

# **Configuration Manual**

MSc Research Project Cloud Computing

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#### **MSc Project Submission Sheet**

School of Computing

Satya Venkata Dinesh Kumar Vetcl	ha	
Cloud Computing	Year:	2019
MSc Research Project		
Sean Heeney		
Computation Based For Improving	the Quality of	Services
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## **Configuration Manual**

#### Satya Venkata Dinesh Kumar Vetcha Student ID: 20238304

### **1** Introduction

This configuration manual contains the procedure for implementing a computationbased load balancing algorithm. It also includes the overall setup for installing the appropriate tools for the research project. This configuration manual helps to guide researchers and academic students and will give an deeper understanding of the proposed method carried out in implementing the project.

### 2 Required Software Tools

The Software tools that are used for the implementation of this project:

- Eclipse IDE:- This tool is used for the implementation of java code for this research project.
- IFogSim Simulator:- It is an extended version of the CloudSim simulator and contains the framework.
- Cloud Analyst Tool:- This is also an extended version of the CloudSim simulator. It is a GUI tool. It consists of default algorithms and service broker policies for the configuration of the proposed algorithm.
- JDK 17.0.4 version:- It consists of Java libraries that are required for running the suggested algorithm.

### **3** Hardware Requirements

- Operating system:- Windows/ Mac/ Linux ( We can use any OS).
- RAM:- Minimum 4GB / 8GB or more than needed.
- Processor:- Any Processor from the Intel Core is suitable.

### 4 Step by Step Software Installation

The steps for the installation of software and tools are shown below.

#### 4.1 JDK Installation

- Java Development Kit(JDK)
- Download JDK 17.0.4 version from the specified Link [1].



Figure 1:- Download Java Development Kit (JDK)

• Install the JDK 17.0.4 Version into the system

🤁 Java(TM) SE Development Kit 17.0.4 (64-bit) - Setup	X 🗊 Java(TM) SE Development Kit 17.0.4 (64-bit) - Destination Folder 🛛 🗙
	Java.
Welcome to the Installation Wizard for Java SE Development Kit 17.0.4	
This wizard will guide you through the installation process for the Java SE Development Kit 17.0.4.	This will install the Java(TM) SE Development Kit 17.0.4 (64-bit), which requires 420MB on your hard drive. Click the "Change" button to change the installation folder.
	Install Java(TM) SE Development Kit 17.0.4 (64-bit) to: C:\Program Files\Java\jdk-17.0.4\
Next > Cancel	Back Next Cancel
Figure 2: IDK Installation	Figure 3:- Installation of IDK

#### 4.2 Eclipse IDE Installation

Download the Eclipse Integrated Development Environment 2022-06 from the given link [2]



Figure 4:- Download Eclipse

• Install the download Eclipse IDE 2022-06 in system



- Make Sure the java JDK version before installing Eclipse IDE
- Now open the Eclipse and create a workspace

Eclipse IDE Launcher	×
Select a directory as workspace Eclipse IDE uses the workspace directory to store its preferences and development artifacts.	
Workspace: C:\Users\satya\Desktop\NCI\workspace-eclipse > Browse	
Use this as the default and do not ask again	cel

Figure 7:- Workspace Creation for Eclipse IDE

- The created workspace shouldn't be changed. Otherwise, the work done will not be available.
- Now create a new Java project in Eclipse IDE



Figure 8:- The new project creation in Eclipse IDE

• Make sure the Java Version and name a project of your interest

#### 4.3 Installation of iFogSim Simulator

• Download the . Zip file from the iFogSim GitHub [3].

