and any of these algorithms can be used based on the requirements.

❖ Questions:

➤ **Question - 1:** What are regions and zones?

Regions are geographical areas, which are independent of each other. On the other hand, zones are parts of the region. In the cloud, regions, and zones are logical abstractions of underlying physical resources that are provided in one or more physical data centers.

➤ **Question - 2:** What are availability zones?

Availability Zones (AZs) are isolated locations within data centre regions from which public cloud services originate and operate.

➤ **Question - 3:** What are collocation facilities in cloud?

A collocation facility, also known as colo, is a data center facility in which a business can rent space for servers and other computing hardware. Typically, a colo provides the building, cooling, power, bandwidth and physical security.