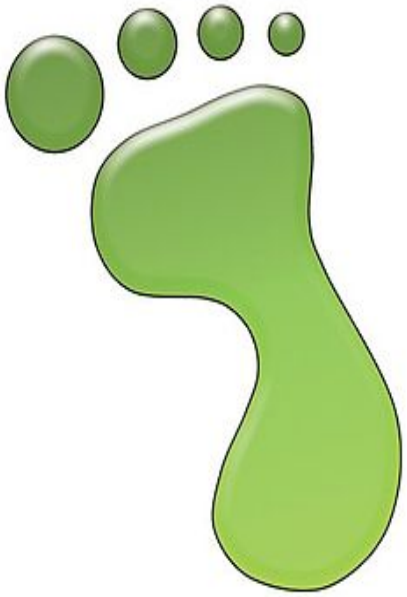
Greenfoot Workshop

Bobby - Snake

Greenfoot



- **Development Environment** based on the **Java programming language**.
- Mainly designed to **ease the Java language learning**
- Allow to easily create 2D **games**
- Greenfoot is freely available on Microsoft Windows, Mac OS X, and Linux.
- http://www.greenfoot.org/

The Java language

- « Object Oriented » Language
- One of the World's most used programming language
- Allow to develop applications running on multiple systems
  - Windows, Mac, Linux, Android, …

« Object Oriented »

- Java applications are made of « **Objects** »

- Each Object is composed of two main parts:
  - A set of internal properties
  - its « behavior », the actions it can do

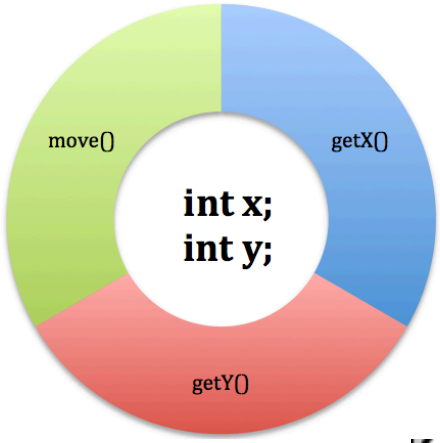
Classes and Objects

- To describe an **object**, we will define a **class**.

- *A* **class** is a kind of « **model** » allowing to build the **objects**
  - We also say that the objects are « instances » of the class

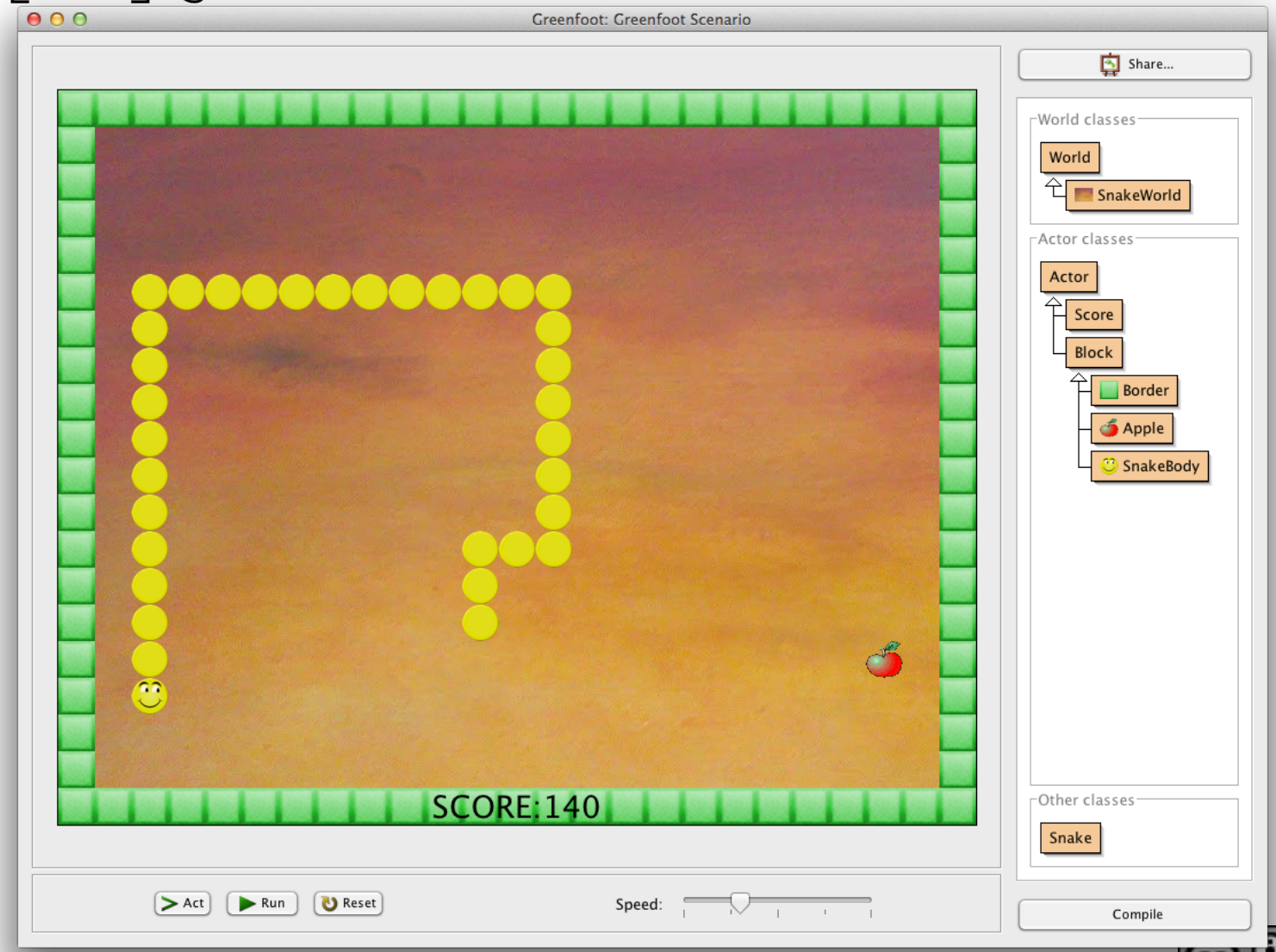
A Java Class sample

```
public class GameElement {

	private int x;
	private int y;

	public GameElement(int initX, int initY) {
		x = initX;
		y = initY;
	}

	public int getX() {
		return x;
	}

	public int getY() {
		return y;
	}

	public void move(int xMove, int yMove) {
		x = x + xMove;
		y = y + yMove;
	}
}
```

