

Configuration Manual

MSc Research Project Cloud Computing

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Configuration Manual

Shamir Ahamed A M 21154929

1 Introduction

This article covers the setting setup of the Cloud sim simulator for the simulation of container-based simulation. These comprise not just the tools and technology used to create the solution, but also the conditions necessary for its effective rollout. The document provides comprehensive instructions for setting up a simulation of this architecture for any other system.

2 Tools/Technologies Prerequisites

The following are some of the necessary conditions for the setup:

- JavaSE 1.8
- Eclipse IDE
- Downloading Artifact (cloudsim-cloudsim-4.0)

3 Solution Deployment Configuration

As the Cloudsim tool is a Java application and I have used Windows machines for implementation, there are some things we need to do before we run the simulation. As the Cloudsim tool is a Java application and I have used Windows machines for implementation, there are some things we need to do before we run the simulation.

3.1 Installation of Java

The Eclipse platform, which was created with Java, may be used to create IDEs, IDE plugins, and rich client applications. You may use Eclipse as an integrated development environment (IDE) for Java language for simulation.

3.1.1 Download Link

url: https://www.oracle.com/java/technologies/downloads/#java8

3.1.2 Installation of java

→ C	nloads/#java8-windows	论 ☆	*
Java downloads Tools and resources Jav	/a archīve		
Commercial license and support are available for	r a low cost with Java SE Subscription.		
JDK 8 software is licensed under the Oracle Tec	nnology Network License Agreement for Oracle Java SE.		
JDK 8u351 checksum			
Linux macOS Solaris Windows			
Product/file description	File size	Download	
x86 Installer	161.54 MB		
x64 Installer	175.54 MB	☐ jdk-8u351-windows-x64.exe	
Documentation Download			
JKF 8			
Server JRE 8			

Figure 1: Click "Next"

😸 Java SE Development Kit 8 Update 172 (64-bit) - Setup	😼 Java SE Development Kit 8 Update 172 (64-bit) - Complete
Java"	
Welcome to the Installation Wizard for Java SE Development Kit 8 Update 172	Java SE Development Kit 8 Update 172 (64-bit) Successfully Installed
This wizard will guide you through the installation process for the Java SE Development Kit 8 Update 172.	
	Click Next Steps to access tutorials, API documentation, developer guides, release notes and more to help you get started with the JDK.
The Java Mission Control profiling and diagnostics tools suite is now available as part of the JDK.	<u>N</u> ext Steps
Next > Cancel	Close

Figure 2: Click "Next"

Figure 3: Click "Close"

3.2 Installation of Eclipse IDE - V2022-09

In order to use Eclipse, system must meet certain criteria.

Memory	CPU	File Size:	OS
4GB	CPU: Intel Core i5-3570.	30 GB	Windows $7/10$ (latest service pack)

Upon completion, the Eclipse Installer executable for Windows must be accessible in the downloads folder. Launch the program that will install Eclipse

3.2.1 Download Link

url: https://www.eclipse.org/downloads/

3.2.2 Installation of Eclipse



Figure 4: To launch Eclipse, run the installation file.

eclipseinsta	aller by Comph	×	eclipseinsta	aller by Comph	×
Eclipse IDE The essential t Maven integra	for Java Developers ools for any java developer, including a Java IDE, a Git client, XML Editor, Myle non.	/n, and	Eclipse IDE The essential t Maven integra	for Java Developers Cord for any Java developer, including a Java IDE, a Git client, XMI, Editor, Mylyn, an Incon.	id
Installation Folder	C:\Users\ian\java-mars3	Ŀ	Installation Folder	C:\Users\ian\java-mars2	5
	create start menu entry create deskton shortcut			create start menu entry create desktop shortcut	
	± INSTALL			► LAUNCH	
				show readme file keep installer	
< BACK			< BACK		

Figure 5: To start the installa- Figure 6: As soon as the setup tion, click the "Install" option. is finished, Start Eclipse..

You may direct Eclipse's installation to a specific directory of your choosing. Your user directory is where things will be stored by default.

