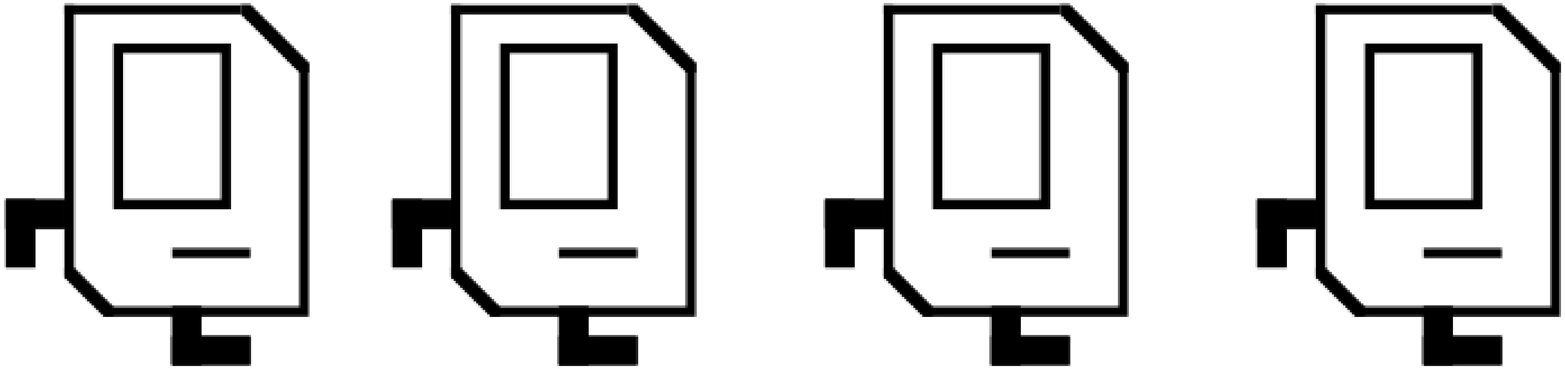
Introduction to Java

Announcements

- Programming Assignment #1 Out:
  - Karel the Robot: Due Friday, January 18 at 3:15 PM.
  - Email: Due Sunday, January 20 at 11:59PM.
- Section assignments given out on Tuesday; you can submit assignments once you have an SL assigned.
  - Didn't sign up? Signups reopen on Tuesday.
- Assignment review hours: **7:00 – 9:00PM** in **Herrin T-175**.
  - Not recorded; sorry about that!
- LaIR hours start tonight!