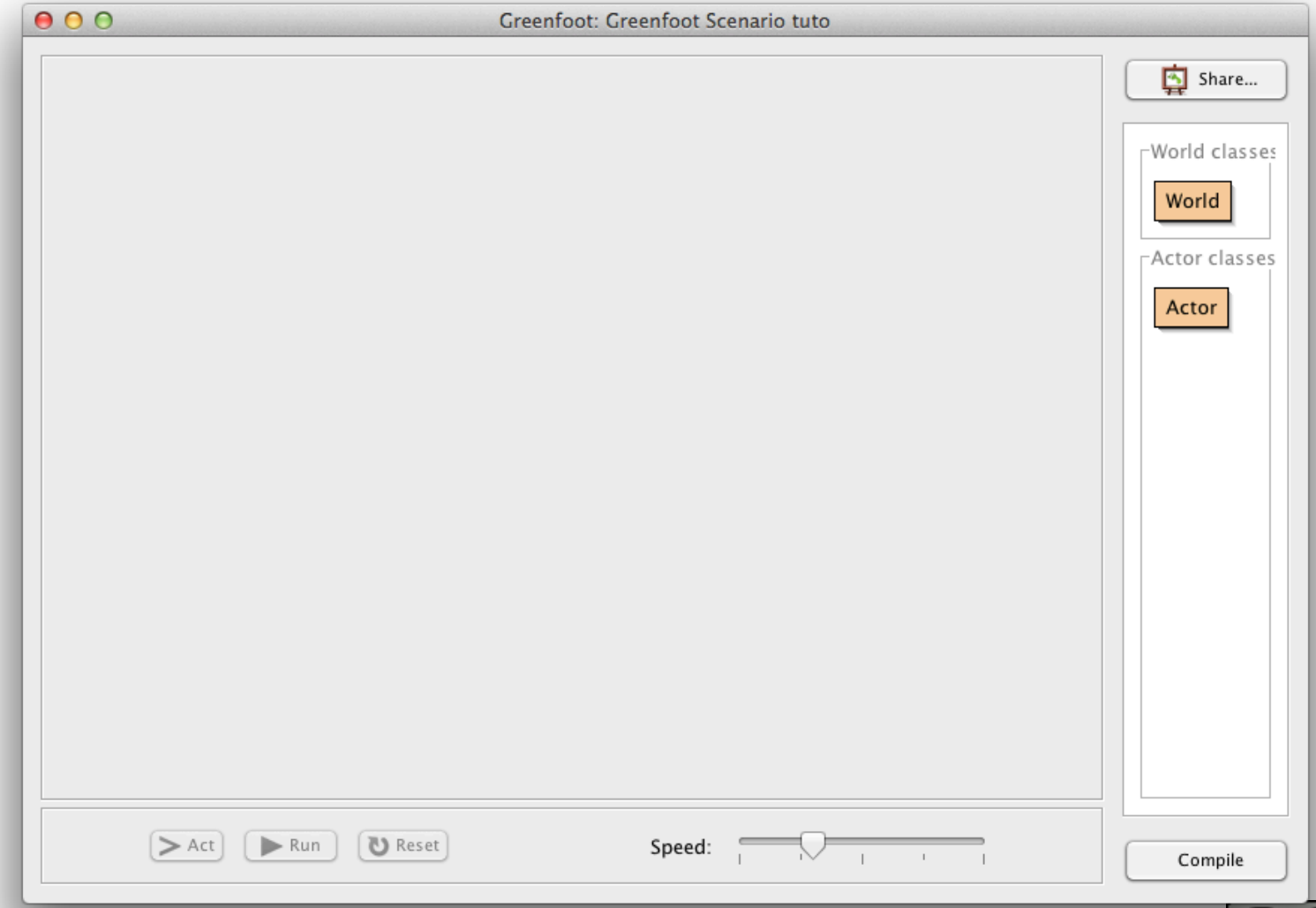


www.devoxx4kids.com

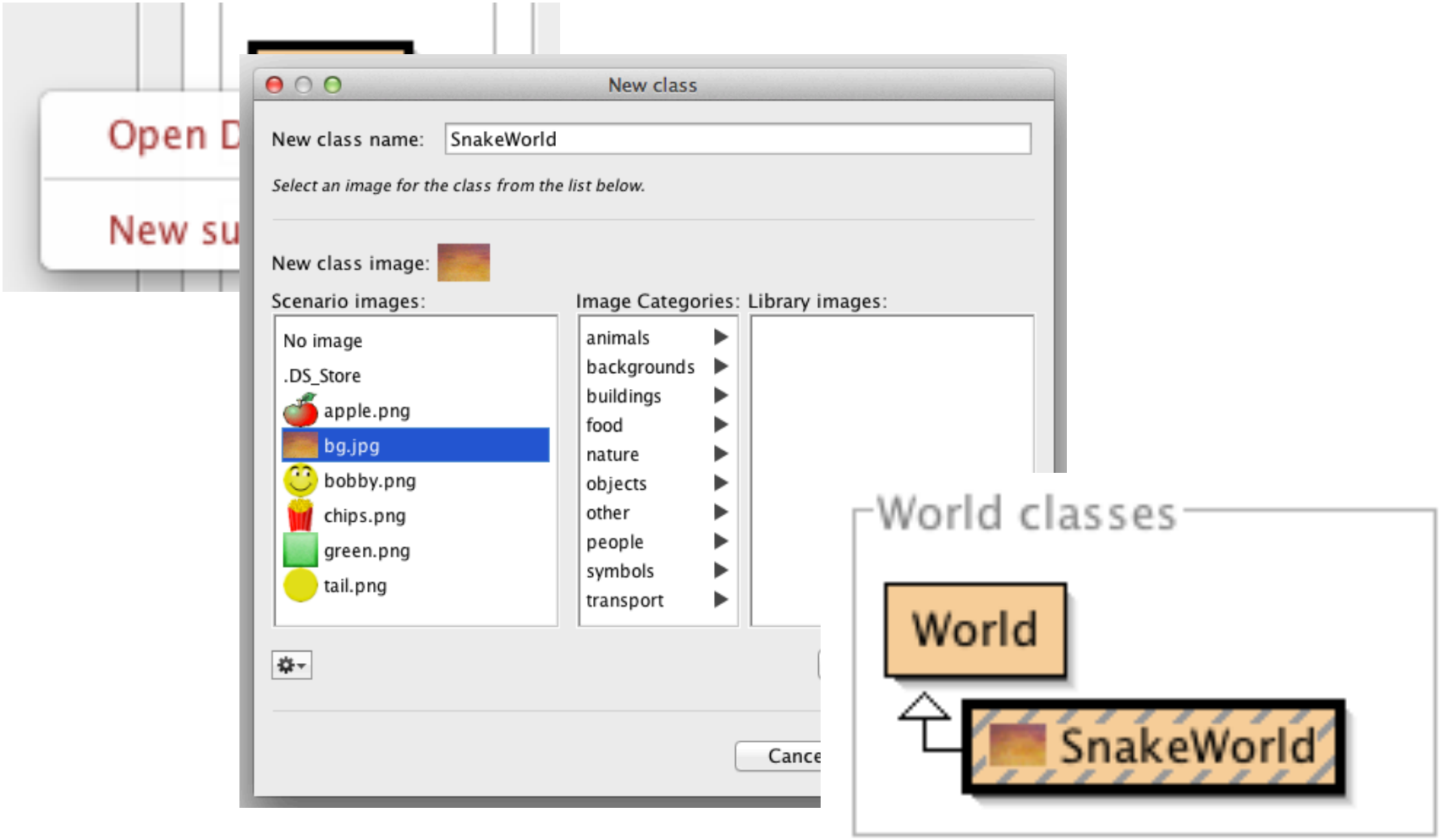
Bobby-Snake


Greenfoot: Greenfoot Scenario
Share...
World classes
World
SnakeWorld
Actor classes
Actor
Score
Block
Border
Apple
SnakeBody
Other classes
Snake
SCORE:140
Act
Run
Reset
Speed:
Compile