Open Eclipse As soon as the setup is finished,

3.3 Downloading Artifact (cloudsim-cloudsim-4.0)

We can download source code on NCI portal. Alternatively we can download from github.

github repo url: https://github.com/shamirahamed/Cloudsim_simulation.git

🐉 main 👻 🐉 1 branch 💿 0 tags	Go to file
shamirahamed Update README.md	Local Codespaces (New)
README.md Update README.md	E Clone (
Cloudsim-cloudsim-4.0.zip v1	HTTPS SSH GitHub CLI
	https://github.com/shamirahamed/Cloudsim_simu
README.md	Use Git or checkout with SVN using the web URL.
	다 Open with GitHub Desktop
	Download ZIP

Figure 7: Code \rightarrow DownloadZip

3.4 Import (cloudsim-cloudsim-4.0) Maven project to Eclipse IDE

Cloudsim Download link: https://github.com/Cloudslab/cloudsim/releases Cloudsim Scheduler link: https://github.com/michaelfahmy/cloudsim-task-scheduling

Importing Maven project from Artifact



Figure 8: Import projects \rightarrow Maven Projects D C Import × ९ 🛛 😰 🗱 »2 □ ₽ ∰ ≪1 □ 8 □ - -🍋 Project Explorer 🗙 🍃 Type Hierarchy 🛛 🖨 🍞 🖇 📟 🗖 è Import existing Maven projects There are no projects in your workspace. To add a project: **?** Select an import wizard: Create a project... > > Oomph > > Run/Debug > > Team > > TextMate ? < Back Next > Finish Cancel

Figure 9: Import projects \rightarrow Existing Maven Projects

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?	< <u>B</u> ack	Next >	Ēi	nish	Cance	4

Figure 10: Click "Next"

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				Deselec	t Tree
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Add project(s) to working set]		
Advanced					
3	 	PT 1 1		~	

Figure 11: Click "Browse"

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er					≣ • (
Name	Date modified	Туре	Size		
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🚞 distribution	13-12-2022 11:29	File folder			
🚞 documentation	13-12-2022 11:29	File folder			
🚞 jars	13-12-2022 11:34	File folder			
🚞 modules	13-12-2022 11:29	File folder			
: cloudsim-cloudsim-4.0					

Figure 12: Browse the artifact location Location will be like \rightarrow C:\ cloudsim-cloudsim-4.0

Import Maven Projects		×
Maven Projects		
Select Maven projects		
Boot Directory: F:\Shamir\cloudsim\Cloudsim Final submission\cloudsim-cloudsim-4.0	Brows	e
<u>P</u> rojects:		
V 2 /pom.xml org.cloudbus.cloudsim:cloudsim-package:4.0:pom	Select	All
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Figure 13: Click \rightarrow Finish Please make sure all check boxes are marked

4 Configuration

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		5			
9	_				
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Figure 14: Wait for the build process to finish before responding to this pop-up.



Figure 15: After build Eclipse IDE Looks Like

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Results Baders Coverg Booten B
Migrate JAB File.

Figure 16: Right-click on the cloudsimexample folder and select Build Path. Java Build Path \rightarrow Libraries Add External Jars

Name	Date modified	Туре	Size
🔬 jswarm-pso_2_08.jar	04-11-2022 07:57	Executable Jar File	1,227 KB

Figure 17: Location: C:\cloudsim-cloudsim-4.0.jars $\$ jswarm-pso-2-08.jar

5 Validations

Validations have been performed using standard cloud simulation tools (Cloudsim); moreover, we're implementing Continer modules and algorithms like FCFS,PSO,RR, and SJF, and feeding it data in accordance with AWS instance characteristics like cores,ram, and storage. We're layering container scheduling on top of the scheduling modules and utilizing it to gauge performance.



Figure 18: Project files are FCFS, PSO, RoundRobin, and SJF



Figure 19: Expansion of project files

5.1 Workloadfiles and configurations

We can give different workload files and can be used in the program



Figure 20: Workload files







Figure 22: code for VM configurations it will be on Container(FCFS,PSO,SJF,RoundRobin).java



Figure 23: code for change some constants for Container (FCFS,PSO,SJF,RoundRobin).java \rightarrow utils \ constants.java

5.2 Running Simulations

After running the simulations. We can evaluate the container scheduling using the logs which is printed on the console



Figure 24: To run \rightarrow Open Container-FCFS-Scheduler.java and click run button