¢	Product ∨ Team Enterprise Exp	lore $\lor$ Marketplace Pricing $\lor$		Search	Sign in Sign up
Gloudslab / iFogSim	Public				
<> Code ① Issues 2	1 Pull requests 2 💿 Actions 🖽 Pr	ojects 🖽 Wiki 🛈 Security	🗠 Insights		
	🐉 main 👻 🌮 2 branches 🛇 1 tag		Go to	file Code -	About
	mgoudarzi90 Update README.md		E Clone	0	The iFogSimToolkit (with its new release iFogSim2) for Modeling and Simulation of Recourse Management Techniques in
	📄 .idea	All scripts are tested and ready to	HTTPS GitHub CLI		Internet of Things, Edge and Fog
	ataset	All scripts are tested and ready to	https://github.com/Cloudslab/iFogS	in.git 🖸	Computing Environments. In the new release Mobili Management Microservice
	🖿 jars	jar files are updated	Use Git or checkout with SVN using the web	URL.	Management, and Dynamic Clustering
	out/production/iFogSim2	All scripts are tested and ready to	🔛 Open with GitHub Desktop		mechanisms are added as new features.
	output	ECG to be fixed			Readme
	results	jar files, topologies, readme, are fi	Download ZIP		49 stars     14 watching
	src src	Microservice Mobility related bugfi	br.	12 months ago	¥ 30 forks
	topologies	jar files, topologies, readme, are fix	ed and updated	12 months ago	
	.gitignore	jar files, topologies, readme, are fix	ed and updated	12 months ago	Releases 1
	README.md	Update README.md		3 months ago	
	iFogSim2.iml	All scripts are tested and ready to v	work	12 months ago	on 25 Apr

Figure 9:- Download the iFogSim file from GitHub

• Importing the downloaded file into Eclipse.

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Figure 10:- Import option in Eclipse IDE

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		From archive file: C:\Users\satya\Downloads\iFogSim-main.zip	Browse
		<ul> <li>✓ ☑ ▷ /</li> <li>✓ ☑ ▷ iFogSim-main</li> <li>✓ ☑ ▷ iFogSim2iml</li> <li>☑ № README.md</li> </ul>	
		Filter Types Select All Deselect All	
		Into folder:	Browse
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	Console ×	C     C	Cancel
	No consoles to di	splay at this time.	

Figure 11:- Importing the iFogSim file

### 5 Development of Proposed Algorithm

The proposed method development and implementation explained in step by step.

#### 5.1 Fog environment creation

• By running the fog.gui.java in Eclipse IDE, it helps for the creation of network topology for the proposed methodology.

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Package Explorer ×	881 - 0	2 Cardiovascul	arHealthMonitoringApplicationjava ×
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Figure 12:- Creation of the Network topology

- The topology designed
  - ➢ C :- Camera (Sensor) of Picture capture
  - ➢ Floor-Finder :- Actuator



Figure 13:- Network Topology for the Proposed Method

#### 5.2 Load Balancing Code Implementation and Creation

The proposed computation based load balancing algorithm code is shown in below figure 14.



Figure 14:- Proposed Java Code Implementation

#### 5.3 Network topology Simulator Output

The below Figure 15 is the simulated network topology output.



Figure 15:- Implemented Topology Output

#### 5.4 Proposed Method Testing and Running

• Run the implemented code

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Figure 16:- Running the Implemented Code

• After running the simulation, the outputs are showed in below figure 17 and 18. The task assigned based on the computational capacity of the fog devices.



Figure 17:- The tasks assigned to nearest fog node

• In the above-plotted results in figure 17, the load on the fog node is less, and also the fog device has the capacity to perform the operation.



Figure 18:- The tasks are assigned to next nearest fog node

• From the above Figure 18, the nearest fog node capacity is not enough for the performing operations. Then tasks are assigned to the next high capability of the fog node.

### 6 Cloud Analyst Tool

#### 6.1 Download Cloud Analyst tool

• You can download the cloud analyst tool . Zip file from the given link [4].