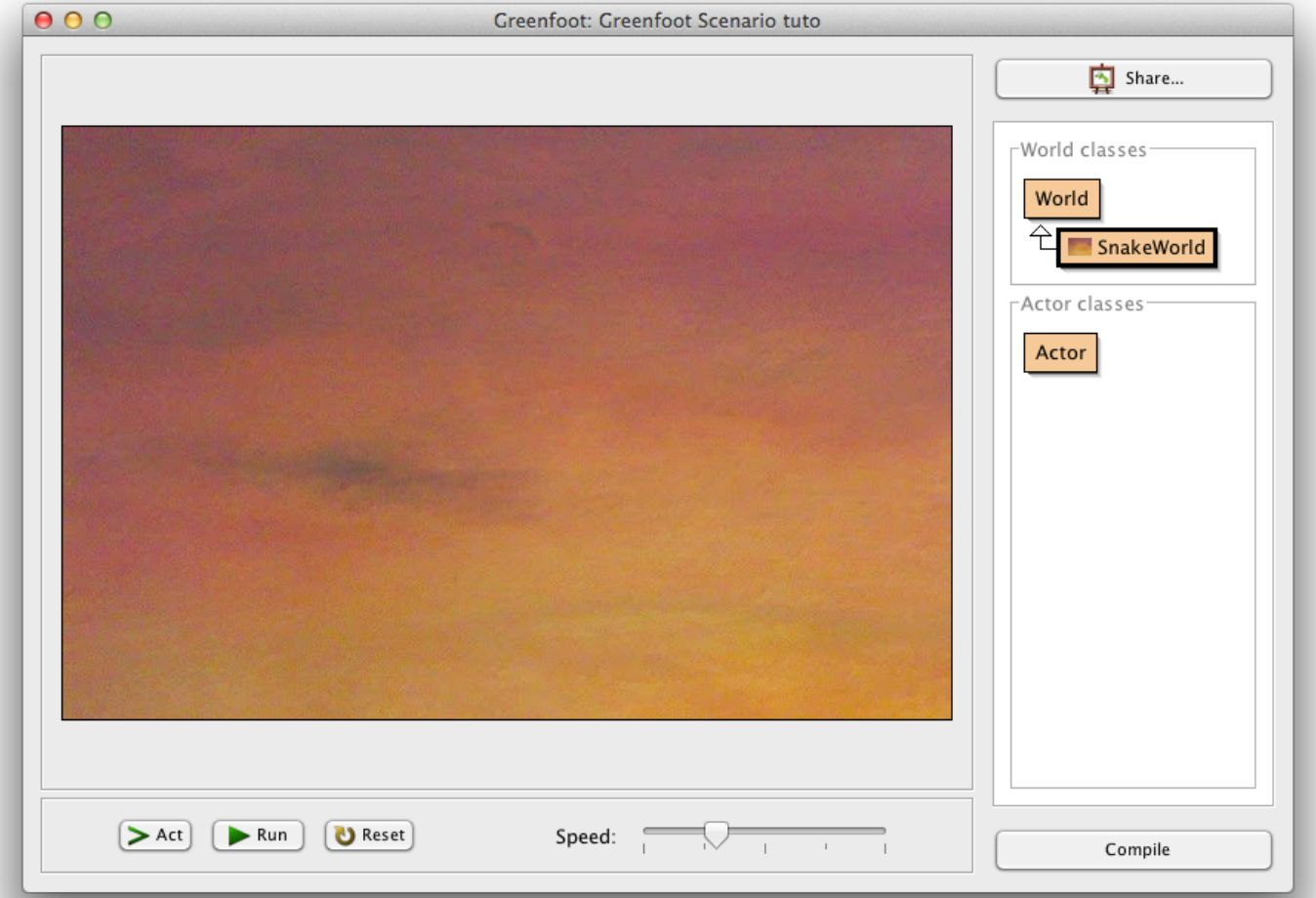
New scenario



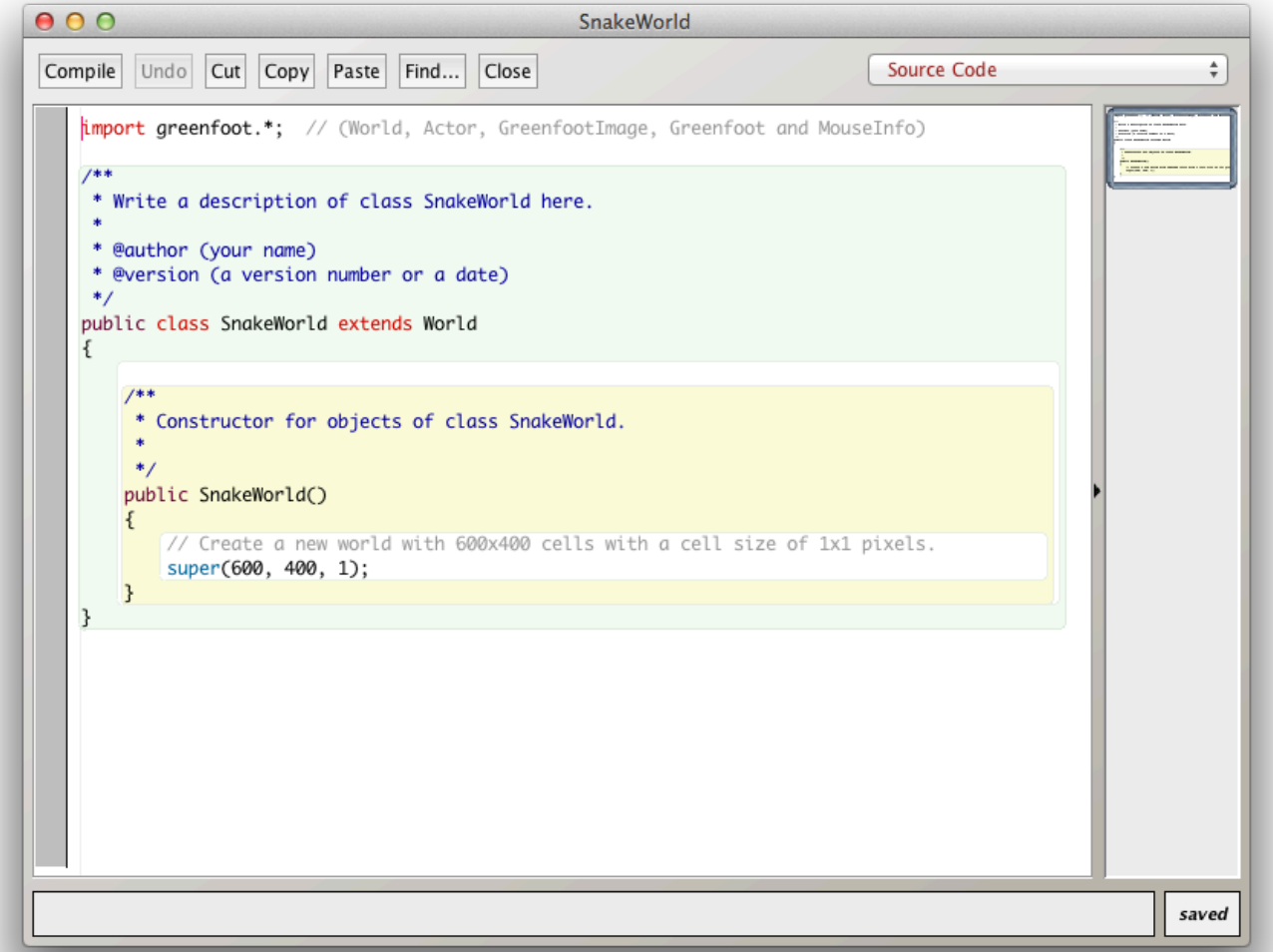
World creation



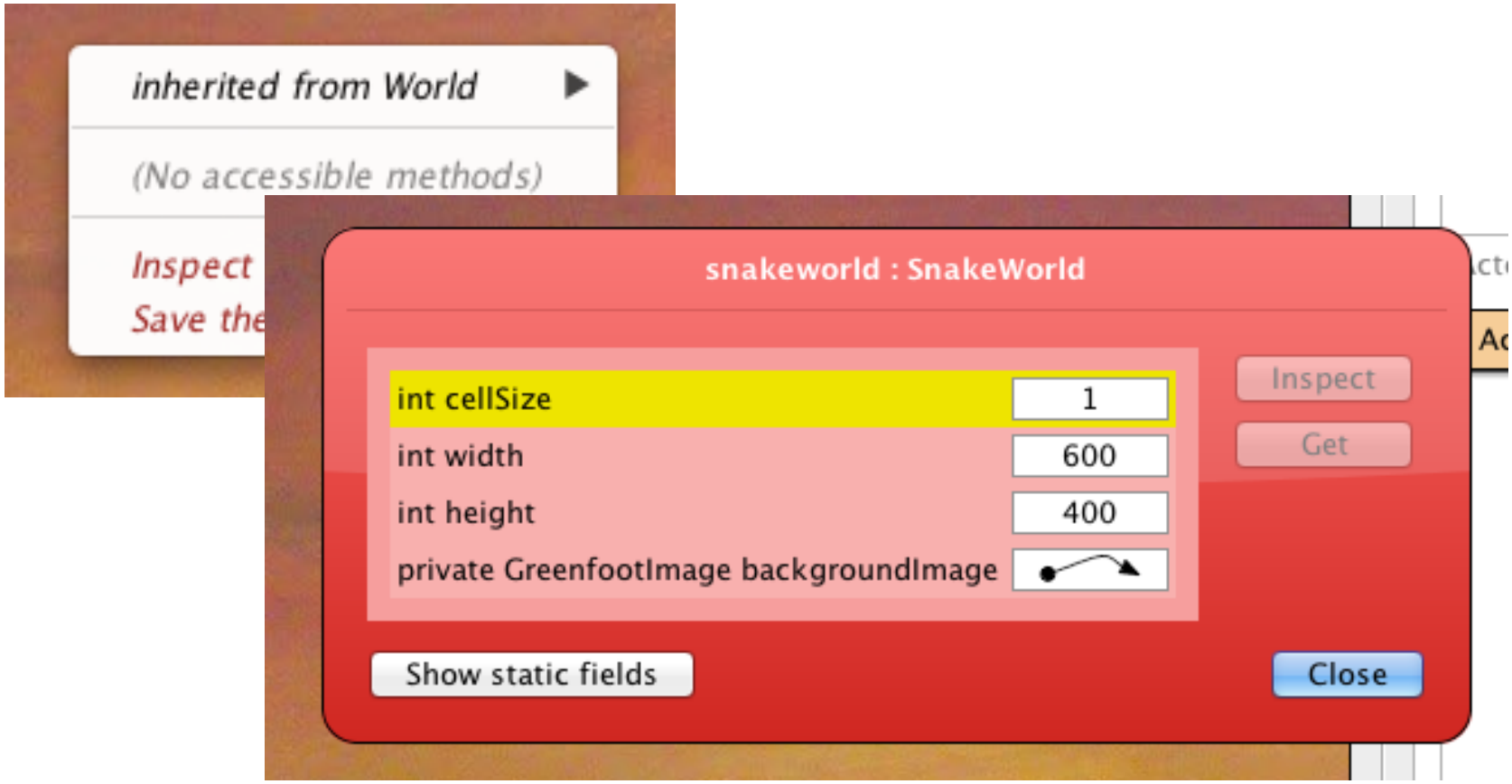
Snake World



SnakeWorld code



Inspect World

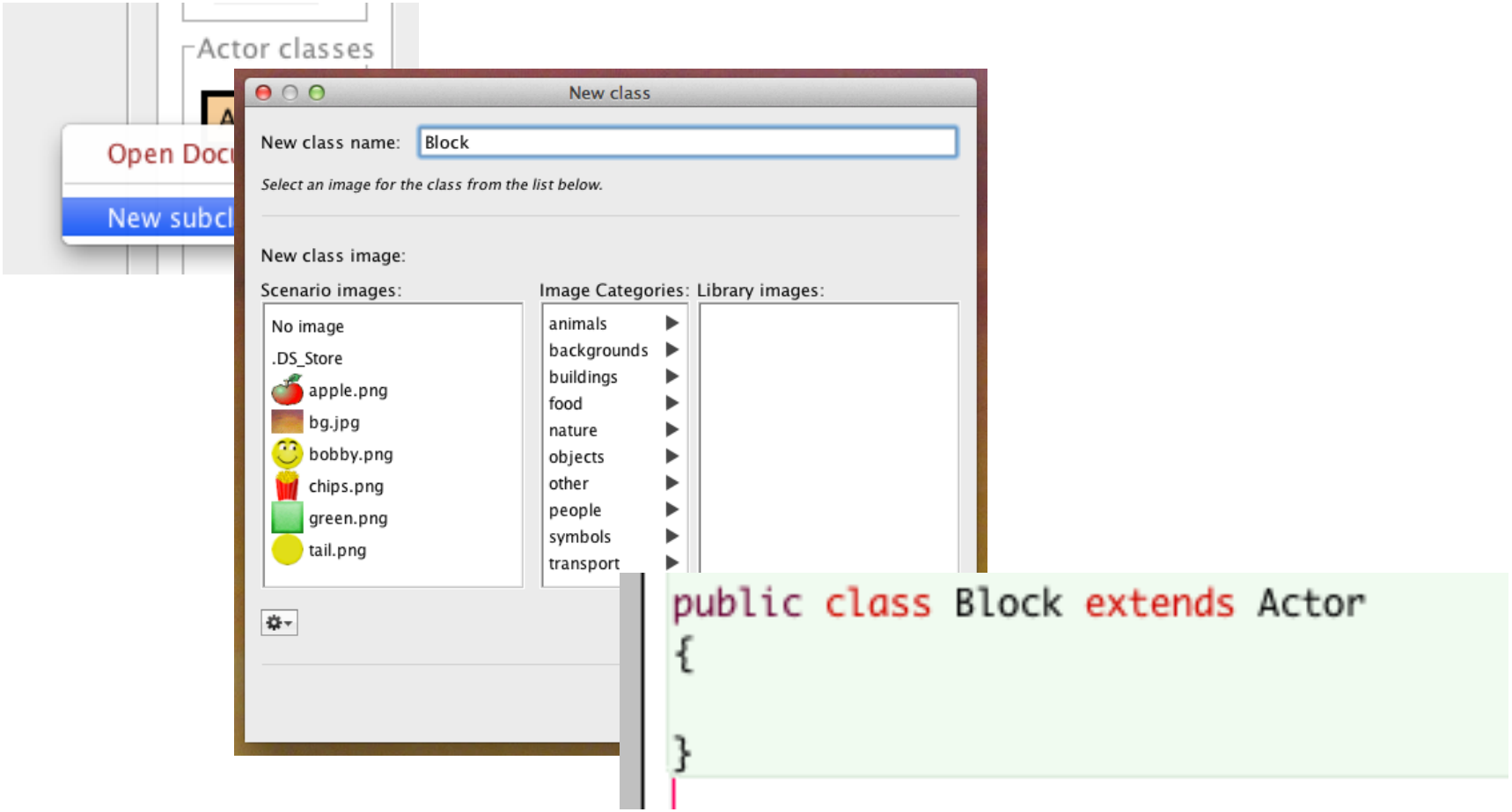