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CloudletID	DataCenterID	CloudletLength	VMID	ContainerID	CPU Utilization	Time	St
22	4	2001	4	42	00.67	08	00.
29	4	2101	4	44	00.53	08.4	0
08	6	2185	6	63	00.47	08.74	
00	5	2194	5	51	00.54	08.78	
07	5	2211	5	53	00.58	08.89	
13	6	2338	6	64	00.49	09.35	
09	5	2442	5	54	00.76	09.77	
21	4	2501	4	41	00.77	10	00.
02	2	2505	2	22	00.66	10.02	
01	2	2558	2	21	00.55	10.23	
06	5	2594	5	52	00.5	10.37	0
28	3	2619	3	33	00.45	10.48	
05	2	2637	2	23	00.63	10.55	
17	3	2647	3	32	00.51	10.59	
04	6	2671	6	62	00.54	10.68	
10	2	2830	2	24	00.53	11.32	
03	6	2924	6	61	00.69	11.7	0
23	4	2993	4	43	00.63	11.97	
16	3	2998	3	31	00.61	11.99	
19	6	2123	6	61	00.7	08.49	0
15	5	2235	5	52	00.67	08.94	
26	5	2116	5	53	00.52	08.46	
12	5	2490	5	51	00.46	09.96	
27	5	2093	5	54	00.59	08.47	

Figure 25: The output of FCFS Scheduler will be displayed in the console

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🗸 📴 modules	1 package PSO;
> 🔛 cloudsim	2
✓	3
✓	4@ import org.cloudbus.cloudsim.*;
V 🔠 FCFS	25
> 🕖 Container_FCFS_Scheduler.java	26 public class Container_PSO_Scheduler {
> 🚺 ContainerFCFSDatacenterBroker.java	27
> 🔠 org.cloudbus.cloudsim.examples	<pre>28 private static List<cloudlet> cloudletList;</cloudlet></pre>
> 🞥 org.cloudbus.cloudsim.examples.container	<pre>29 private static List<vm> vmList;</vm></pre>
> 🔠 org.cloudbus.cloudsim.examples.network	<pre>30 private static List<containerhost> hostList;</containerhost></pre>
> 🔠 org.cloudbus.cloudsim.examples.network.datacen	31
> 🔠 org.cloudbus.cloudsim.examples.power	32 private static Datacenter[] datacenter;
> 🖶 org.cloudbus.cloudsim.examples.power.planetlab	33 private static PSO PSOSchedularInstance;
> 🌐 org.cloudbus.cloudsim.examples.power.random	34 private static double mapping[];
V 🔠 PSO	35 private static double[][] commaderix;
> D Container_PSO_Scheduler.java	37 private static diviset container list.
> 🕖 ContainerPSODatacenterBroker.java	
> 🚺 PSO.java	39 private static List <vm> createVM(int userId, int vms) {</vm>
> D SchedulerFitnessFunction.java	40 //Creates a container to store VMs. This list is passed to the broker later
> 🚺 SchedulerParticle.java	<pre>41 LinkedList<vm> list = new LinkedList<vm>();</vm></vm></pre>
> D SchedulerParticleUpdate.java	42
∽ 🚌 RoundRobin	43 //VM Parameters
> 🔊 ContainerRoundRobinDatacenterBroker.java	44 long size = 10000; //image size (MB)
> 🔊 ContainerRoundRobinScheduler.java	45 int ram = 512; //xm memory (MB)
V 🔠 SJF	46 int mips = 250;
> 🕖 Container_SJF_Scheduler.java	47 long bw = 1000;
> 🚺 ContainerSJFDatacenterBroker.java	48 int pesNumber = 4; //number of cpus
> 🔠 utils	49 String vmm = "Xen"; //VMM name
> 🍅 src/main/resources	50
🅮 src/test/java	51 //create VMs
> 🛋 JRE System Library [JavaSE-1.8]	52 Vm[j Vm = new Vm[Vms];

Figure 26: To run \rightarrow Open Container-PSO-Scheduler.java and click run button