A Farewell to Karel



Welcome to Java

But First…

A Brief History of Digital Computers

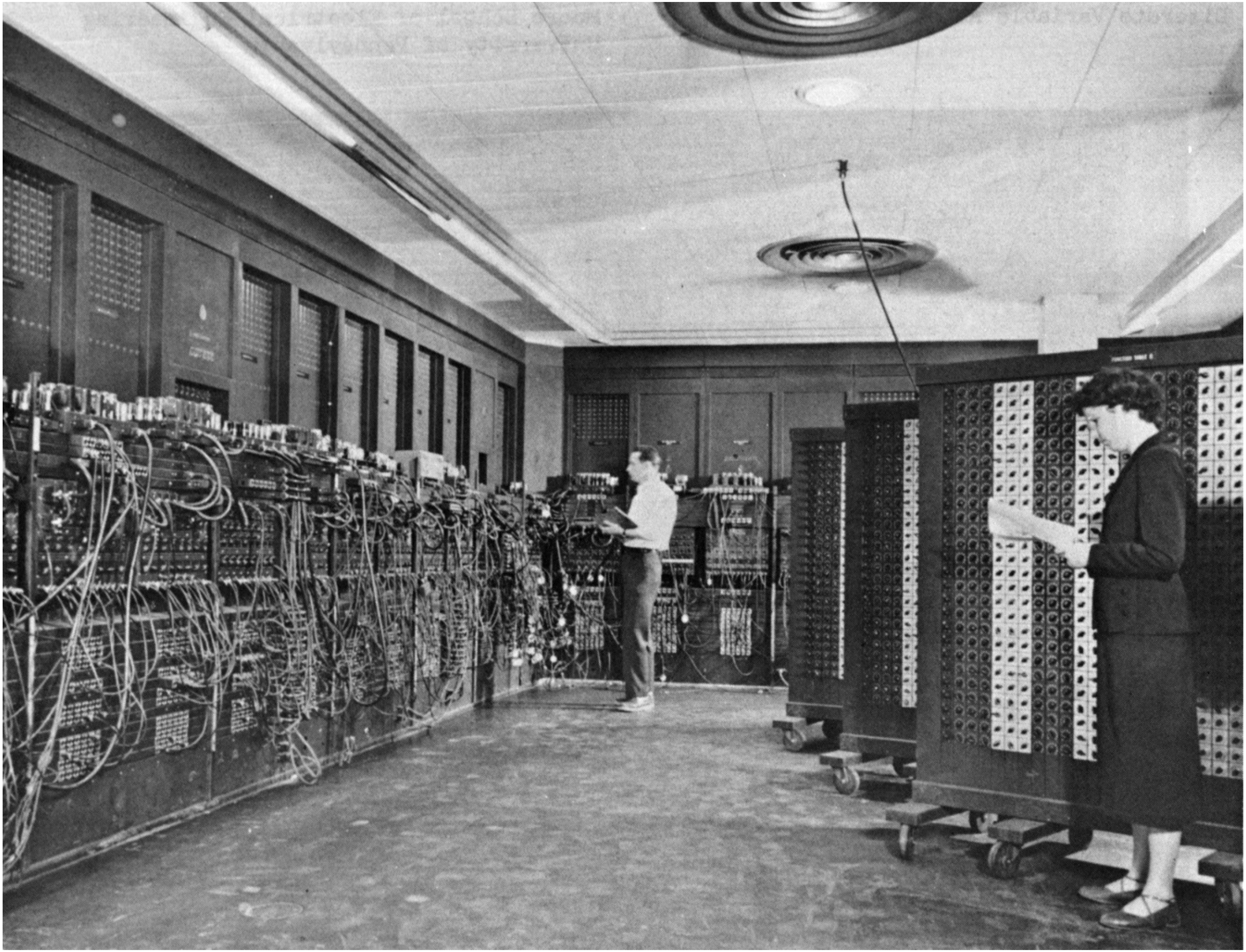
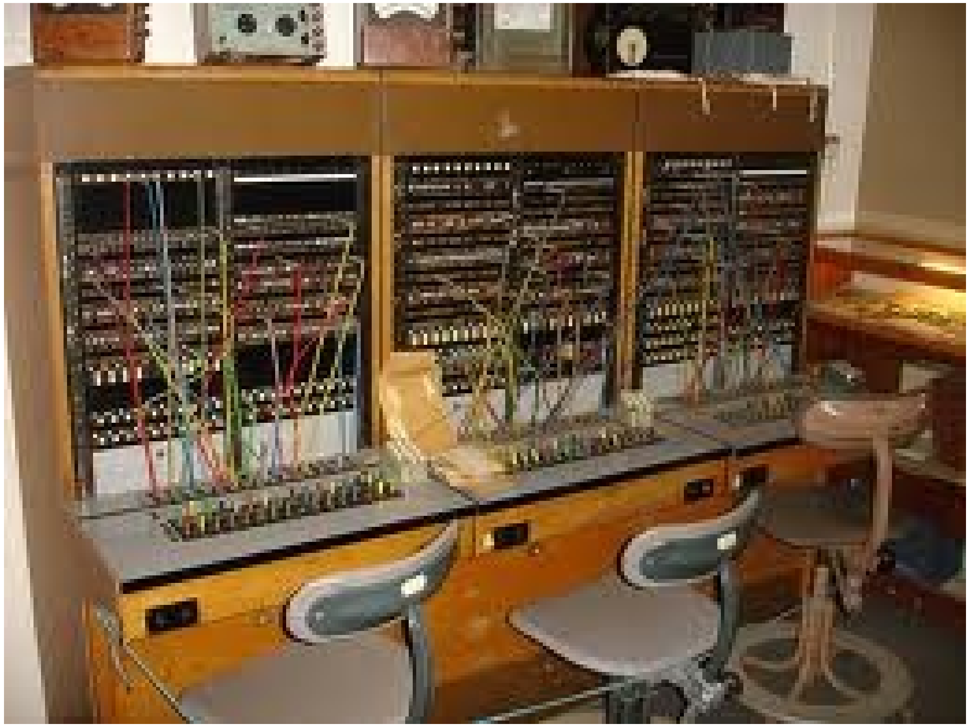
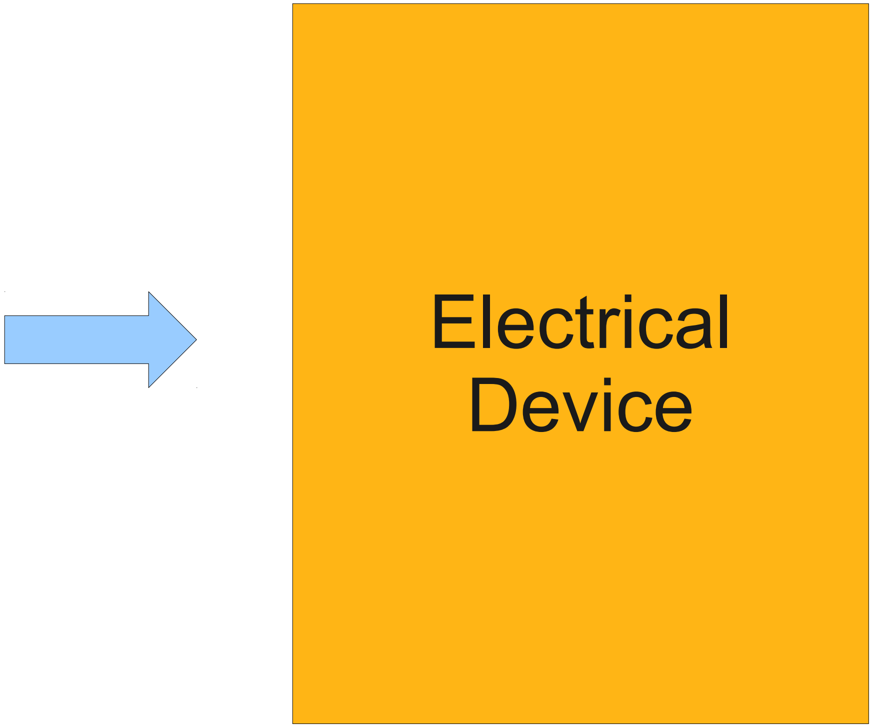