Change the code

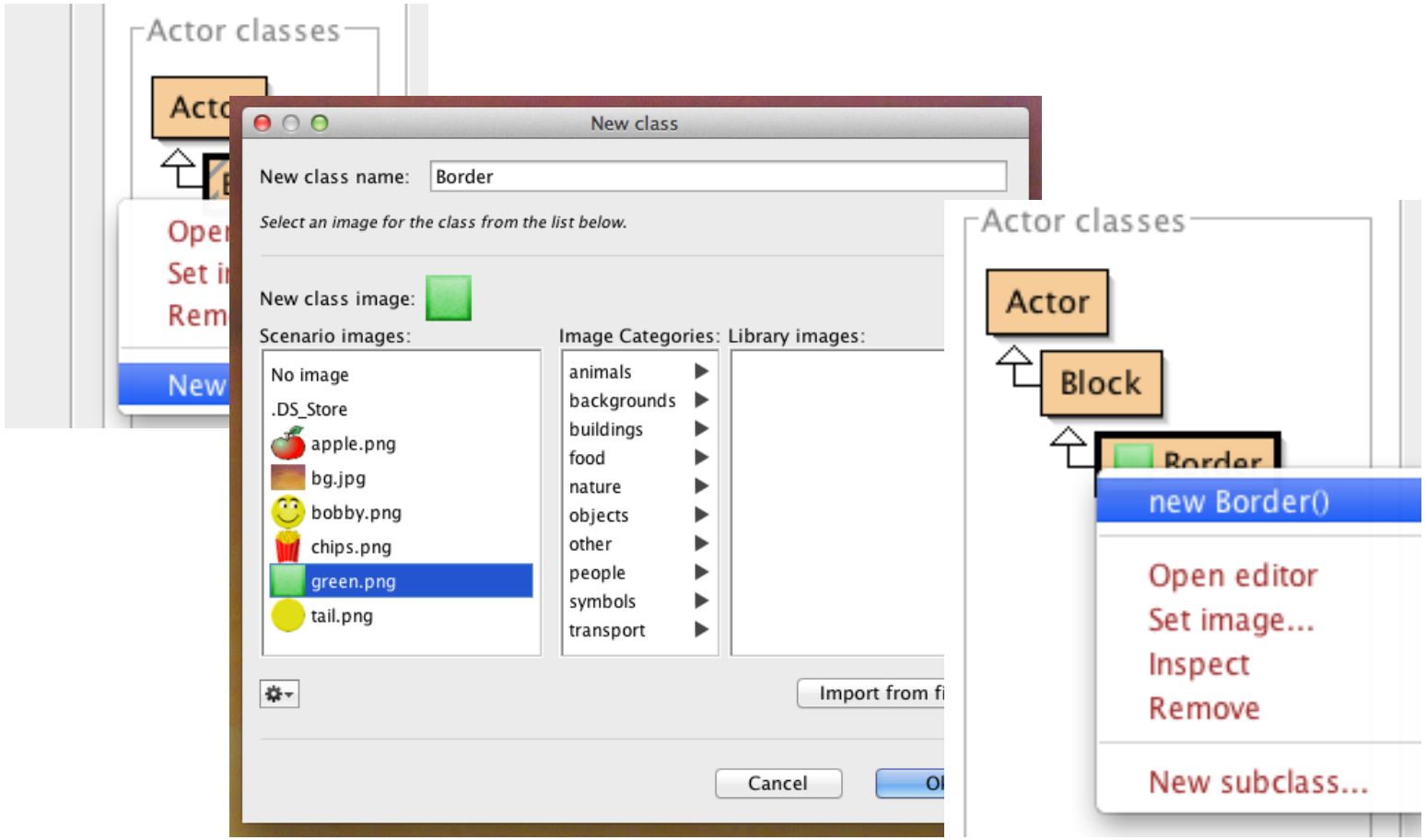
- We will use blocks of 32x32 pixels
- The game size will be 25 x 20 blocks

```
/**
 * Constructor for objects of class SnakeWorld.
 *
 */
public SnakeWorld()
{
    super(25, 20, 32);
```

