

Fundamentals of Java

Input/Output

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Input/Output

We have already seen how a program prints output to the screen:

```
System.out.println("hello");
```

Let's break down this line:

- We pass "hello" as an argument to println()
- println() is a method inside "out".
- "out" is an object inside of "System".
- "System" is a class.

System.out

The System.out object provides various methods for printing output to the screen:

- `println()` prints a value on a line by itself
- `print()` prints a value without terminating the line
- `printf()` prints a formatted string

System.out is an example of an **OutputStream**.

OutputStream

An OutputStream is an object used to write a sequence of bytes to some destination.

Example destinations:

- The screen (linked to System.out)
- A file
- A network socket connection

InputStream

The opposite of an OutputStream is an InputStream. It reads input from a source.

Example sources:

- The keyboard (i.e. System.in)
- A file
- A network socket connection

System.in

The System.in object on its own provides only low level methods for reading input as a sequence of bytes.

A program normally wants high level methods such as:

- Reading a String
- Reading an integer
- Reading a double

Packages

Java provides thousands of standard classes performing various useful functions. They are organised into different packages of related classes.

3rd parties may also provide useful packages (either free or paid).

Importing classes

To use a class from a package, you need to import the class from the package.

```
import javax.swing.JButton;
```

This imports class JButton from package javax.swing.

```
import java.text.*;
```

This imports every class from package java.text.

Scanner

The `Scanner` class from package `java.util` provides high level methods on top of any `InputStream`.

```
Scanner keyboard = new Scanner(System.in);
```

Class `Scanner` provides the following methods:

- `nextInt()` reads an integer
- `nextDouble()` reads a double
- `nextLine()` reads a line of text (a `String`)

Example program

```
System.out.print("What is your name? ");  
String name = keyboard.nextLine();  
  
System.out.println("Hello, " + name + ".");
```

Exercises

1. Write a program to ask the user for his/her name (`nextLine`) and age (`nextInt`) and then print out "Hello <name>, you are <age> years old."
2. Modify your house volume program to ask the user to type in the house dimensions.
3. Modify your wheel circumference/volume program to ask the user to type in the wheel dimensions.
4. Modify the first program to ask for the age first, and the name second.