Image credit: http://upload.wikimedia.org/wikipedia/commons/4/4e/Eniac.jpg

Programming in the 1940s





Electrical Device

High-Level Languages

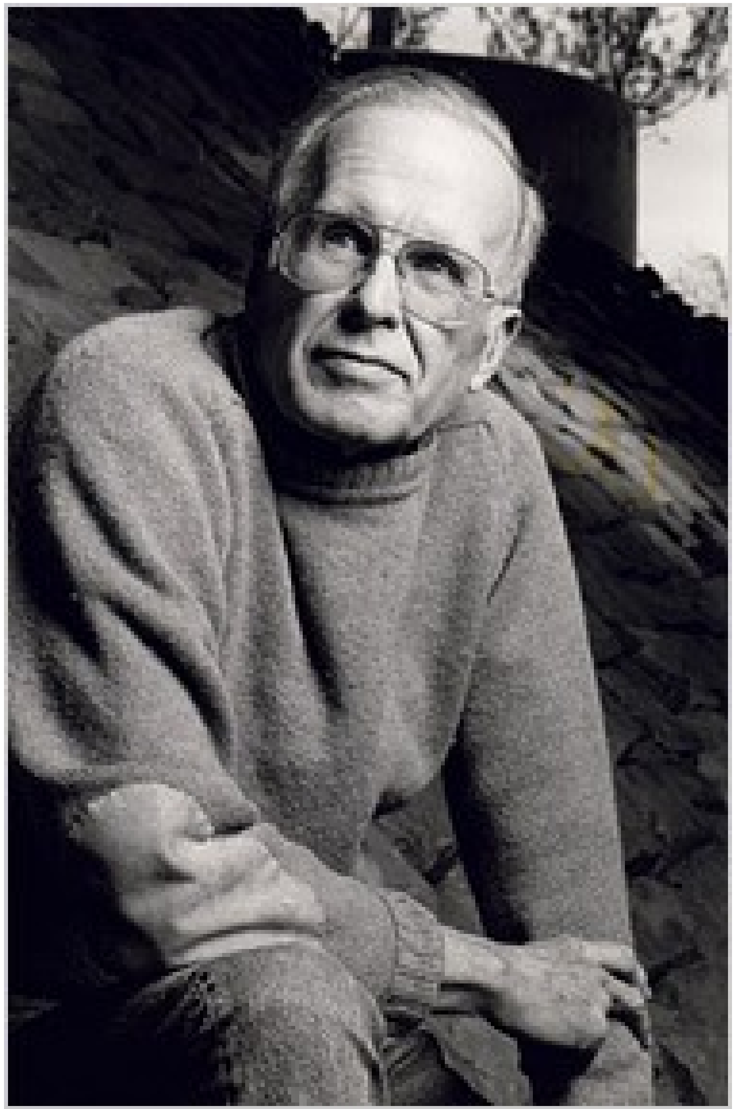
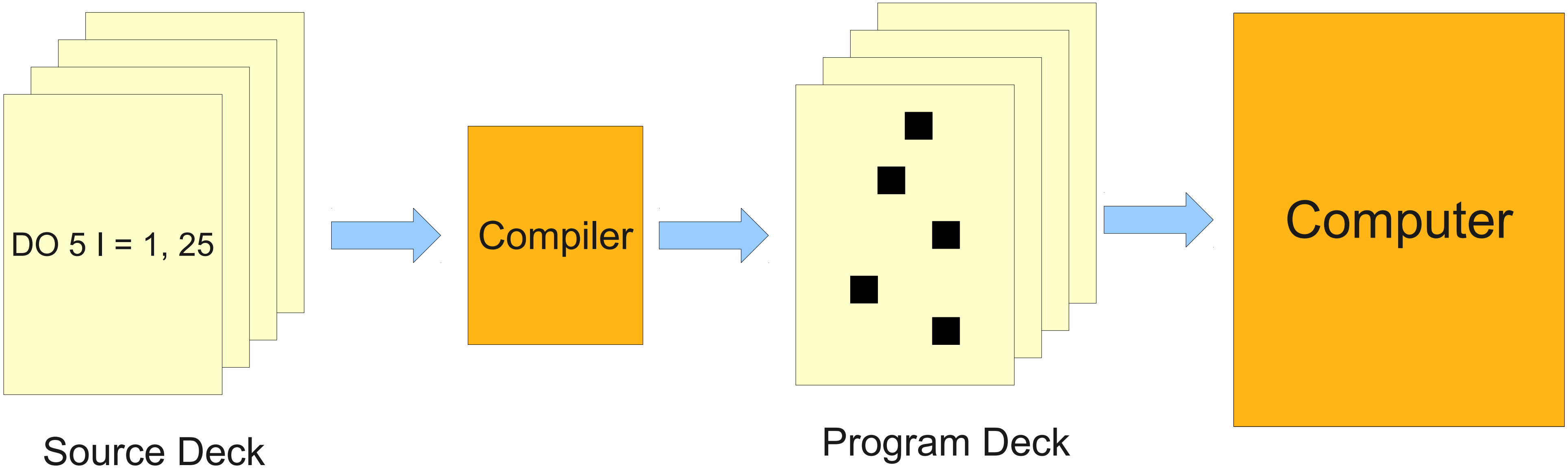