Create a Block



Create the Border



Coordinates

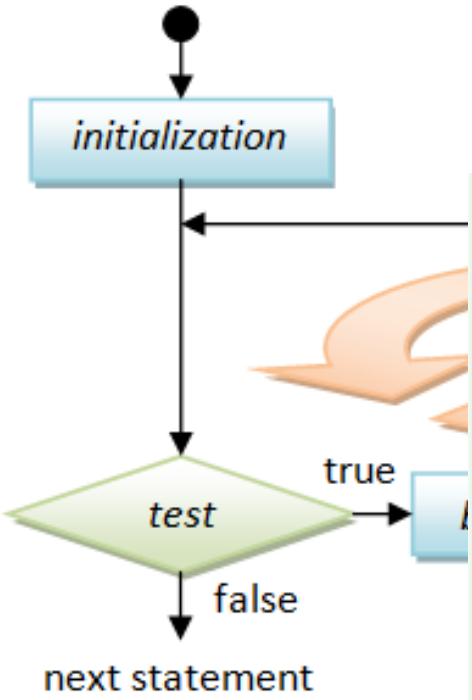
(0,0)	(1,0)	(2,0)	…	(24,0)
(0,1)	(1,1)	(2,1)	…	(24,1)
(0,2)	(1,2)	(2,2)	…	(24,2)
…	…	…	…	…
(0,19)	(1,19)	(2,19)	…	(24,19)

Display the borders

```
public SnakeWorld()
{
    super(25, 20, 32);
    addObject(new Border(), 0, 0);
}
```

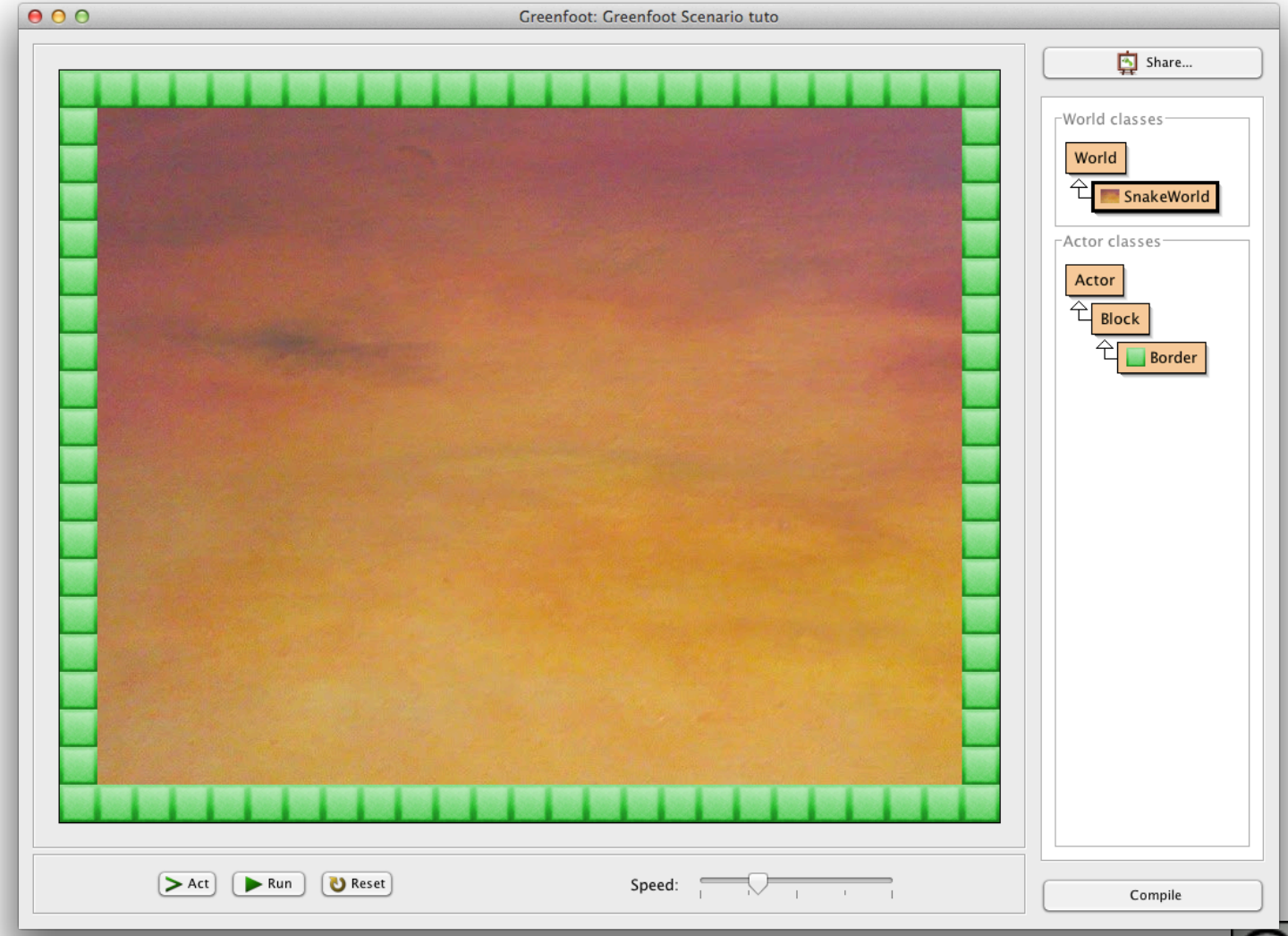
for loops

for (*initialization* **;** *test* **;** *post-processing* **) {**
  body **;**
}

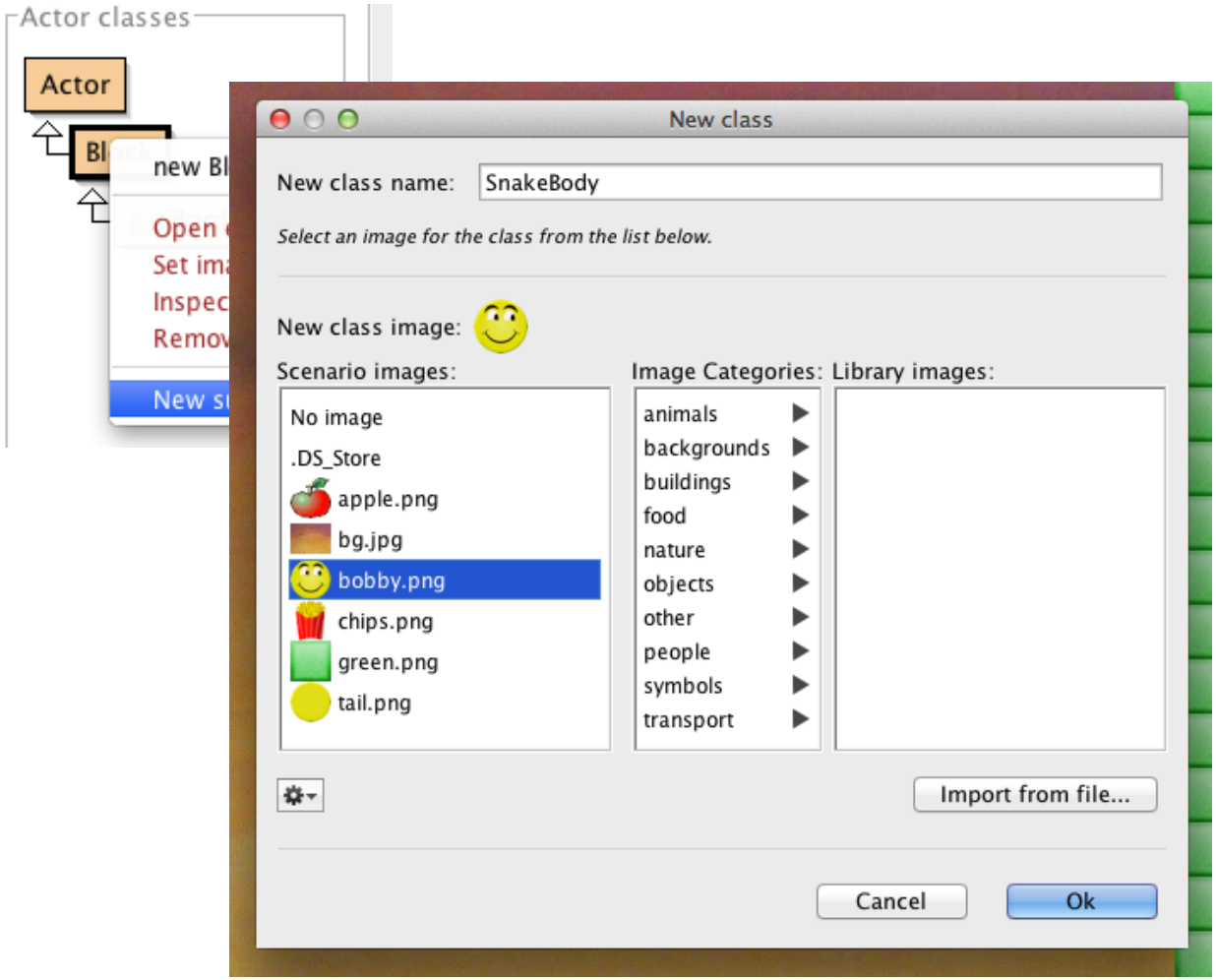



```
public SnakeWorld()
{
    super(25, 20, 32);

    for (int x = 0; x < getWidth(); x ++ ) {
        addObject(new Border(), x, 0);
        addObject(new Border(), x, getHeight()-1);
    }

    for (int y = 0; y < getHeight(); y ++) {
        addObject(new Border(), 0, y);
        addObject(new Border(), getWidth()-1, y);
    }

}
```

