**ICPSR: Complex Systems Models in the Social Sciences**

**Installing Java, Repast, and Eclipse**

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**Updated: August 6, 2014**

Below are the instructions for installing Java, Eclipse (as our integrated development environment or IDE), and the Repast toolkit and configuring them so that they work together. All of these software packages are free and available online. The steps for installing the software should be performed in the order that they are listed below. These procedures were tested on Mac OS X and Windows and so hopefully they will work for both operating systems. Note: clickable links are in blue, folder names are in green, pop-up windows are in orange, and information that you need to enter is in emerald.

# 1  Java

You probably already have Java installed on your computer. If you are using a Mac, since Java is part of the operating system, you only need to run Software Update to ensure that you have the latest version. If you are using a different operating system (e.g., Windows or Linux), go to this page to either install Java or verify that you have the latest version.

# 2  Repast

To install Repast go to the following page and click Download on the left. Follow the link to the sourceforge page. The version of Repast that we are going to use is called Repast J (not Repast Simphony). To locate the installation files click on the Repast folder and then click on the Repast 3.1 folder. Now install the version of Repast J that is appropriate for you operating system. You will want to install either `RepastJ-3.1.dmg` (for OS X), `Repast_J_3.1_Installer.exe` (for Windows), or `repastj-3.1.tar.gz` (for Linux). You do not need to install the suite unless you also want Repast Py, which you would use if you were programming in Python.

After you figure out the download appropriate for your operating system, click on the name of the file to download Repast, and then follow the installation instructions. For OS X, you will want to copy the Repast-3.1 folder and paste it in Applications. For Windows, simply accept the default installation suggestions. After installing, Repast can be found in `C:\Program Files\Repast 3`.

# 3   Eclipse

To install Eclipse go the following page and click Download Eclipse on the right. On the Eclipse Downloads page, you want to locate Eclipse Standard 4.4, and click on the appropriate operating system on the right to download. On the next page, click on the green arrow to download. For OS X, once downloaded, unzip the file, and copy and paste the eclipse folder into Applications. For Windows, once downloaded, unzip the file, and copy and paste the eclipse folder into `C:\Program Files\`.

Next, navigate to the eclipse folder and then launch Eclipse by clicking on the eclipse icon. When you do that the Workspace Launcher will appear, which asks where you want your projects stored. Simply accept the default location, note where the location is on your computer, check the box to use this as the default location for all of your projects, and click OK. You should confirm that the folder where your projects will be stored was actually created. For OS X, this folder will be located in `Documents/workspace`. For Windows, this folder will be located in `C:\Documents and Settings\...\workspace` (or something like that). Once you click OK, Eclipse will open. The first screen that you will see is the Welcome screen. You can click on the icons to obtain various information about Eclipse but that is not necessary for now. Click the X in the top left of the Welcome screen to close it. You are now in the location where our programming will be done.

Note: After you install Eclipse you will want to enable line numbers. For Windows, go to Window on the menu bar and select Preferences. Now expand the General section by clicking on the box, and then expand the Editors section by clicking on the box, and then click on Text Editors. Finally, select Show line numbers, click Apply, and then click ok. For OS X, go to Eclipse on the menu bar and select Preferences. Now expand the General section by clicking on the arrow, and then expand the Editors section by clicking on the arrow, and then click on Text Editors. Finally, select Show line numbers, click Apply, and then click ok.

# 4   Configuring Eclipse and Repast

The next step is to create a project in Eclipse that contains the Repast libraries (i.e., the .jar files). You will perform these steps each time you create a new project.

1. Open Eclipse.

2. On the tool bar on the left side of the programming environment (just below the File menu), click the black arrow, and select Java Project.

3. In the New Java Project box that pops up, enter repastj as the Project name, and click Finish.

4. You should now see a folder called repastj in Package Explorer on the left hand side of the window. You should also check to make sure there is a folder named repastj in your workspace folder.

5. Make sure the repastj folder is highlighted and go the Menu bar, click on Project, and then select Properties.

6. In the Properties for repastj box the pops up, select Java Build Path, and then click on Libraries, which is the third tab at the top of the box on the right.

