Configuration Manual

MSc Research Project
Cloud Computing

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Project Submission Sheet
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Configuration Manual

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1 Setup

In Order to recreate this project simulation, It is very straight forward. All that is needed is to set up the JavaIDE as well as Download the Simulation Code of a Modified iFogSim2

1.1 JavaIDE Setup

In order to replicate this research, you first need to have a Java IDE set up and running. For this research, Eclipse was used. (n.d.)

1. Download the Eclipse Installer: Download Eclipse Installer from http://www.eclipse.org/download Eclipse is hosted on many mirrors around the world. Please select the one closest to you and start to download the Installer

2. Start the Eclipse Installer executable: For Windows users, after the Eclipse Installer executable has finished downloading it should be available in your download directory. Start the Eclipse Installer executable. You may get a security warning to run this file. If the Eclipse Foundation is the Publisher, you are good to select Run. For Mac and Linux users, you will still need to unzip the download to create the Installer. Start the Installer once it is available.

3. Select the package to install: The new Eclipse Installer shows the packages available to Eclipse users. You can search for the package you want to install or scroll through the list. Select and click on the package you want to install.

4. Select your installation folder: Specify the folder where you want Eclipse to be installed. The default folder will be in your User directory. Select the '**Install**' button to begin the installation.

5. Launch Eclipse: Once the installation is complete you can now launch Eclipse. The Eclipse Installer has done it's work.

1.2 running iFogSim2

Next it is important to have iFogSim Mahmud et al. (2021) running. I will be providing a guide to the final version created for this research

1. Create a Java project

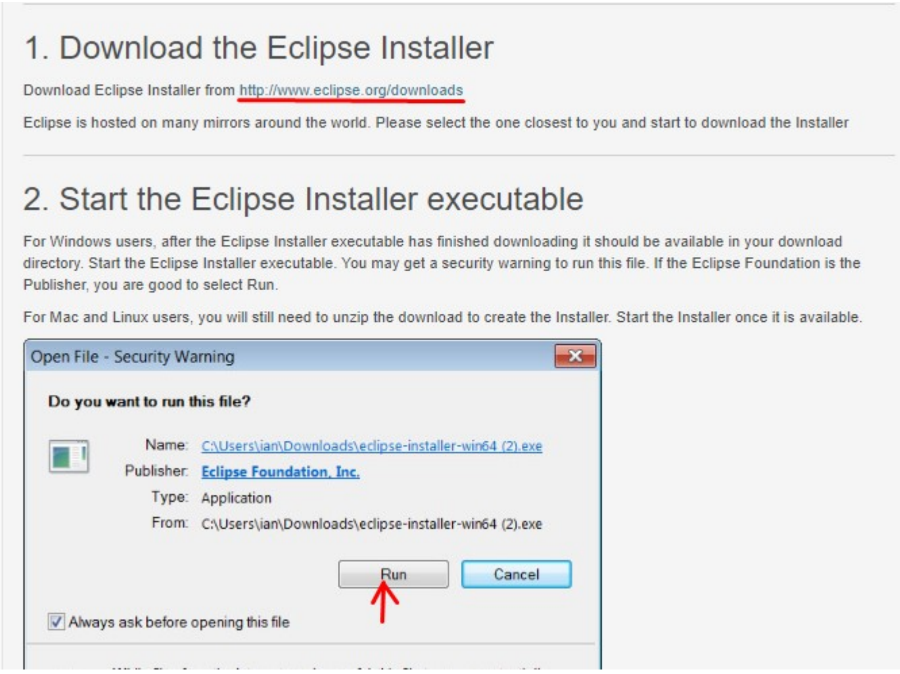

Figure 1: Following the guide on https://www.eclipse.org/downloads/packages/installer

2. Inside the project directory, initialize an empty Git repository with the following command: "git init"
3. Add the Git repository of iFogSim2 as the origin remote: "git remote add origin https://github.com/Surelaarrgh/MovingFog"
4. Pull the contents of the repository to your machine: "git pull origin main"
5. Include the JARs to the project
6. Run the simulation file (e.g. CarDriv.java) to get started

2 Setting up your own Experiment

Once you have the iFogSim environment set up, the experiments in this work can be replicated or even extended to other scenarios by varying the experiment variables

2.1 Experiment variables

Fig 2 Shows the parameters that can be set for each fog device to simulate different levels of device configurations

The configuration details of the module can equally be modified to match the scenario in question.

Other Configurations like Clustering mode, placement algorithm etc are already set in the code.

In order to extend this work over a larger geographical area, the mobility walk class must be carefully modified to retain a mathematical relationship between the range and the 2D Polygon.

```
MicroserviceFogDevice org.fog.test.perfeval.CarsDriv.createFogDevice(String nodeName, long
mips, int ram, long upBw, long downBw, double ratePerMips, double busyPower, double
idlePower, String deviceType)

Creates a vanilla fog device

Parameters:
    nodeName name of the device to be used in simulation
    mips MIPS
    ram RAM
    upBw uplink bandwidth
    downBw downlink bandwidth
    ratePerMips cost rate per MIPS used
    busyPower
    idlePower
    deviceType
Returns:
```

Figure 2: Variables for for devices

```
void org.fog.application.Application.addAppModule(String moduleName, int ram, int mips,
int size)

Parameters:
    moduleName
    ram
    mips
    size
```

Figure 3: Module size details

3 Intepreting results

All results are given in Standard industry SI units. But the more important result is being able to follow the flow of the tuples and the mobility handoff from cluster to cluster as the vehicle moves to a position unreachable by it's current parent node. One such detail is shown in fig 4

```
gateway_107 : Energy Consumed = 169911.33240499996
gateway_108 : Energy Consumed = 166866.59999999995
gateway_109 : Energy Consumed = 166866.59999999995
gateway_110 : Energy Consumed = 200438.05752999993
gateway_111 : Energy Consumed = 166866.59999999995
gateway_112 : Energy Consumed = 166866.59999999995
gateway_113 : Energy Consumed = 166866.59999999995
gateway_114 : Energy Consumed = 207915.86114943188
```

Figure 4: Variations in energy consumed by each device

```
car_0 : Energy Consumed = 164979.73346000066
car_1 : Energy Consumed = 164979.73346000066
car_2 : Energy Consumed = 164979.73346000066
car_3 : Energy Consumed = 164979.73346000066
cloud : Energy Consumed = 2664000.0
```

Figure 5: Energy profile of Respective Fog Devices

References

(n.d.).

Mahmud, R., Pallewatta, S., Goudarzi, M. and Buyya, R. (2021). Ifogsim2: An extended ifogsim simulator for mobility, clustering, and microservice management in edge and fog computing environments, *Journal of Systems and Software* **190**: 111351.