The game borders



Class SnakeBody

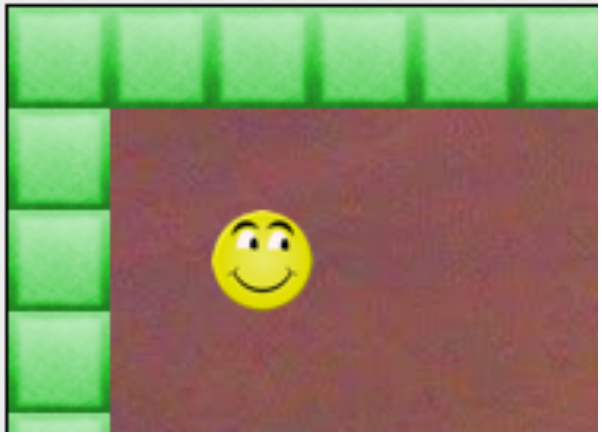


SnakeWorld changes

```
public class SnakeWorld extends World
{
    private LinkedList<SnakeBody> snake = new LinkedList<SnakeBody>();
```

```
import greenfoot.*;
import java.util.*;
```

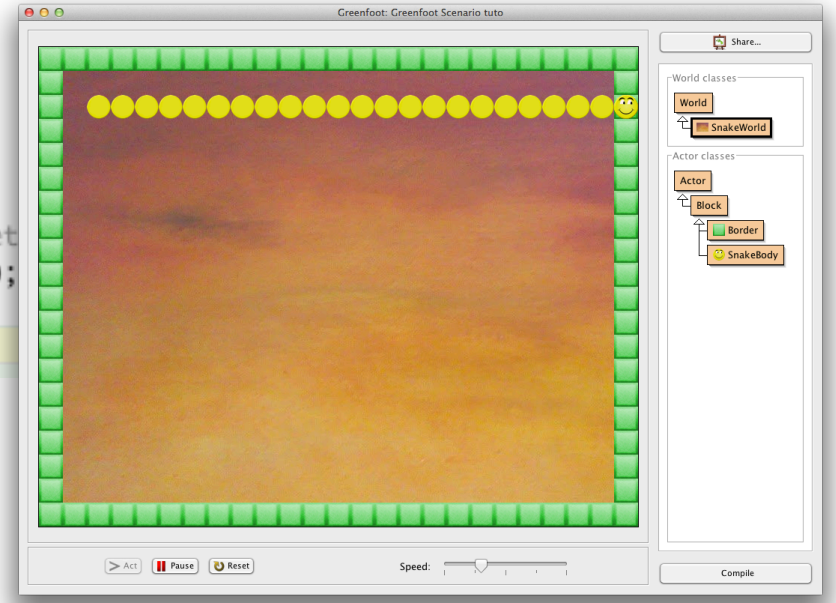
```
public SnakeWorld()
{
    super(25, 20, 32);

    SnakeBody body = new SnakeBody();
    snake.add(body);
    addObject(body, 2, 2);
```



Movement

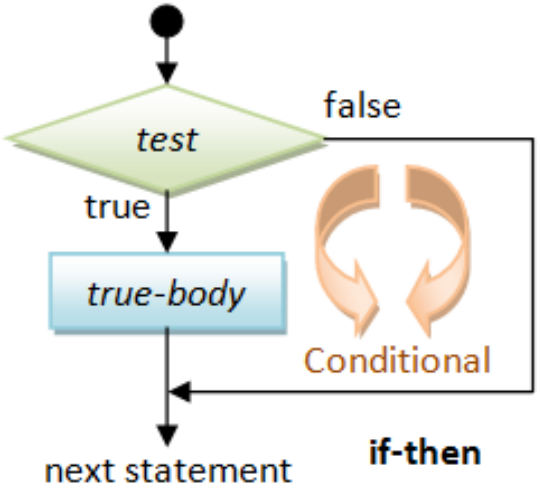
```
public class SnakeWorld extends World
{
    private LinkedList<SnakeBody> snake = new LinkedList<SnakeBody>();
    private int dx = 1;
    private int dy = 0;
```

```
public void act()
{
  //on remplace l'image de la tête
  SnakeBody head = snake.getLast();
  head.setImage("tail.png");

  //crée une nouvelle tête
  SnakeBody newHead = new SnakeBody();
  int newHeadX = head.getX()+dx;
  int newHeadY = head.getY()+dy;

  //ajoute la nouvelle tête à la liste et
  addObject(newHead, newHeadX, newHeadY);
  snake.add(newHead);
}
```

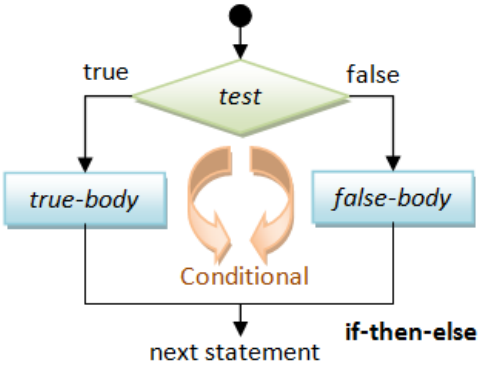


If Statement

```
if ( condition ) {
        true-body ;
}
```



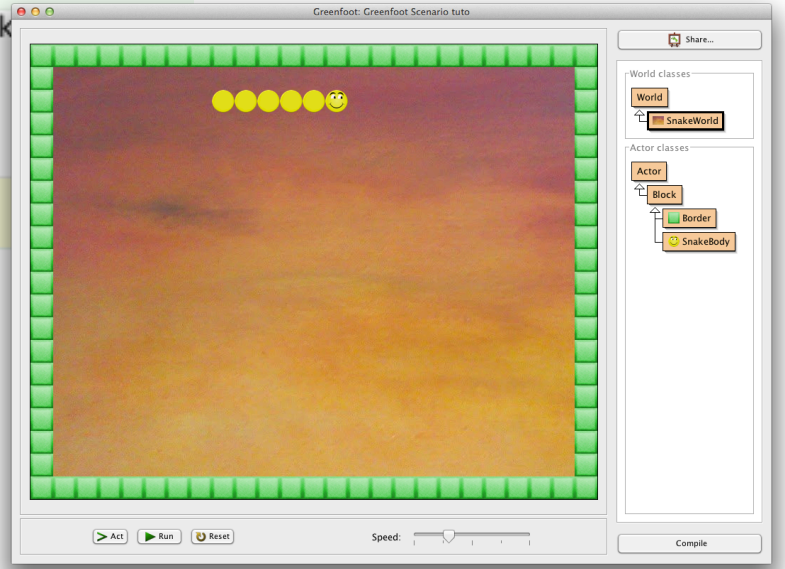

```
if ( condition ) {
   true-body ;
} else {
   false-body ;
}
```



Limit the Snake size

```
public class SnakeWorld extends World
{
    private LinkedList<SnakeBody> snake = new LinkedList<Snak
    private int dx = 1;
    private int dy = 0;
    private int tailCounter = 5;
```

