

Introduction to Java

In this course, you will work in teams of 3–4 students to learn new concepts. This activity will introduce you to the process. We'll also take a first look at how to store data in Java programs.

Content Learning Objectives

After completing this activity, students should be able to:

- Describe the responsibility of each team role.
- Identify components of the "hello world" program.
- Write Java code to declare int and double variables.
- Explain what it means to assign a value to a variable.

Process Skill Goals

During the activity, students should make progress toward:

- Leveraging prior knowledge and experience of other students. (Teamwork)



Meta Activity: Team Roles

Decide who will be what role for today; we will rotate the roles each week. If you have only three people, one should have two roles. If you have five people, two may share the same role.

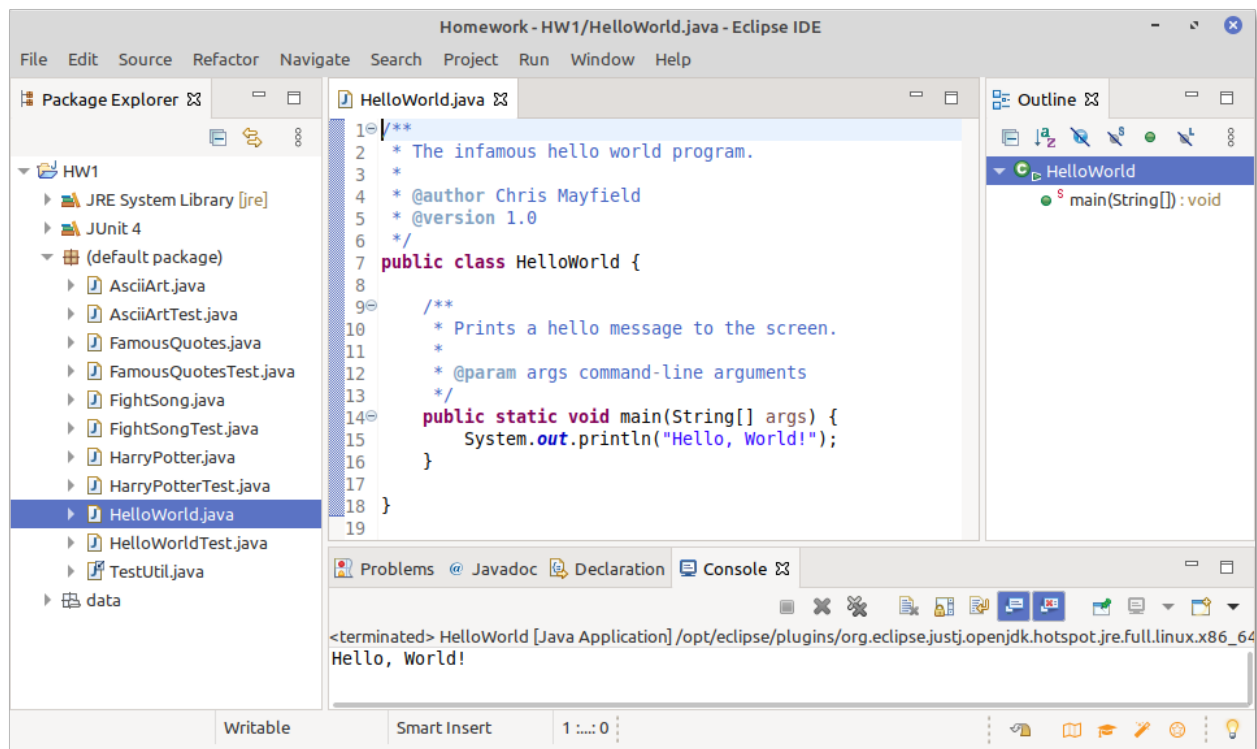
Manager:
Presenter:
Recorder:
Reflector:

Questions (15 min)

Start time:

1. What is the difference between **bold** and *italics* on the role cards?
2. Manager: invite each person to explain their role to the team. Recorder: take notes of the discussion by writing down key phrases next to the table above.
3. What responsibilities do two or more roles have in common?
4. For each role, give an example of how someone observing your team would know that a person is not doing their job well.
 - Manager:
 - Presenter:
 - Recorder:
 - Reflector:

Model 1 Hello, World!



Questions (10 min)

Start time:

5. What is the name of the class? What is the name of the file? What folder is the file in?
6. How many lines of code is the above program? How many statements does it have?
7. What is the purpose of the first six lines? What is the purpose of the two blank lines?
8. Describe in your own words what `System.out.println` does. Be very specific.

Model 2 Variables

Most programs store and manipulate data values. We use *variables* to give values meaningful names. The following code *declares* three variables and *assigns* them (using the = operator). Each variable is stored in the computer's memory, represented by the boxes on the right.

Java code

```
int dollars;  
int cents;  
double grams;  
  
dollars = 1;  
cents = 90;  
grams = 3.5;
```

Computer memory

dollars	1
cents	90
grams	3.5

Questions (10 min)

Start time:

9. Identify the Java *keyword* used in a variable declaration to indicate
 - a) an integer:
 - b) a real number:
10. Consider numbers of dollar bills, cents, and grams. Which of these units only makes sense as an integer, and why?
11. What would you expect the following statements to print out?
 - a) `System.out.println(dollars);`
 - b) `System.out.println(cents);`
 - c) `System.out.println(grams);`
12. In the previous question, how does the third printed line (c) differ from the first two?

13. What do you think is the purpose of a variable declaration?

14. What will be output by the following code, and why?

```
double one;  
one = 1;  
System.out.println(one);
```

Model 3 Assignment

The following eight lines of code are executed one at a time, in order. The boxes on the right show the state of the (same) two variables after each step.

Declaring a variable instructs the computer to reserve space for it in memory:

```
1 int dollars;  
2 int cents;
```

dollars

cents

Variables cannot be used until they are *initialized* (assigned for the first time):

```
3 dollars = 2;  
4 System.out.println(dollars); // OK  
5 System.out.println(cents);  // error
```

dollars

cents

Each time you assign a variable, you are *updating* its value stored in memory:

```
6 dollars = 3;  
7 dollars = 4;  
8 cents = 49;
```

dollars

cents

Questions (10 min)

Start time:

15. How many times is each variable in Model 3 assigned?

16. What is the error in the second `System.out.println` statement? (Don't just repeat the text in Model 3; explain in your own words what the problem is.)

17. What is the value of `dollars` right before it's assigned for the last time? What is the value of `cents` before it's assigned for the last time?

18. Consider the statement: `cents = dollars;`

a) Compare this code to lines 6–8 in Model 3. What value do you think `cents` and `dollars` will have after running this statement?

b) Which side of the equals sign (left or right) was assigned a new value?

19. In Java, the `+` and `-` symbols are used to perform addition and subtraction. For example, the statement `dollars = dollars + 1;` adds one to the current value of `dollars`.

a) What is the value of `dollars` (in memory) after running this statement?

b) Do you consider the equals sign in Java an operation to be performed? (like `+`)
If so, explain the operation. If not, explain why not.

c) Do you consider the equals sign in mathematics an operation to be performed?
If so, explain the operation. If not, explain why not.

20. In your own words, explain how you should read the `=` sign in Java. For example, the Java statement `x = a + b;` should be read out loud as "x _____ a plus b."