USER MANUAL

MCCABE-THIELE SIMULATOR

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1 PRELIMINARY REQUIREMENTS

When receiving the zip file containing all submitted work for this project, you will find inside two distinct Simulator files, either *McCabeThieleSimulator.zip* or a *McCabeThieleSimulator.jar*, depending on how you wish to run the code. In the sections that follow, these two options and how to properly execute them are instructed depending on whether you wish to use the Eclipse IDE to do so, or is you wish to use an OS shell (Terminal or Command Prompt for Mac or Windows, respectively).

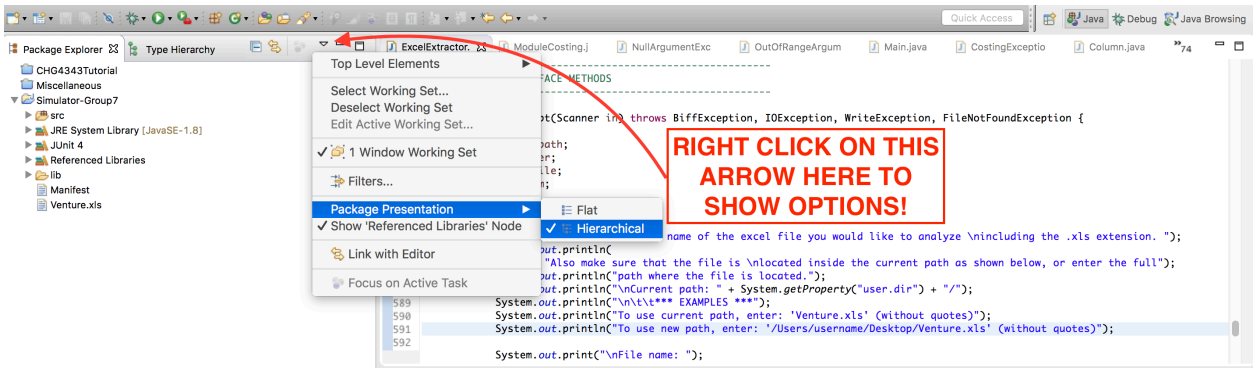
In either case, you must ensure to extract the repository zip file containing all the files; however, you **MUST NOT** further extract the Simulator program files, i.e. the *McCabeThieleSimulator.zip* and *McCabeThieleSimulator.jar* **MUST NOT** be extracted!

2 GETTING STARTED

2.1 OPENING THE CODE ARCHIVE FILE (.ZIP) WITH THE ECLIPSE IDE

To open a Java archive zip file in Eclipse, please follow these steps outlined below:

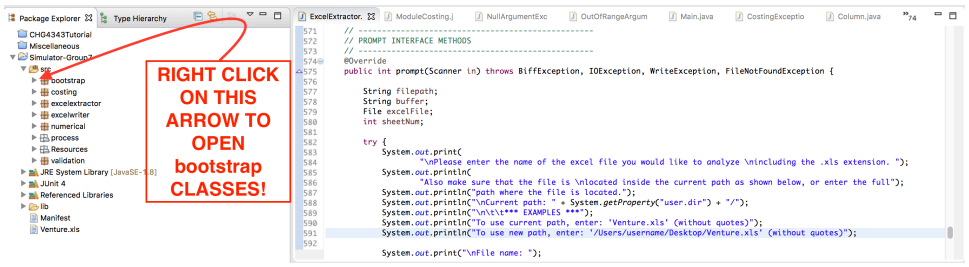
1- Download the zip file attached in the sent email and store it in a folder on your file system (Desktop, Downloads, or any other location). **Do NOT extract this file**, keep it as a zip file.
2- Ensure to download the latest version of Eclipse IDE for Java Developers (version Mars) from the link (https://www.eclipse.org/downloads/?osType=win32) - ensure to select the proper system architecture (32 or 64-bit).
3- Extract and install Eclipse similar to any other application.
4- On initial startup, select a workspace location when prompt to do so.
5- Exit the welcome screen tab and click File, Switch Workspace, Other… and select appropriate workspace folder you would like to use (can be any folder, nothing special required).
6- Click File, Import, General, Existing Projects into Workspace, Click Browse… in 'Select achieve file:' and locate and select the zip file stored earlier.
7- Click Finish.
8- Project should now be loaded and visible in left-side panel of the package folder. Simply click on the drop down arrow on the left side of the Project name and click on the 'src' folder to locate the appropriate class files located in the various package folders (double click the class file to open in editor window).
9- *Suggestion*: select the down pointing arrow to the right of the 'Package Explorer, Package Presentation, Hierarchical' for a better representation of the nested folder representation (see screenshot below).