Image: http://upload.wikimedia.org/wikipedia/commons/thumb/5/55/Grace_Hopper.jpg/300px-Grace_Hopper.jpg
http://www.nytimes.com/2007/03/20/business/20backus.html

Programming in the 1950s


DO 5 I = 1, 25

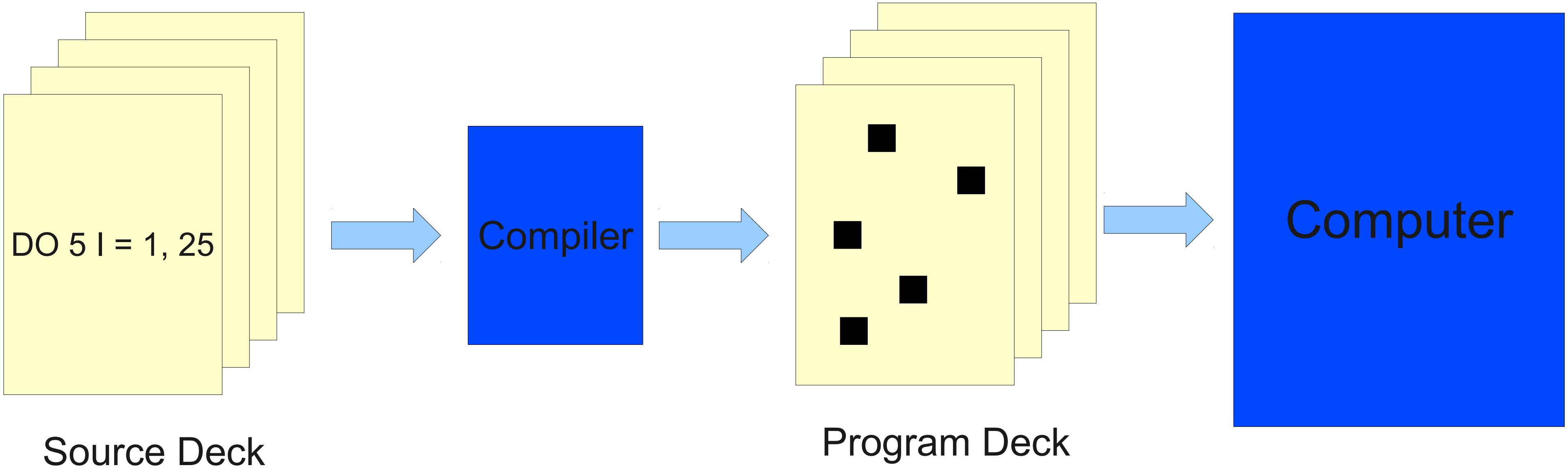
Source Deck

Compiler

Program Deck

Computer

Programming in the 1950s



DO 5 I = 1, 25

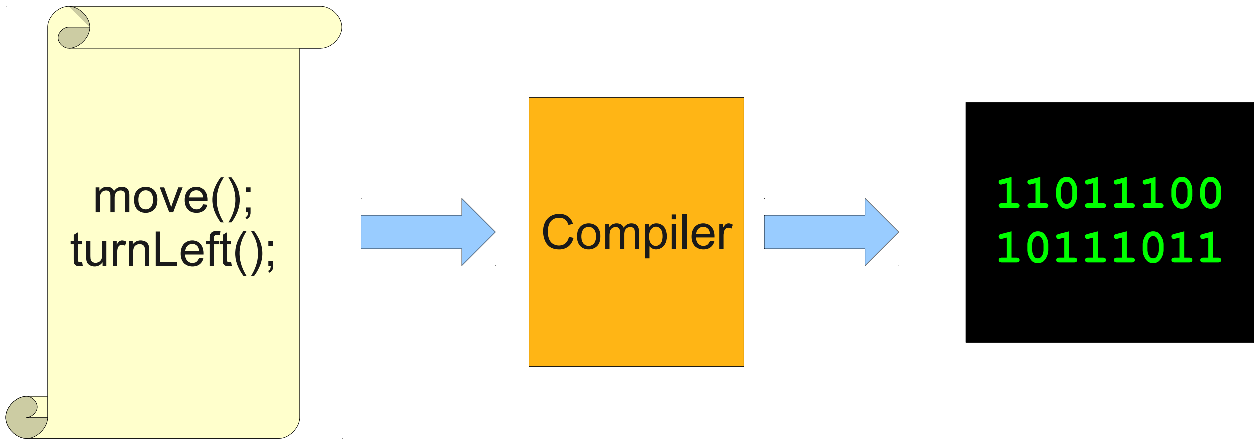
Compiler

Computer

Source Deck

Program Deck

Programming Now (ish)