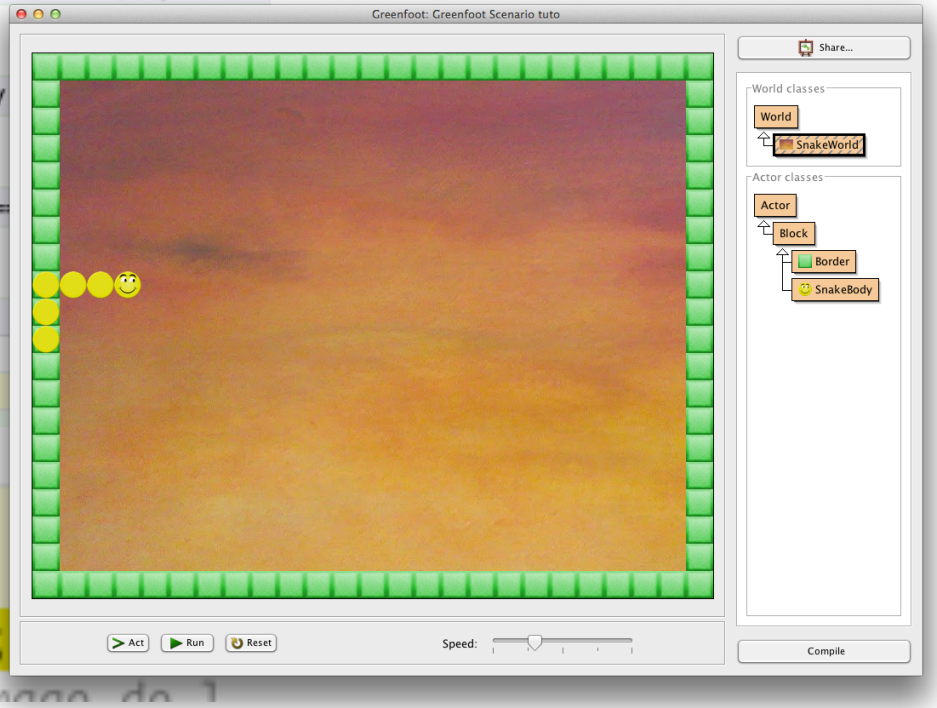
```
    public void act()
    {
      //on remplace l'image de la tête
      SnakeBody head = snake.getLast();
      head.setImage("tail.png");

      //crée une nouvelle tête
      SnakeBody newHead = new SnakeBody();
      int newHeadX = head.getX()+dx;
      int newHeadY = head.getY()+dy;

      //ajoute la nouvelle tête à la liste et au world
      addObject(newHead, newHeadX, newHeadY);
      snake.add(newHead);

      if (tailCounter == 0) {
          SnakeBody tail = snake.removeFirst();
          removeObject(tail);
      } else {
          tailCounter--;
      }
    }
```



Change of direction

```
private void changeDirection() {
    if (Greenfoot.isKeyDown("left") && dx == 0 ) {
        dx = -1;
        dy = 0;
    } else if (Greenfoot.isKeyDown("right") && dx == 0 ) {
        dx = 1;
        dy = 0;
    } else if (Greenfoot.isKeyDown("down") && dy
        dx = 0;
        dy = 1;
    } else if (Greenfoot.isKeyDown("up") && dy =
        dx = 0;
        dy = -1;
    }

}
```

```
public void act()
{
    changeDirection();
```



Manage collisions (1)

```
public class SnakeWorld extends World
{
    private LinkedList<SnakeBody> snake = new LinkedList<SnakeBody>();
    private int dx = 1;
    private int dy = 0;
    private int tailCounter = 5;
    private boolean dead = false;
```

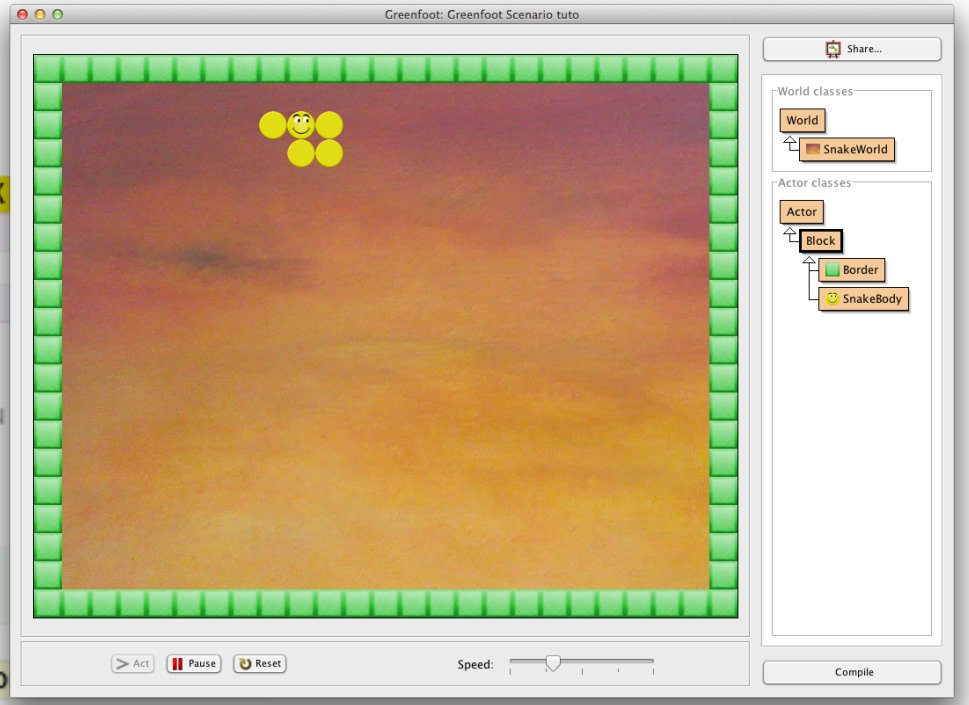
```
    public void act()
    {
        if (dead) {
            return;
        }
        changeDirection();
```

```
    public void dead() {
        dead = true;
    }
```

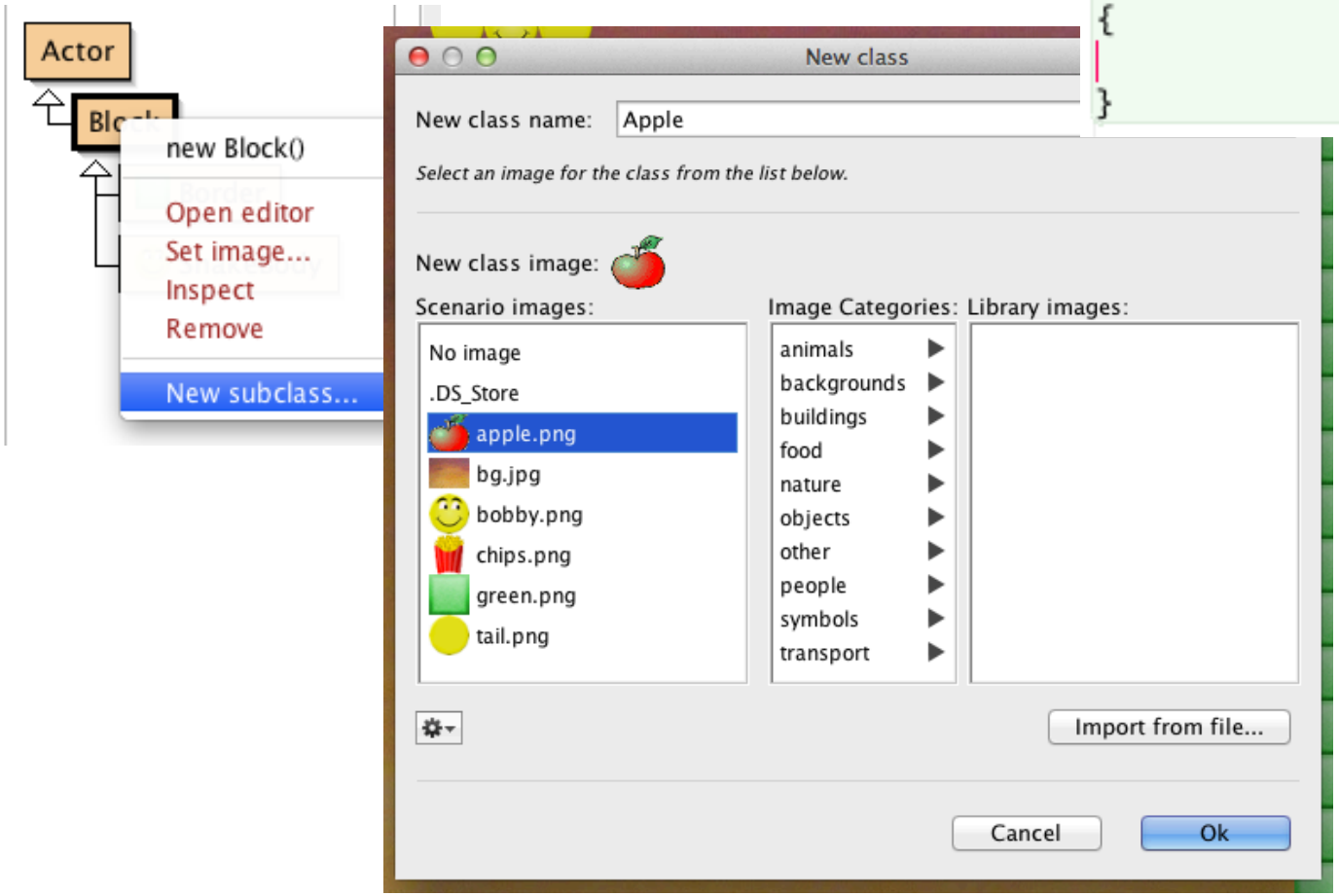
Manage collisions (2)

```
//crée une nouvelle tête
SnakeBody newHead = new SnakeBody();
int newHeadX = head.getX()+dx;
int newHeadY = head.getY()+dy;

List<Block> blocks = getObjectsAt(newHeadX
for(Block block : blocks) {
    block.collision(this);
}


//ajoute la nouvelle tête à la liste et au
addObject(newHead, newHeadX, newHeadY);
snake.add(newHead);
```

```
public class Block extends Actor
{

    public void collision(SnakeWo
        world.dead();
    }
}
```



