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Java Fundamentals

3-1
Getting Started with Greenfoot

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Objectives

This lesson covers the following objectives:

- Download and install Greenfoot
- Describe the components of the Greenfoot interactive development environment
- Create an instance of a class
- Describe classes and subclasses
- Recognize Java syntax used to correctly create a subclass

Launch Greenfoot

- To launch Greenfoot:
  - Double-click the Greenfoot icon on your desktop.
  - Select the Greenfoot program from your list of computer programs.

Greenfoot Textbook Scenarios

- To become familiar with Greenfoot, download and run the scenarios created by the authors of the Greenfoot textbook.

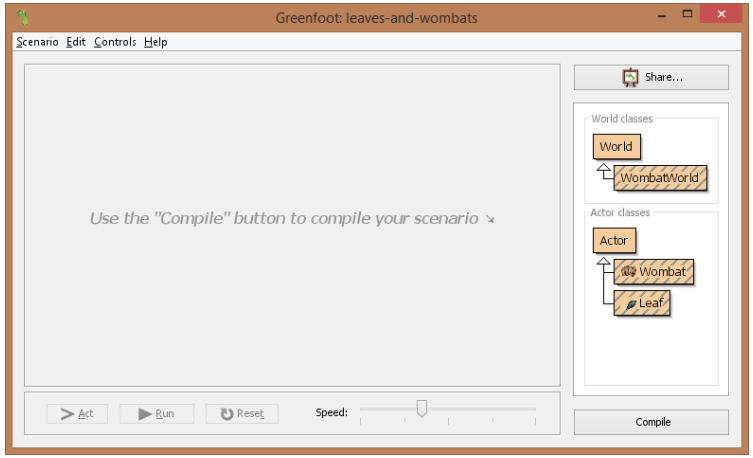
A scenario is a game or simulation implemented in Greenfoot.

Steps to Download the Greenfoot Textbook Scenarios

- Go to the Greenfoot textbook webpage:
  - http://www.greenfoot.org/book
- Click the Book Scenarios link.
- Save the zip file to a folder on your computer.
- Extract the zip files to a folder on your computer.
- Name this folder "Greenfoot Scenarios".
- If your computer does not have zip file extraction software, download free, open source software at 7zip.com.

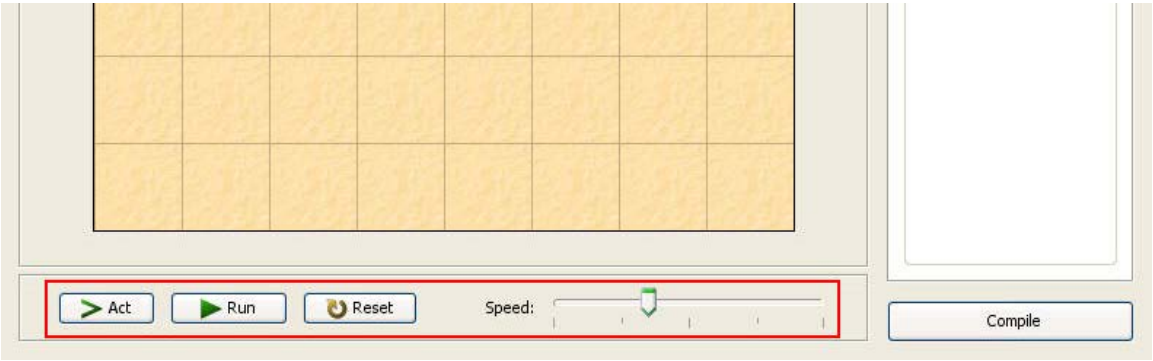
Steps to Open a Scenario in Greenfoot

- From the Scenario menu, select Open.
- From the Greenfoot scenarios folder you created on your computer, select the leaves-and-wombats scenario from the chapter01 folder.
- The scenario will open in a new window.



Execution Controls

- Execution controls to run a scenario include:
  - Act: Runs all actions in the scenario once.
  - Run/pause: Runs all actions in the scenario repeatedly until Pause is clicked.
  - Reset: Pauses the scenario or resets the scenario back to its starting position.
  - Speed: Runs actions faster or slower.