<pre>cterminated> Container_PSO_Scheduler[Java Application] C\User\LENOVO\p2\poot\plugins\org.edipse.justj.openjdk.hotspotjre.full.win32.x86_64_17.0.4.v20. Datacenter_2 is shutting down Datacenter_3 is shutting down Broker_0 is shutting down Simulation completed. Simulation completed. CloudletID DataCenterID CloudletLength VMID ContainerID CPU Utilization Time St 08 2 2185 2 23 00.41 08.74 07 4 2211 4 42 00.41 08.74 07 4 2211 4 42 00.41 08.84 00 2 2194 2 21 00.65 08.85 15 5 2235 5 53 00.47 08.94 24 3 2320 3 34 00.62 09.28 13 6 2338 6 6 22 00.69 09.35 09 5 2442 5 52 00.76 09.77 12 4 2490 4 44 00.45 09.96 21 6 2501 6 64 00.57 10 00. 02 3 2505 3 32 00.42 10.02 01 3 2558 3 31 00.67 10.23 06 6 2594 6 61 00.66 10.38 05 2 2637 2 22 00.52 10.55 17 3 2647 3 33 00.53 10.55 17 3 2647 3 33 00.53 10.55 17 3 2647 3 33 00.53 10.55 17 3 2647 3 33 00.53 10.55 17 3 2647 3 33 00.53 10.55 17 3 2647 3 33 00.53 10.55 17 3 2647 3 33 00.53 10.55 17 3 2647 3 33 00.53 10.55 11 4 2685 4 43 00.74 10.74 18 5 2774 5 54 00.42 11.1 0 10 2 283 22774 5 54 00.42 11.1 0 10 2 283 22774 5 54 00.42 11.1 0 10 2 283 22774 5 54 00.42 11.1 0 10 2 283 22774 5 54 00.42 11.1 0 10 2 283 22 2774 5 54 00.42 11.1 0 10 2 283 22 2774 5 54 00.42 11.1 0 10 2 283 22 2774 5 54 00.42 11.1 0 10 2 283 22 2774 5 54 00.42 11.1 0 10 2 283 2 2774 5 54 00.42 11.1 0 10 2 283 2 2774 5 54 00.42 11.1 0 10 2 283 2 2774 5 54 00.42 11.1 0 10 2 283 2 2774 5 54 00.42 11.1 0 10 2 283 2 2774 5 54 00.42 11.1 0 10 2 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 2774 5 54 00.42 11.1 0 10 29 283 2 298 6 6 63 00.55 11.99 19 4 2123 4 41 00.43 08.49 24 24 22 210.055 11.99 19 4 2123 4 41 00.43 08.49 25 29 201 5</pre>	📃 Console 🗙	🕖 Container_PSO_Sche	duler.java		🔳 🗙 💥 📗	🛃 💀 🗲 🚝 🛃	📃 🔻 📑 🕶	
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136233866200.6909.35095244255200.7609.77124249044400.4509.96216250166400.571000.023250533200.4210.02013255833100.6710.23066259466100.6610.38052263722200.5210.55173264733300.5310.59045267155100.6210.68114268544300.7410.74185277455400.4211.1102283022400.4411.32034292444100.4611.7194212344100.4308.49252215522200.4508.62142218422100.7508.84225200155200.430809.	24	3	2320	3	34	00.62	09.28	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	13	6	2338	6	62	00.69	09.35	
124 2490 4 44 00.45 09.96 21 6 2501 6 64 00.57 10 $00.$ 02 3 2505 3 32 00.42 10.02 01 3 2558 3 31 00.67 10.23 06 6 2594 6 61 00.66 10.38 05 2 2637 2 22 00.52 10.55 17 3 2647 3 33 00.53 10.59 04 5 2671 5 51 00.62 10.68 11 4 2685 4 43 00.74 10.74 18 5 2774 5 54 00.42 11.1 0 10 2 2830 2 24 00.44 11.32 03 4 2924 4 41 00.46 11.7 0 16 6 2998 6 63 00.55 11.99 19 4 2123 4 41 00.43 08.49 25 2 2155 2 22 00.45 08.62 14 2 2184 2 21 00.75 08.84 22 5 2001 5 52 00.43 08 $09.$	09	5	2442	5	52	00.76	09.77	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12	4	2490	4	44	00.45	09.96	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	21	6	2501	6	64	00.57	10	00.
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	02	3	2505	3	32	00.42	10.02	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	01	3	2558	3	31	00.67	10.23	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	06	6	2594	6	61	00.66	10.38	
	05	2	2637	2	22	00.52	10.55	
	17	3	2647	3	33	00.53	10.59	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	04	5	2671	5	51	00.62	10.68	
18 5 2774 5 54 00.42 11.1 0 10 2 2830 2 24 00.44 11.32 03 4 2924 4 41 00.46 11.7 0 16 6 2998 6 63 00.55 11.99 19 4 2123 4 41 00.43 08.49 25 2 2155 2 22 00.45 08.62 14 2 2184 2 21 00.75 08.84 22 5 2001 5 52 00.43 08 09.	11	4	2685	4	43	00.74	10.74	
10 2 2830 2 24 00.44 11.32 03 4 2924 4 41 00.46 11.7 0 16 6 2998 6 63 00.55 11.99 19 4 2123 4 41 00.43 08.49 25 2 2155 2 22 00.45 08.62 14 2 2184 2 21 00.75 08.84 22 5 2001 5 52 00.43 08 09.	18	5	2774	5	54	00.42	11.1	Ο.
03 4 2924 4 41 00.46 11.7 0 16 6 2998 6 63 00.55 11.99 19 4 2123 4 41 00.43 08.49 25 2 2155 2 22 00.45 08.62 14 2 2184 2 21 00.75 08.84 22 5 2001 5 52 00.43 08 09.	10	2	2830	2	24	00.44	11.32	
166299866300.5511.99194212344100.4308.49252215522200.4508.62142218422100.7508.84225200155200.430809.	03	4	2924	4	41	00.46	11.7	0
19 4 2123 4 41 00.43 08.49 25 2 2155 2 22 00.45 08.62 14 2 2184 2 21 00.75 08.84 22 5 2001 5 52 00.43 08 09.	16	6	2998	6	63	00.55	11.99	
25 2 2155 2 22 00.45 08.62 14 2 2184 2 21 00.75 08.84 22 5 2001 5 52 00.43 08 09.	19	4	2123	4	41	00.43	08.49	
14 2 2184 2 21 00.75 08.84 22 5 2001 5 52 00.43 08 09.	25	2	2155	2	22	00.45	08.62	
22 5 2001 5 52 00.43 08 09.	14	2	2184	2	21	00.75	08.84	
	22	5	2001	5	52	00.43	08	09.