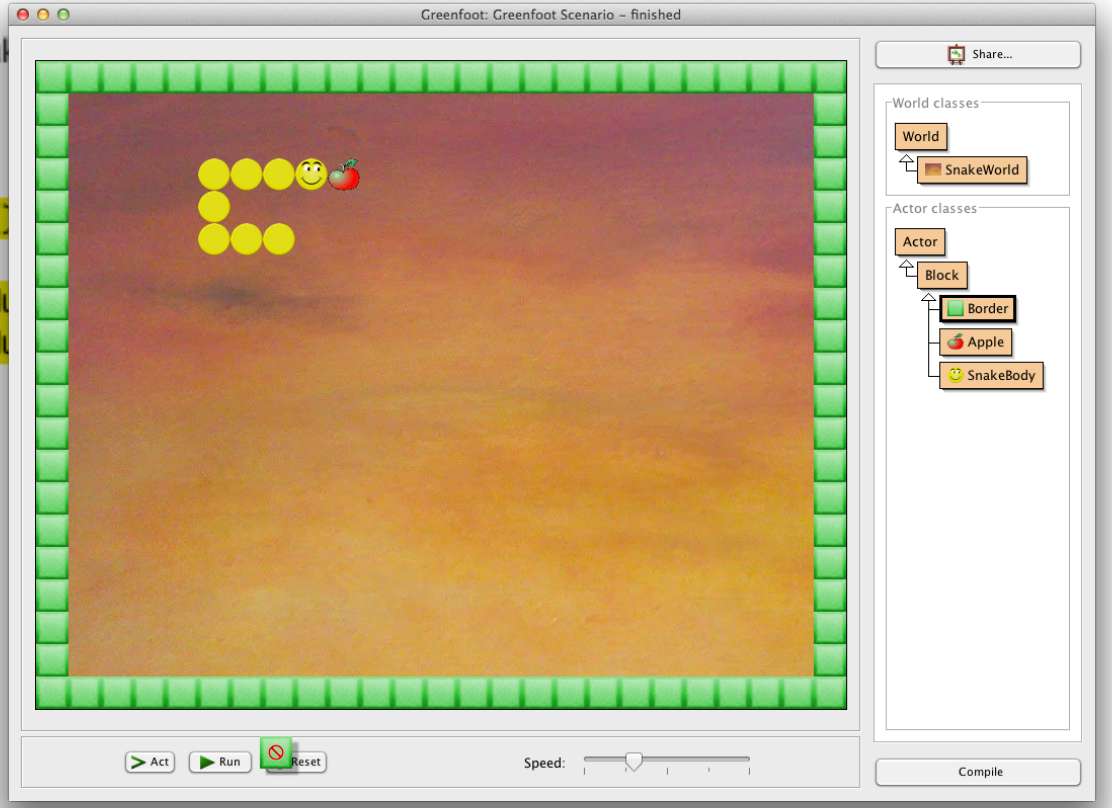
Add Apples (1)




```
public class Apple extends Block
{

}
```

Add Apples (2)

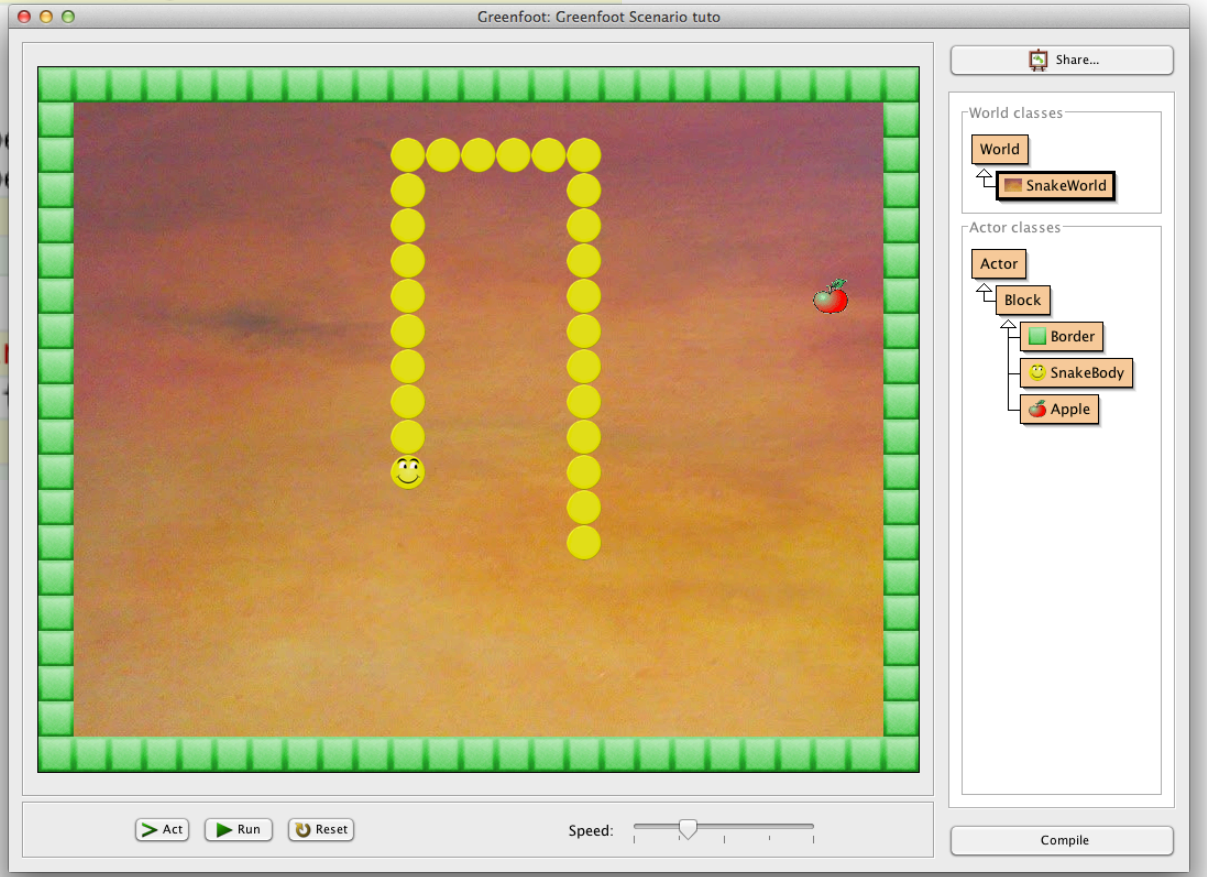
```
public SnakeWorld()
{
    super(25, 20, 32);

    SnakeBody body = new Snak
    snake.add(body);
    addObject(body, 2, 2);

    Apple apple = new Apple(
    addObject(apple,
        Greenfoot.getRandomNu
        Greenfoot.getRandomNu
```



Collision with an apple

```
public class Apple extends Block
{
    public void collision(SnakeWorld world) {
        world.grow(2);

        setLocation(
            Greenfoot.getRandomNumbe
            Greenfoot.getRandomNumbe
    }
}
```

```
    public void grow(i
        tailCounter =
    }
```



Add sounds

```
public void collision(SnakeWorld world) {
    Greenfoot.playSound("slurp.mp3");
    world.grow(2);
    setLocation(
        Greenfoot.getRandomNumber(getWorld().getWidth()-2)+1,
        Greenfoot.getRandomNumber(getWorld().getHeight()-2)+1);
}
```

```
public void collision(SnakeWorld world) {
    Greenfoot.playSound("dead.mp3");
    world.dead();
}
```

Congratulations!

- You have completed your first Greenfoot game!

- You can now start to add new features in your game or start creating new games !