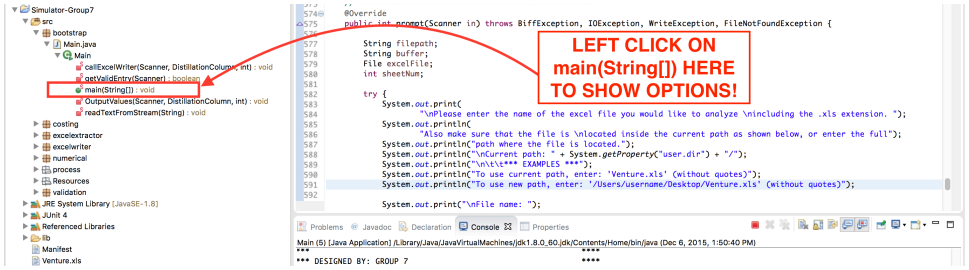
2.2 STARTING THE SIMULATOR WITH THE ECLIPSE IDE

The following set of screenshots illustrate the steps needed to ENSURE that the proper main method is started.

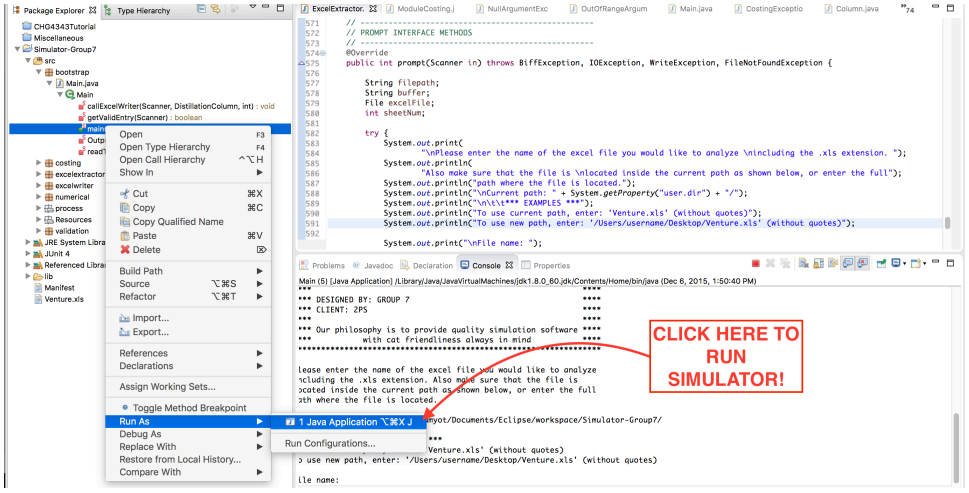
1) Open the `bootstrap` package classes by right clicking on left-side arrow.



2) Open the menu options of `main(String[])` by left-clicking on its name.



3) Select 'Run As', then right click on '1 Java Application' to run the Simulator.



2.3 STARTING THE SIMULATOR WITH AN OS SHELL

1. Open an OS shell application.

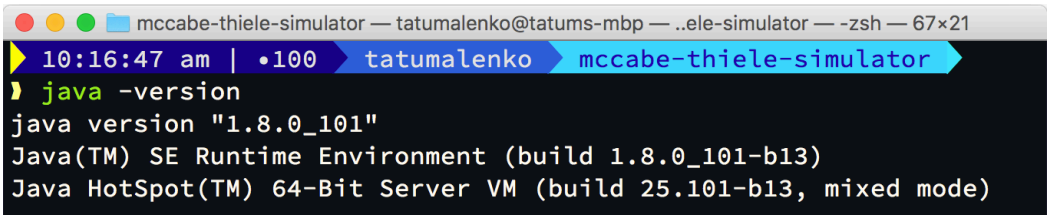
Begin by opening a Terminal or other shell variant on your operating system.

In windows: open the application *Command Prompt*

In Mac: open the application *Terminal*

2. Verify Java installation and version.

Assuming Java is properly installed and located on your system PATH environment, the commands `java -jar filename.jar` will start the Simulator without any issues. However, to ensure this is the case, try to verify your Java version with `java -version`:



Ensure that the displayed version is **1.8.0_*** and above. If not, go to the Java website and acquire the latest release (some functionalities of the Simulator are not compatible with the older versions such as 1.6 that the DrJava IDE typically uses).

3. Start the *.jar* file and run the simulator.

To start the Simulator, enter the commands `java -jar filename.jar` where filename is the name of the Simulator ending with a .jar extension.

WARNING: WHEN ENTERING A FILE'S NAME, YOU MUST ENSURE IT IS LOCATED IN THE CURRENT DIRECTORY. OTHERWISE, YOU NEED TO SUPPLY THE ABSOLUTE PATH OF THE FILE'S LOCATION. EXAMPLES WILL BE GIVEN HERE NEXT.

3.a File is located within the current directory.

If the file contains no spaces, then you simply enter the commands and filename.jar:

```
java -jar McCabeThieleSimulator.jar
```

If the file DOES contain spaces, then you MUST enter the filename.jar within double quotes.

```
java -jar "Some filename with spaces.jar"
```

3.b When the file is located in another directory.