Figure 27: The output of PSO Scheduler will be displayed in the console



Figure 28: To run \rightarrow Open Container-RoundRobinScheduler-Scheduler.java and click run button

CloudletID	DataCenterID	CloudletLength	VMID	ContainerID	CPU Utilization	Time	St
22	4	2001	4	42	00.67	08	00.
29	4	2101	4	44	00.53	08.4	0
08	6	2185	6	63	00.47	08.74	
00	5	2194	5	51	00.54	08.78	
07	5	2211	5	53	00.58	08.89	
13	6	2338	6	64	00.49	09.35	
09	5	2442	5	54	00.76	09.77	
21	4	2501	4	41	00.77	10	00.
02	2	2505	2	22	00.66	10.02	
01	2	2558	2	21	00.55	10.23	
06	5	2594	5	52	00.5	10.37	0
28	3	2619	3	33	00.45	10.48	
05	2	2637	2	23	00.63	10.55	
17	3	2647	3	32	00.51	10.59	1
04	6	2671	6	62	00.54	10.68	
10	2	2830	2	24	00.53	11.32	
03	6	2924	6	61	00.69	11.7	0
23	4	2993	4	43	00.63	11.97	
16	3	2998	3	31	00.61	11.99	
19	6	2123	6	61	00.7	08.49	0
15	5	2235	5	52	00.67	08.94	
26	5	2116	5	53	00.52	08.46	
12	5	2490	5	51	00.46	09.96	
27	5	2093	5	54	00.59	08.47	

Figure 29: The output of RoundRobinScheduler Scheduler will be displayed in the console