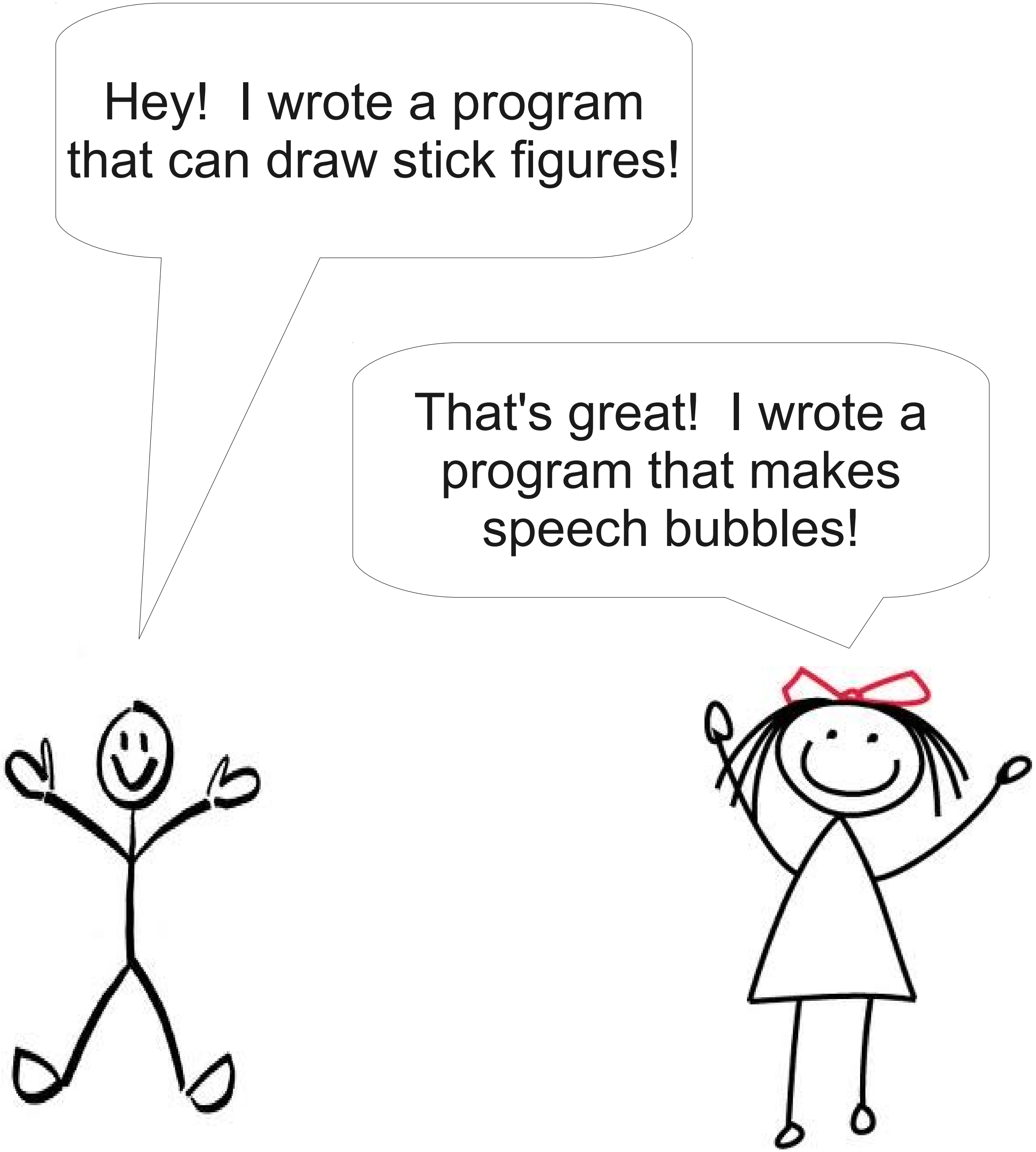
```
move();
turnLeft();
```

Compiler

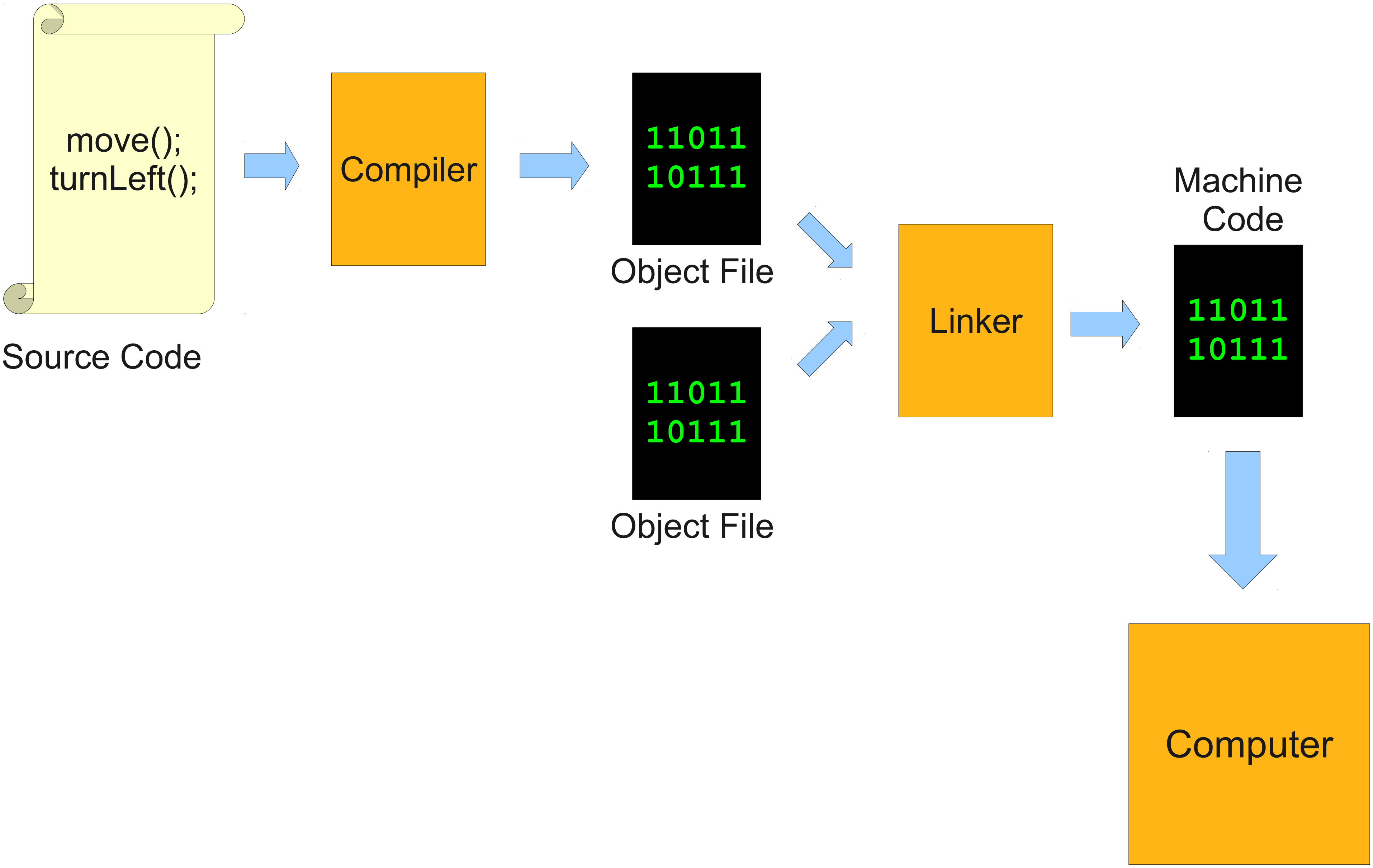
```
11011100
10111011
```

Source Code