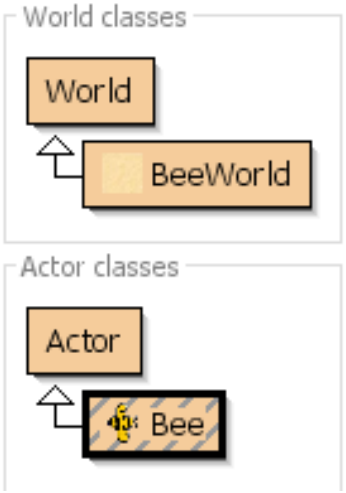
Inherited Characteristics

- In nature, a bee inherits some characteristics that are common to all bees: six legs and two wings.
- The bee may also inherit the characteristics of its breed that gives it a specific color, shape and size.
- In Greenfoot, a class, such as the Bee class, defines the characteristics of all bee objects that act in the scenario, such as how they look and ways they can act.

A class contains the specifications that define the appearance and movement of an object. The class provides instructions to Greenfoot for how to create and display instances when they are added to your scenario.

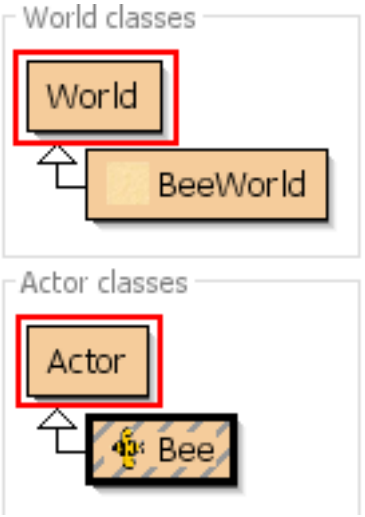
Classes in Greenfoot

- The class tells your scenario how its objects should look and act when the scenario is run.
- When you add a class to your scenario, it appears in the class hierarchy (to the right of the world).
- You can add as many instances of the class as you wish to the scenario.



Superclass Types

- Two types of superclasses appear in the Greenfoot class hierarchy:
  - World:
    - Holds the subclasses that provide the background image for the scenario's world.
    - Defines the size and resolution of the world.
  - Actor:
    - Holds the subclasses that produce the
    - instances that act in the scenario.



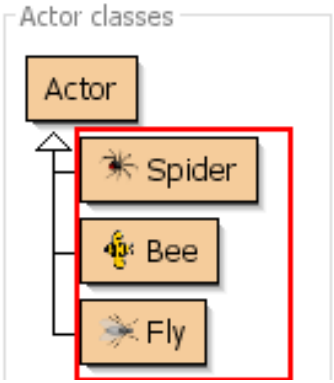
The overarching class of a group of classes is called a superclass. In this example - World and Actor

Subclasses

- Subclasses are a specialization of a class.
- For example, the Bee class is a subclass of the Actor superclass. This subclass:
  - Inherits all of the properties of the Actor superclass, such as a pre-defined set of actions that Actor subclasses can perform.
  - Has properties specific to its subclass, such as the image that gives bee objects their appearance.
  - Can receive new properties that the programmer creates specifically for the subclass, such as images or actions.

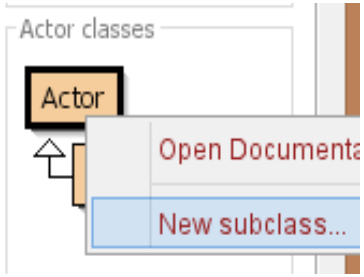
Subclass Properties

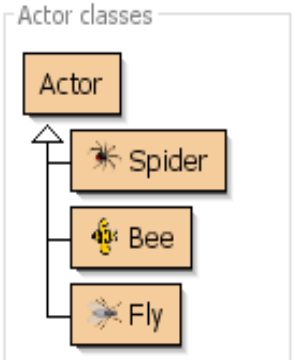
- A subclass has an "is-a" relationship to a superclass (Bee is a subclass of the Actor superclass).
- Properties can be modified (such as the class's name, image to display, or actions to perform).
- An arrow in the class hierarchy shows the subclass's relationship to the superclass.