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Project Explorer 🗙 🏗 Type Hierarchy 📄 🕏 🍞 🖇 📟 E	1 🔎 Container_SIF_Scheduler.java 🗙	-
✓	> 💥 cloudsim-examples > 🗯 src/main/java > 👪 SJF > 👧 Container_SJF_Scheduler >	
✓ ﷺ src/main/java	1 package SJF:	
V 🌐 FCFS		
> 🕖 Container_FCFS_Scheduler.java	3	
> 🚺 ContainerFCFSDatacenterBroker.java	💁 4⊕ import org.cloudbus.cloudsim.*;□	
> 🔠 org.cloudbus.cloudsim.examples	27	
> 🔠 org.cloudbus.cloudsim.examples.container	28 public class Container_SJF_Scheduler {	
> 🔠 org.cloudbus.cloudsim.examples.network	29	
> 🔠 org.cloudbus.cloudsim.examples.network.datacen	30 private static List <cloudlet> cloudletList;</cloudlet>	
> 🔠 org.cloudbus.cloudsim.examples.power	31 private static List <containerhost> hostList;</containerhost>	
> 🖶 org.cloudbus.cloudsim.examples.power.planetlab	32 private static List <vm> vmList;</vm>	
> 🖶 org.cloudbus.cloudsim.examples.power.random	33 private static Datacenter[] datacenter;	
V 🔠 PSO	34 private static double[][] commMatrix;	
> 💭 Container_PSO_Scheduler.java	35 private static double[][] execMatrix;	
> 💭 ContainerPSODatacenterBroker.java	36 private static Object containerList;	
> 🗊 PSO.java	37	
> 3 SchedulerFitnessFunction.java	38 ^{co} private static List create/M(int userid, int vms) {	
> D SchedulerParticle.iava	39 //Creates a container to store vis. Inis list is passed to the proker later	
SchedulerParticleUpdate.iava	40 LinkedList <vm> ();</vm>	
× A RoundRobin		
> In ContainerRoundRobinDatacenterBroker.iava	12 //Wir Falameters	
ContainerRoundRobinScheduler.iava	44 int ram = 512 (//mmercy //Mb)	
× ⊕ SIF	45 int mis = 250.	
Container SIE Scheduleriava	$46 \qquad \text{long by } = 1000;$	
ContainerSIEDatacenterBroker java	47 int pesNumber = 1: //number of cpus	
> I utile	48 String vmm = "Xen": //VMM name	
(# src/main/resources	49	
src/test/iava	50 //create VMs	
IRE System Library (JavaSE-1.8)	51 Vm[] vm = new Vm[vms];	
Mayen Dependencier	52	
N Referenced Libraries	53 for (int i = 0; i < vms; i++) {	
	54 vm[i] = new Vm(datacenter[i].getId(), userId, mips, pesNumber, ram, bw, size, vmm,	ne
) 🗁 ~	55 list.add(vmfil):	

Figure 30: To run \rightarrow Open Container-SJF-Scheduler.java and click run button

📮 Console 🗙	Container_SJF_Sched	uler.java		🔳 🗙 💥 🛛	🗼 📑 😺 🗗 🚝 🛃	📃 🔻 📑 🔻	- E
<terminated> Cor</terminated>	ntainer_SJF_Scheduler [Jav	va Application] C:\Users\LE	NOVO\.p2\poo	ol\plugins\org.eclipse.justj.	openjdk.hotspot.jre.full.wir	32.x86_64_17.0).4.v20
Datacenter_3	is shutting down	n					
Datacenter 4	is shutting down	n					
Broker 0 is	shutting down						
Simulation c	completed.						
Simulation c	completed.						
0	OUTPUT ======						
CloudletID	DataCenterID	CloudletLength	VMID	ContainerID	CPU Utilization	Time	St
00	5	2194	5	51	00.54	08.78	
07	2	2211	2	21	00.76	08.84	
02	3	2505	3	31	00.68	10.02	
01	4	2558	4	41	00.71	10.23	
06	6	2594	6	61	00.7	10.38	0
18	2	2774	2	21	00.75	11.1	0
10	5	2830	5	51	00.79	11.32	
05	3	2637	3	31	00.58	10.55	
11	6	2685	6	61	00.52	10.74	
03	4	2924	4	41	00.71	11.7	1
25	2	2155	2	21	00.6	08.62	2
13	5	2338	5	51	00.55	09.35	
09	3	2442	3	31	00.69	09.77	
12	6	2490	6	61	00.73	09.96	
04	4	2671	4	41	00.66	10.68	
29	2	2101	2	21	00.46	08.4	2
14	5	2184	5	51	00.5	08.74	2
19	6	2123	6	61	00.52	08.49	
17	3	2647	3	31	00.41	10.59	
08	4	2185	4	41	00.77	08.74	
15	5	2235	5	51	00.52	08.94	
27	6	2093	6	61	00.73	08.37	
21	3	2501	3	31	00.75	10	41.
20	4	2969	4	41	00.79	11.88	
16	5	2998	5	51	00.48	11.99	

Figure 31: The output of SJF Scheduler will be displayed in the console