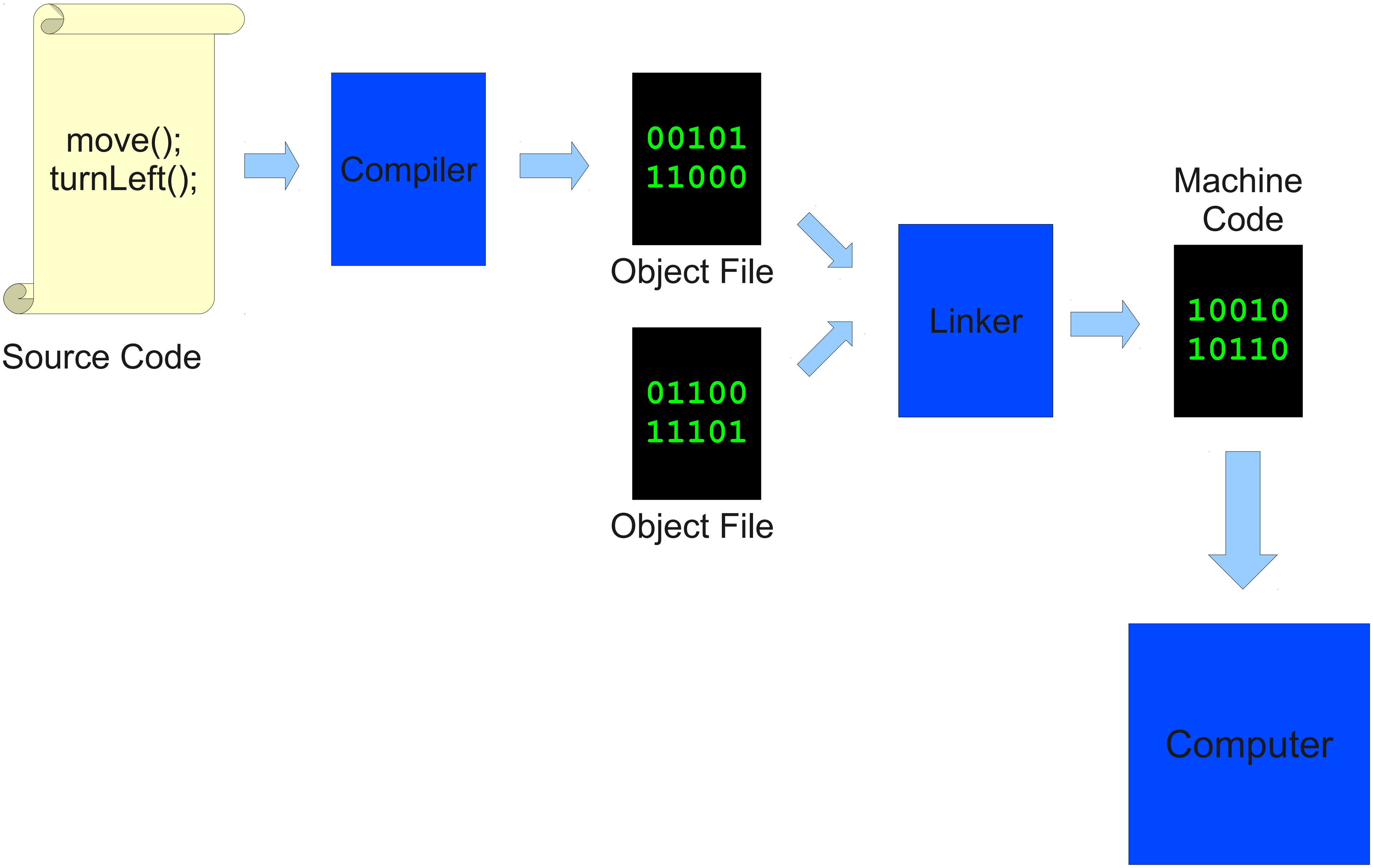
Machine Code


Hey! I wrote a program that can draw stick figures!
That's great! I wrote a program that makes speech bubbles!