research on workflow scheduling, DynamicCloudSim provides the functionality to simulate the execution of scientific workflows using different well-established schedulers.
DynamicCloudSim has been developed by Marc Box at Humboldt University of Berlin, Germany. The download is available at the gooject unaballe on Google Code. For questions and suggestions, please contact box (at) informatik hu-berlin de.
RealCloudSim
Real/Outcomes in a simulater of allocations of virtual machines based on the main engine of the Coefficien register. Real/Outcomes propriated interface to and structs the produced on the BRITE format. Real/Outcomes in an engine to simulate allocations based on Generic Algorithms. Most different of the simulation and struct to allocations and structs of a produced interface on the simulation and struct to advent and structs the simulation and struct the simulation and struct the simulation and struct to advent and structs the simulation and struct the simulation and structs the simulation and struct the simulati
Real/CloudSim has been developed by Lucio Agostinho Rocha and team at State University of Campinas, Brazil.
Doubts and suggestions can be e-mailed to outrosdiesvirao at yahoo dot com dot br. Download and more information can be found in the <u>rootect page at SourceForge</u> .
CloudReports
CloudReports is a graphic tool that simulates distributed computing environments based on the Cloud Computing paradigm. It uses CloudSim as its simulation engine and provides an easy-to-use user interface, report generation features and creation of extensions in a plugin fashion.
CloudReports has been developed by Thiago Sa and team at Federal University of Ceara, Brazil.
Download and more information can be found in the <u>project's</u> other
CloudAuction
This works advands. Cloudein by developing a package litrary that enables CloudSin to handle auction-based services. The main objective of this research is implementing auction-based mechanisms in Cloudein. To test the package litrary, a new market mechanism to efficiently allocate services to participant based on the combinitional double accion projective was implemented. The main objective applicable in Cloud computing environments to the benefit and satisfaction of both uses and providers. In this package litrary, the auction is held based on cost for CPUINS and the memory market handle. What has expected with locat if the market handle to be services and providers. In this package litrary, the auction is held based on cost for CPUINS and the memory market handle autoin cost and providers.
CloudAuction has been developed by Younses Teimoury (OI4U) and Pamia Samini (UKM).
Download: <u>CloudAuttionV2.0.z@</u> (released on Mar 25, 2013).
CloudMIG Xpress
CloudInG Xpress facilities the comparison and planning phases concerning the regration of software systems to PauS or las3-based Oud environments. Code models can be extracted from Java-based software to (1) model the current system deployment and augment it with a present workstar profile. (2) compare the trade-dist that have to be made for different doud deployment options, and (2) automatically transform the system model to a CloudSm model to enable integrated simulation of various cloud deployment options, and (3) automatically transform the system model to a CloudSm model to enable integrated simulation of various cloud deployment options, and (3) automatically transform the system model to a CloudSm model to enable integrated simulation of various cloud deployment options, and (3) automatically transform the system model to a CloudSm model to enable integrated simulation of various cloud deployment options, and (3) automatically transform the system model to a CloudSm model to enable integrated simulation of various cloud deployment options, response times, and SLA violations.
CloudMIG Xpress has been developed by Soren Frey, Florian Fitteau, and team at the Software Engineering Group, Kiel University, Kiel, Germany.
Download and more information: Project on Sourcefurge.
FederatedCloudSim
FederateGrandSim (FS) is a vessilia and federationion to the ClaudSim Interment. It alsons for a multicle of claud federation experiments; CS support of the clauds and clauds a
FederatedCloudSim has been developed by researchers from Technical University of Dortmund, Germany. For details, please check out FederatedCloudSim website.
CloudAnalyst
Double deaply (1 a tool groups) and the biveney of Melborney where pail to respond evaluations of usual networks tools according to groupsymble dealbaction of users and data centers. In this tool, communities of users and data centers supporting the social networks are characterized and, based on their location groups and the social network againstance of the data center are obtained logged. Durnhoad: <u>CloseReserva</u> (networks) and load on the data center are obtained logged.

Figure 19: - Download the Cloud Analyst tool

• Extract the . Zip file and Open that file. Then run the file which was shown in below figure 20.

his PC > Desktop > CloudAnal	yst > CloudAnalyst		
Name	Date modified	Туре	Size
settings	17/07/2022 08:58	File folder	
Classes	17/07/2022 08:58	File folder	
늘 config	17/07/2022 08:58	File folder	
🚞 jars	17/07/2022 08:58	File folder	
🚞 javadoc	17/07/2022 08:58	File folder	
resources	17/07/2022 08:58	File folder	
source	17/07/2022 08:58	File folder	
test test	11/08/2022 15:15	File folder	
.classpath	17/07/2022 08:58	CLASSPATH File	1 K
.project	17/07/2022 08:58	PROJECT File	1 K
GridSim_stat	17/07/2022 19:25	Text Document	0 K
📄 readme	17/07/2022 08:58	Text Document	1 KI
🔏 run	17/07/2022 08:58	Windows Batch File	1 KI
sim_report	12/08/2022 18:02	File	49 KI
sim_trace	12/08/2022 18:00	File	0 KI

Figure 20:- Run the Tool

#### 6.2 Regions in Cloud Analyst tool

• The division of regions in the cloud analyst toolkit is shown in below figure 21.



Figure 21:- The Region division in Cloud analyst tool

#### 6.3 Configuration of User bases

• Userbases are used for the generation of traffic to the data center. The world map is divided into 6 regions and data centers are placed at different locations. Below Figure 22 shows the user base configuration.