Steps to Create a New Subclass

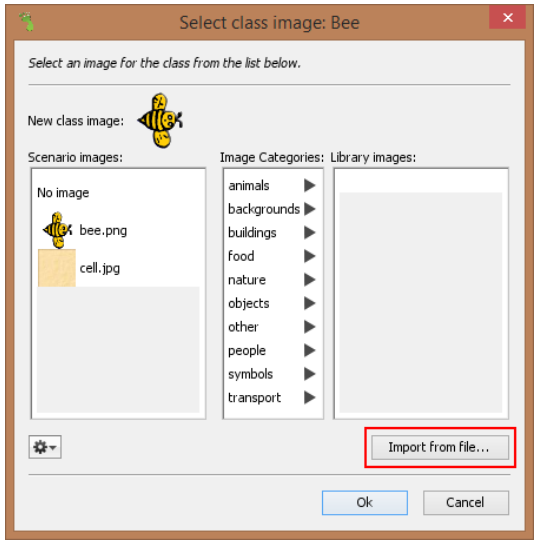
- Right click on the World or Actor superclass.
- Select New subclass...
- Name the class.
- Select a class image from the menu for the subclass's instances to display, then click OK.
- The subclass will appear in the class hierarchy.





Steps to Create a New Subclass with an Image Imported From Your Computer

- Right click on the World or Actor superclass.
- Select New Subclass...
- In the New Class window, click the Import From File... button.
- Select the image file to import from your computer.
- Name the new subclass, then click OK.
- The subclass with the new image appears in the class hierarchy.



Steps to Create a New Subclass with an Image Drawn in a Paint Program

- Right click on the Actor superclass.
- Select New Subclass...
- In the New Class window, click the editor icon. 
- In the drop-down list that appears, select Create New Image.
- Enter the name of the image file and dimensions. Click OK.
- Draw the image in your computer's paint program, then save it to your computer.
- Create a new subclass, and import the image file. The new subclass will be added to the scenario.

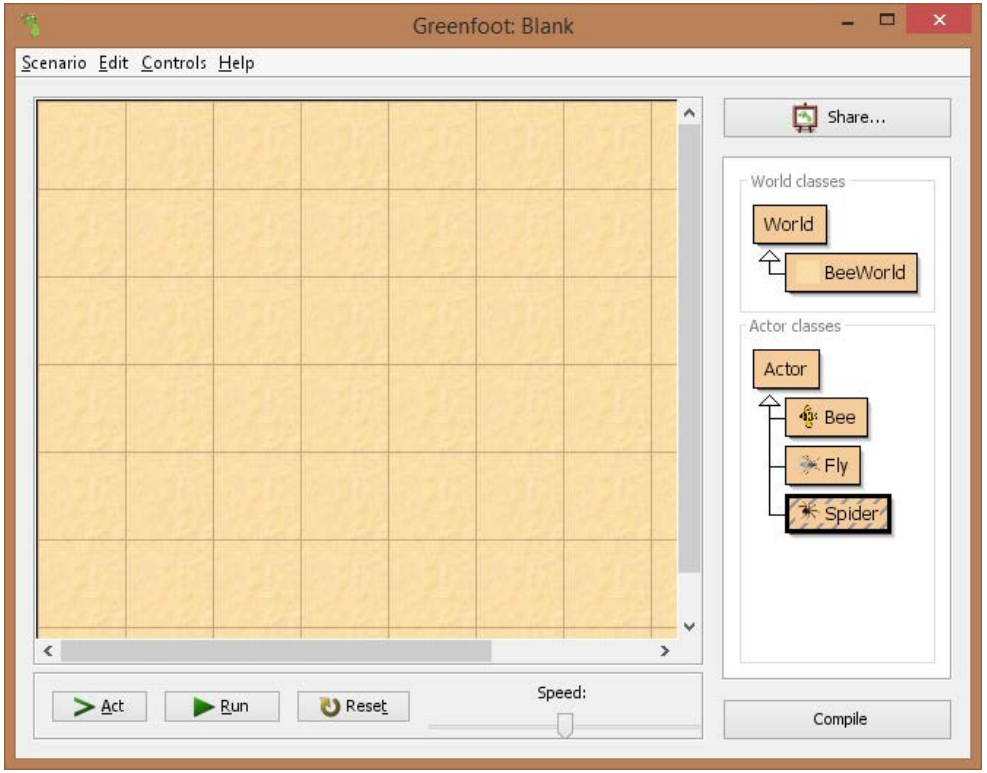
Compilation

- Once a new subclass is created and displayed in the class hierarchy, it has stripes across it.
- Stripes indicate that compilation is required.
- Compilation is required:
  - When the class's source code has been modified.
  - When a subclass or superclass is created or modified.