7. You need to associate the Java libraries provided by Repast by clicking the Add External JARs button.

8. Navigate to the Repast library folder, named lib, open that folder, select all, and click open. For OS X, the lib folder is located in Applications/Repast-3.1/RepastJ/lib. For Windows, the lib folder is located in `C:\Program Files\Repast 3\Repast J\lib`.

9. Now click the Add External JARs button again and this time navigate to the location of repast.jar, select repast.jar, and click open. For OS X, repast.jar is located in `Applications/Repast-3.1/RepastJ/`. For Windows, the repast.jar is located in `C:\Program Files\Repast 3\Repast J\`.

10. Now, click the fourth tab labeled Order and Export at the top of the Java Build Path box and click the Select All button. Now, deselect the JRE System Library at the top of the Build class path order and exported entries list box. Click ok.

11. In Package Explorer, if you click on the arrow (or plus sign) you should see the JRE System Library and Referenced Libraries. If you click on those arrows (or plus signs) you will see all of the .jar files that come with the JRE System Library and all of the .jar files that you just placed on the Java Build Path.

12. You will need to leave the repastj folder open if you want to access the libraries that are stored within it.

# 5  Setting Up an Eclipse Project that Points to the Repast Libraries I

The instructions below show you how to create a new project and run an agent-based model in Eclipse using previously created .java files to work with Repast. While we will use the Heat Bugs demo model that comes with Repast in the example below, these instructions can be used to set up any of the demo models that come with Repast.

1. Open Eclipse.

2. On the tool bar on the left side of the programming environment (just below the File menu), click the black arrow, and select Java Project.

3. In the New Java Project box that pops up, enter heatBugs as the Project name, and click Next. The source tab should now be selected showing you the source folder of this project.

4. Click on the Projects tab and Click Add. The items in this list box are other open projects that you have the option of associating with the project you are currently creating. If the repastj folder is open in Package Explorer then you should see it listed in the list box. If so, select the repastj folder, and click ok. This tells the project you are creating, heatBugs, to use the contents of the repastj project.

5. Click on the Order and Export tab, click the box next to the repastj folder, and click Finish. This ensures that the current project, heatBugs, includes all of the appropriate build paths from the repastj project.

6. You should see a folder called heatBugs in Package Explorer on the left hand side of the window. If you click on the arrow (or plus sign) next to the heatBugs folder you will see the contents that are contained within, which so far should only include the JRE System Library.

7. At the highest level of organization is the Java project. A Java project must include one or more Java packages. We now need to create a Java package. Make sure the heatBugs folder is highlighted, then go to the tool bar on the left side of the programming environment (just below the File menu), click the black arrow, and select Package.

8. In the New Java Package box that pops up, enter heatBugs, and click Finish. You should now see a package called heatBugs nested within the src (or source) folder.

9. Now highlight the heatBugs Java package you just created, go to the Menu bar, click on File, and select Import.

10. In the Import box that pops up, click on the arrow (or plus sign) next to General, click on File System, and click Next.

11. In the From directory box click browse. For OS X, navigate to
`Applications/Repast-3.1/RepastJ/demos/src/uchicago/src/repastdemos/heatBugs/`
and click Open. For Windows, navigate to
`C:\Program Files\Repast 3\Repast J\demos\src\uchicago\src\repastdemos\heatBugs\`
and click Open.

12. Click the box next to the heatBugs folder and then click Finish. The Java package, which was clear (denoting empty) should now be brown-ish.

13. If you click on the arrow (or plus sign) next to the heatBugs Java package you will see all of the .java files associated with this project.

14. In the Problems box at the bottom of Eclipse you will see there are 4 errors that need to be fixed. These errors exist because the package name in the .java files is different from the package name we created.

15. Click on the arrow (or plus sign) next to Errors and then double-click the first error.

16. This will bring up the .java file that contains the error. The error is at the top of the file and is denoted with a light bulb-red error box. Click on the light bulb. You will be presented with two options: 1) Move 'HBNoGui.java' to package 'uchicago.src.repastdemos.heatBugs' or 2) Change package declaration to 'heatBugs'. Select the second option by double-clicking on it. This will change the package declaration in your file to the name you entered previously.