When the path AND file name contain no spaces in the sequence of subdirectories, entering the following without quotes is permissible:

```
java -jar dir_path_to_jar/McCabeThieleSimulator.jar
```

However, when the directory contains spaces, you MUST enter the full path within double quotes, such as this:

```
java -jar dir_path_to_jar_with_spaces/McCabeThieleSimulator.jar
```

4. Start simulator.

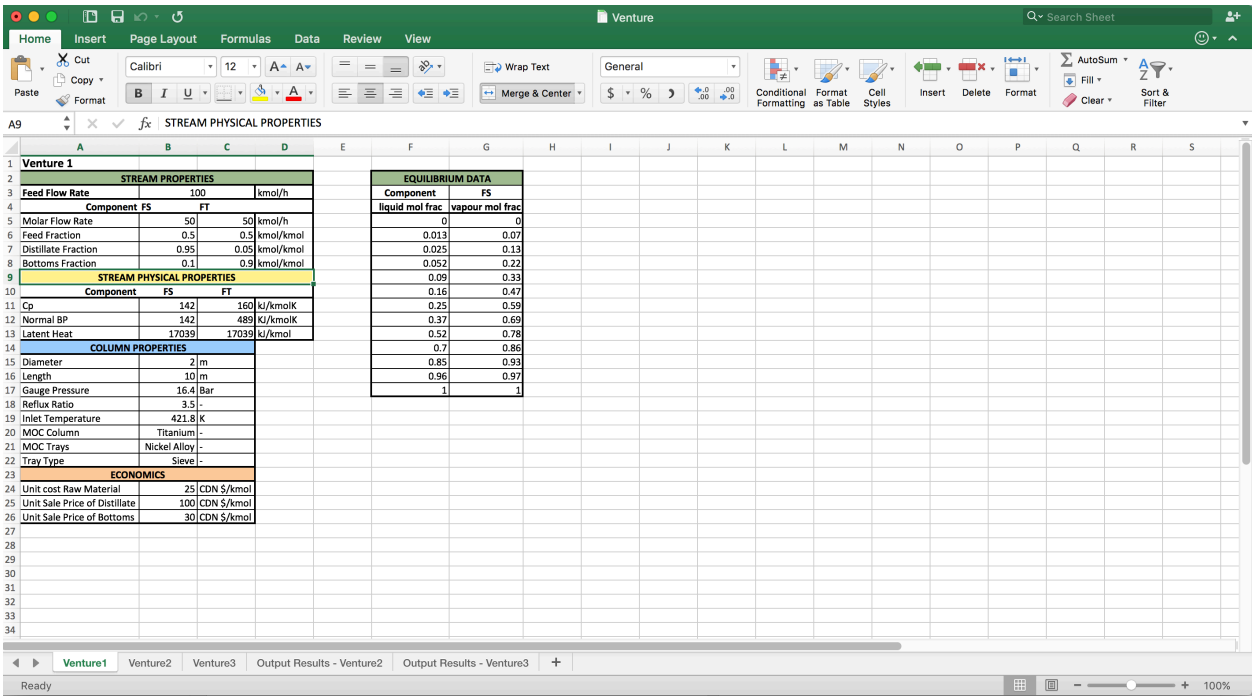
Simply press 'Enter' and the application will start!

3 USING THE SIMULATOR WITH EXCEL

3.1 GETTING YOUR EXCEL VENTURE DATA READY

The screenshot below is a layout of the accompanied file "Venture.xls" that is supplied with the simulator. Take good care of this file since it shows the placeholders that every variable that are to be read from JAVA. Although formatting does not need to be preserved, the cell location and associated variable do. That said, the simulator always assumes the cell same location (can be

any sheet, you will specify this during runtime), so you must be careful when creating your own data sheet that does not rely on this template.



	A	B	C	D
1	**Venture 1**			
2	**STREAM PROPERTIES**			
3	**Feed Flow Rate**	100		kmol/h
4	**Component**	**FS**	**FT**	
5	Molar Flow Rate	50	50	kmol/h
6	Feed Fraction	0.5	0.5	kmol/kmol
7	Distillate Fraction	0.95	0.05	kmol/kmol
8	Bottoms Fraction	0.1	0.9	kmol/kmol
9	**STREAM PHYSICAL PROPERTIES**			
10	**Component**	**FS**	**FT**	
11	Cp	142	160	kJ/kmolK
12	Normal BP	142	489	KJ/kmolK
13	Latent Heat	17039	17039	kJ/kmol
14	**COLUMN PROPERTIES**			
15	Diameter	2	m	
16	Length	10	m	
17	Gauge Pressure	16.4	Bar	
18	Reflux Ratio	3.5	-	
19	Inlet Temperature	421.8	K	
20	MOC Column	Titanium	-	
21	MOC Trays	Nickel Alloy	-	
22	Tray Type	Sieve	-	
23	**ECONOMICS**			
24	Unit cost Raw Material	25	CDN $/kmol	
25	Unit Sale Price of Distillate	100	CDN $/kmol	
26	Unit Sale Price of Bottoms	30	CDN $/kmol	

EQUILIBRIUM DATA	
Component	**FS**
liquid mol frac	**vapour mol frac**
0	0
0.013	0.07
0.025	0.13
0.052	0.22
0.09	0.33
0.16	0.47
0.25	0.59
0.37	0.69
0.52	0.78
0.7	0.86
0.85	0.93
0.96	0.97
1	1