Simulation Dura	ation: 60.0	hou	rs 🔻						
ser bases:	Name	Region	Requests per	Data Size	Peak Hours	Peak Hours	Avg Peak	Avg Off-Peak	
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	UB3	5	80	100	3	9	1000	100	Remove
	UB4	1	80	100	3	9	1000	100	
	UB5	3	80	100	3	9	1000	100 👻	
oplication eployment onfiguration:	Service Brok	enter	Closest Data Ce	nter	ne Size	Memory		BW	
	DC1	erner	# 4465	5	10000	merriory	512	1000	Add New
	DC2			5	10000		512	1000	
									Remove



• In the user base, the service broker policies can be configured from the drop down list.

### 6.4 Data Center Configuration

• Data Centers are able to perform the tasks that are generated from the userbases. Below is figure 23.

Data Centers:         Name         Region         Arch         OS         VMM         Cost per VM \$/Hr         Memory Cost \$/s         Storage Cost \$/s         Data Transfer Cost \$/s         Physical HW           DC1         0x86         Linux         Xen         0.1         0.05         0.001         0.1         3           DC2         1/x86         Linux         Xen         0.1         0.05         0.001         0.1         2           Physical Hardware Details of Data Center : DC1           Memory (Mb)         Storage (Mb)         Available BW         Number of Processor         Processor         VM Policy         Add New           1         204800         100000000         10000         4         1000 TIME_SHARED         Copy           1         204800         100000000         10000         4         1000 TIME_SHARED         Copy           2         204800         100000000         10000         4         1000 TIME_SHARED         Remove	Main Configuration	Data Ce	enter Conf	iguration	Advanced							
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Figure 23:- Data Center Configuration

• After configuration of userbases and data centers configuration in different regions on world map. The figure is shown in below figure 23.

#### 6.5 After the Configuration

• Configuration of user base and data centers are completed



Figure 24:- Configured the Userbase and Data centers

#### 6.6 Simulation Results

• By running the simulation results with different service broker policies and algorithms. The outputs will be shown in below figure 25 and figure 26.

C:\WINDOWS\system32\cmd.exe
5.0: DC1-Broker: Cloud Resource List received with 2 resource(s)
5.0: DC2-Broker: Cloud Resource List received with 2 resource(s)
5.0: DC1-Broker: Trying to Create VM #0
5.0: DC2-Broker: Trying to Create VM #0
5.0: DC1-Broker: Trying to Create VM #1
5.0: DC1-Broker: Trying to Create VM #2
5.0: DC2-Broker: Trying to Create VM #1
5.0: DC1-Broker: Trying to Create VM #3
5.0: DC1-Broker: Trying to Create VM #4
5.0: DC2-Broker: Trying to Create VM #2
5.0: DC2-Broker: Trying to Create VM #3
5.0: DC2-Broker: Trying to Create VM #4
Gathering simulation data.
UB1 finalizing. Messages sent:11205, Received:11265
UBS TINALIZING, Messages Sent:11332, Received:11332 DC1 Deskan fizedising, subsitted aloudlate 454070 pagessing aloudlate 1 allDesuestsDessessed 4543200
UC1=Broker finalizing, Submitted Cloudets=404070 processing Cloudets=1, allRequestsProcessed=4043200
UB6 requests sets 047032 - nession-04703
UBD fequests sent-subjects, received-subjects
UR3 requests sent-010407 received-010407
UB2 finalizing. Messages sent:11302. Received:11302
URA finalizing. Messages sent:11340. Received:11340
UB2 requests sent=906776 . received=906776
Got response for 1511340 but it seems to be completed.
UB5 requests sent=912340 , received=912340
UB1 requests sent=905934 , received=905934
DC2-Broker finalizing, submitted cloudlets=92967 processing cloudlets=0 ,allRequestsProcessed=910132
UB4 requests sent=910132 , received=910132
Simulation completed.
********** Vm allocations in DC1
0->185629
1->185628
2->185628
3->185628
4->185628
**************** Vm allocations in DC2
0->37188
1-3/188
2-37188
3->3/188
4->3/185 第業第第第日本のContone DC1#第第第第
Datacenter: Del
6 178
C
*****Datacenter, DC2*****
User id Debt
8 178

Figure 25:- The outputs in command window



Figure 26:- The results of Cloud analyst in tool

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