17. Now go to File and select Save or use the keyboard short cut to save the file. The change will not be recognized until you select Save. Files that requiring saving have an asterisk beside their names in their tab at the top of the Programming Window. Once you select Save the light bulb-red error box should disappear.

18. In the Problems box you will see there are 3 errors that need to be fixed. Repeat steps 15-17.

19. In the Problems box you will see there are 12 warnings. You can ignore these for now.

20. We are now ready to run the model. Go to the Menu bar, click Run, and select Run Configurations.

21. In the Run Configurations box, make sure Java Application is selected, and click on the blank document on the left hand side of the window.

22. Enter heatBugs in the Name box.

23. In the Project box, heatBugs should already be listed.

24. Next to the Main class box click Search, which tells Eclipse to search for the file in the current project that has a main class. In the Select Main Type box that pops up, click on HeatBugsModel (the file in the heatBugs package that contains a main class), and click ok.

25. Now click Apply, and then click Run.

26. Repast should then open the model.

27. If you click the Play button, which looks similar to the one a VCR, the heatBugs model should run.

28. You can close the model by clicking on X.

29. When you want to run this model in the future you can do so by clicking on the black arrow next to the run icon and selecting heatBugs.

# 6 Setting Up an Eclipse Project that Points to the Repast Libraries II

The instructions below show you how to create a new project and run an agent-based model in Eclipse that uses previously created .java files to work with Repast. We will use Thomas Schelling's Segregation Model in the example below.

1. Go to the course website, download schelling.zip, and unzip the file.

2. Open Eclipse.

3. On the tool bar on the left side of the programming environment (just below the File menu), click the black arrow, and select Java Project.

4. In the New Java Project box that pops up, enter schelling as the Project name, and click Next. The source tab should now be selected showing you the source folder of this project.

5. Click on the Projects tab and Click Add. The items in this list box are other open projects that you have the option of associating with the project you are currently creating. If the repastj folder is open in Package Explorer then you should see it listed in the list box. If so, select the repastj folder, and click ok. This tells the project you are creating, schelling, to use the contents of the repastj project.

6. Click on the Order and Export tab, click the box next to the repastj folder, and click Finish. This ensures that the current project, schelling, includes all of the appropriate build paths from the repastj project.

7. You should see a folder called schelling in Package Explorer on the left hand side of the window. If you click on the arrow (or plus sign) next to the schelling folder you will see the contents that are contained within, which so far should only include the JRE System Library.

8. At the highest level of organization is the Java project. A Java project must include one or more Java packages. We now need to create a Java package. Make sure the schelling folder is highlighted, then go to the tool bar on the left side of the programming environment (just below the File menu), click the black arrow, and select Package.

9. In the New Java Package box that pops up, enter schelling, and click Finish. You should now see a package called schelling nested within the src (or source) folder.

10. Now highlight the schelling Java package you just created, go to the Menu bar, click on File, and select Import.

11. In the Import box that pops up, click on the arrow (or plus sign) next to General, click on File System, and click Next.

12. In the From directory box click browse. Now, navigate to the location of the folder where you unzipped the schelling.zip file, and click Open.

13. Click the box next to the schelling folder and then click Finish. The Java package, which was clear (denoting empty) should now be brown-ish.

14. If you click the schelling Java package you will see all of the .java files associated with this project.

15. In the Problems box you will see there are 51 warnings. You can ignore these for now.

16. We are now ready to run the model. Go to the Menu bar, click Run, and select Run Configurations.

17. In the Run Configurations box, make sure Java Application is selected, and click on the blank document on the left hand side of the window.

18. Enter schelling in the Name box.

19. In the Project box, type schelling.

20. Next to the Main class box click Search, which tells Eclipse to search for the file in the current project that has a main class. In the Select Main Type box that pops up, click on SegregationGUI (the file in the schelling package that contains a main class), and click ok.

21. Now click Apply, and then click Run.

22. Repast should then open the model.

23. If you click the Play button, which looks similar to the one a VCR, the schelling model should run.

24. You can close the model by clicking on X.

25. When you want to run this model in the future you can do so by clicking on the black arrow next to the run icon and selecting schelling.