Compilation translates the source code into machine code that the computer can understand. The striped appearance ensures that you added the source code or class correctly before you proceed.

Compiling a Greenfoot Scenario

- Click Compile.
- Once compiled, the stripes disappear.
- You may then continue programming or run the scenario.

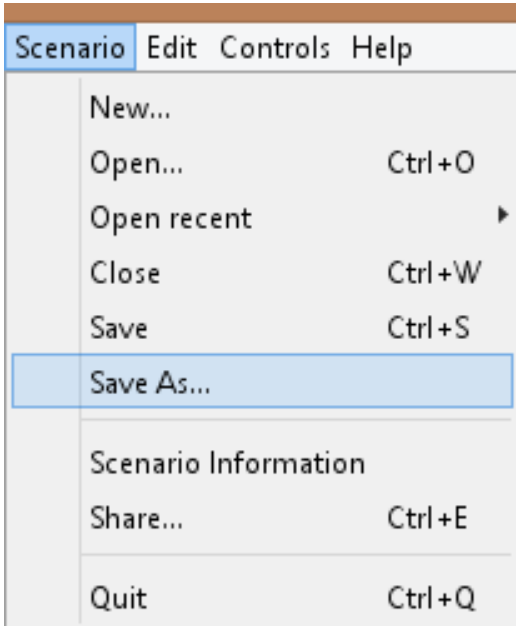


Save Multiple Versions of Scenarios

- Save the scenario frequently as you work.
- Each time you close Greenfoot, it saves your current work.
- Save multiple versions of scenarios:
  - To return to an earlier version of a scenario.
  - To have multiple scenarios to work from.

Steps to Save a Scenario

- In the Scenario menu, select Save As...
- Save a copy to a folder on your computer.



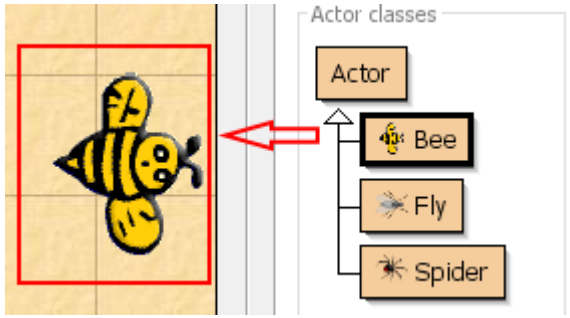
Instances of a Class

- The Bee class has characteristics such as movement, color, and size.
- A Bee that flies in a field, or rests in a flower, is a physical object that is a unique instance of the Bee class.
- An instance holds the characteristics of the class, but can be manipulated and changed.

Greenfoot Instances

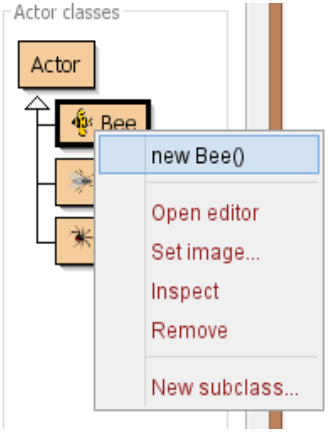
- One or many instances of a class can be added to the scenario.
  - Actor instances move and act in your scenario.
  - World instances provide the background for your scenario.
- Instances can perform the behaviors written by the programmer in the class's source code.

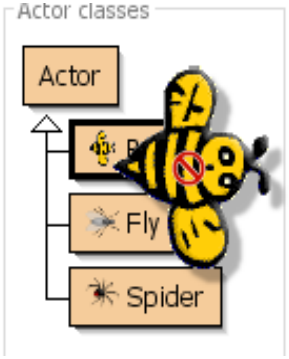
Instances are the objects from a class that act in your scenario.

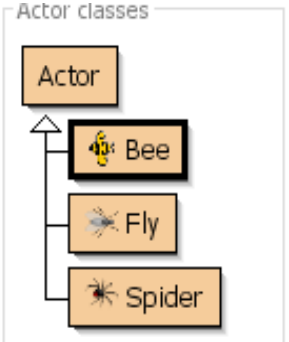


Steps to Add an Instance to a Scenario

- Right click on the class.
- Click the new [class name] option.
- Drag the instance into the scenario with your cursor.
- Program the instance to act by writing source code in the class's Code editor.







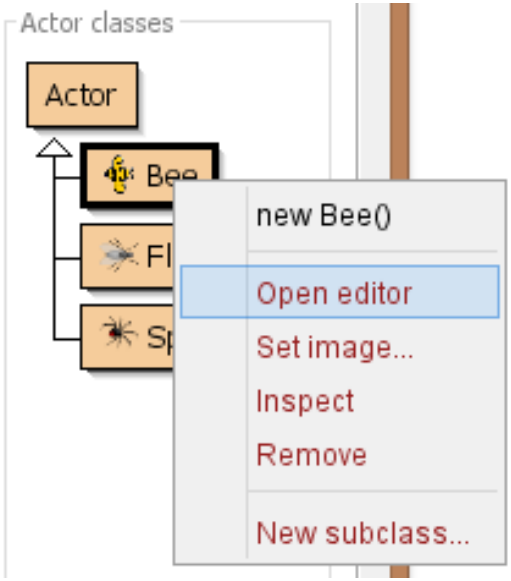
Source Code

- DNA gives humans certain characteristics, such as appearance, mobility, and communication.
- Like DNA, source code is written to tell the class how its instances could act in the scenario.

Source code defines what all instances of each class are capable of doing. The behavior of each instance is determined by the source code of its class.

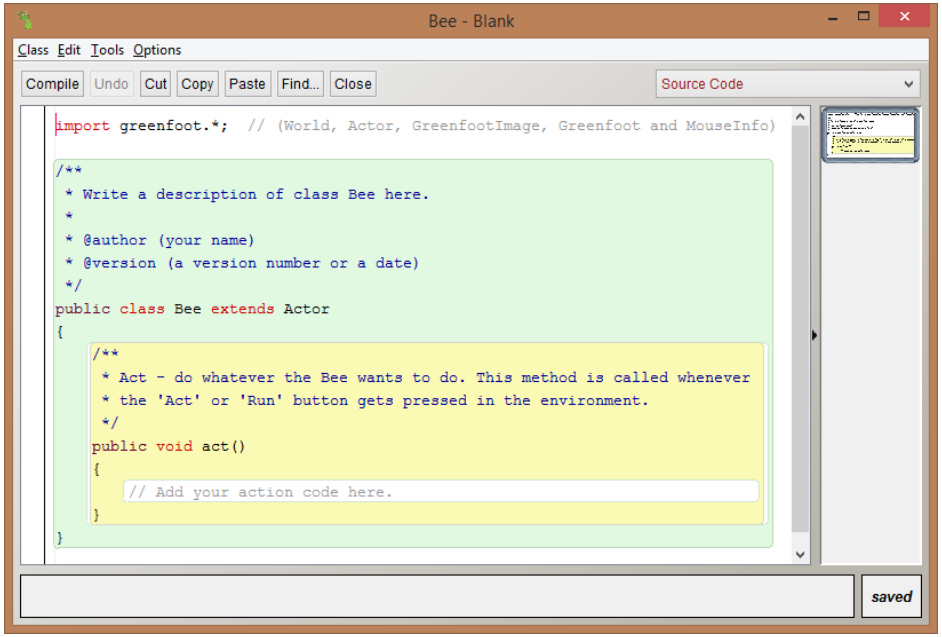
Steps to View a Class's Source Code

- Right click on a class in the class menu.
- Select Open Editor.



Code Editor

- The Code editor displays the class's source code.
- This is where instructions are programmed for how instances of the class can act in the scenario.



Terminology

Key terms used in this lesson included:

- Class
- Compilation
- Instance
- Source code
- Subclass
- Superclass

Summary

In this lesson, you should have learned how to:

- Download and install Greenfoot
- Describe the components of the Greenfoot interactive development environment
- Create an instance of a class
- Describe classes and subclasses
- Recognize Java syntax used to correctly create a subclass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