Programming Now



Programming Now



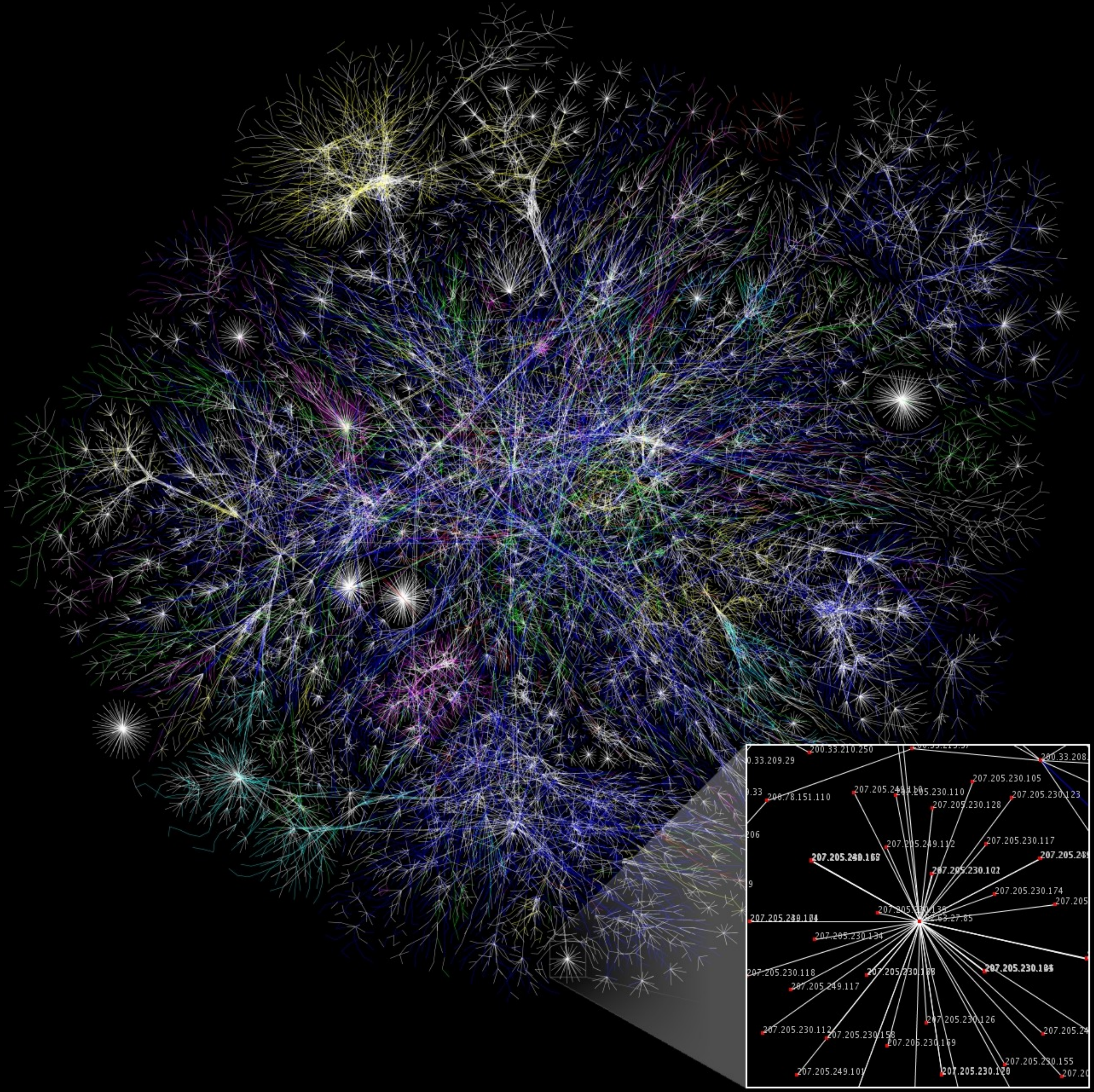
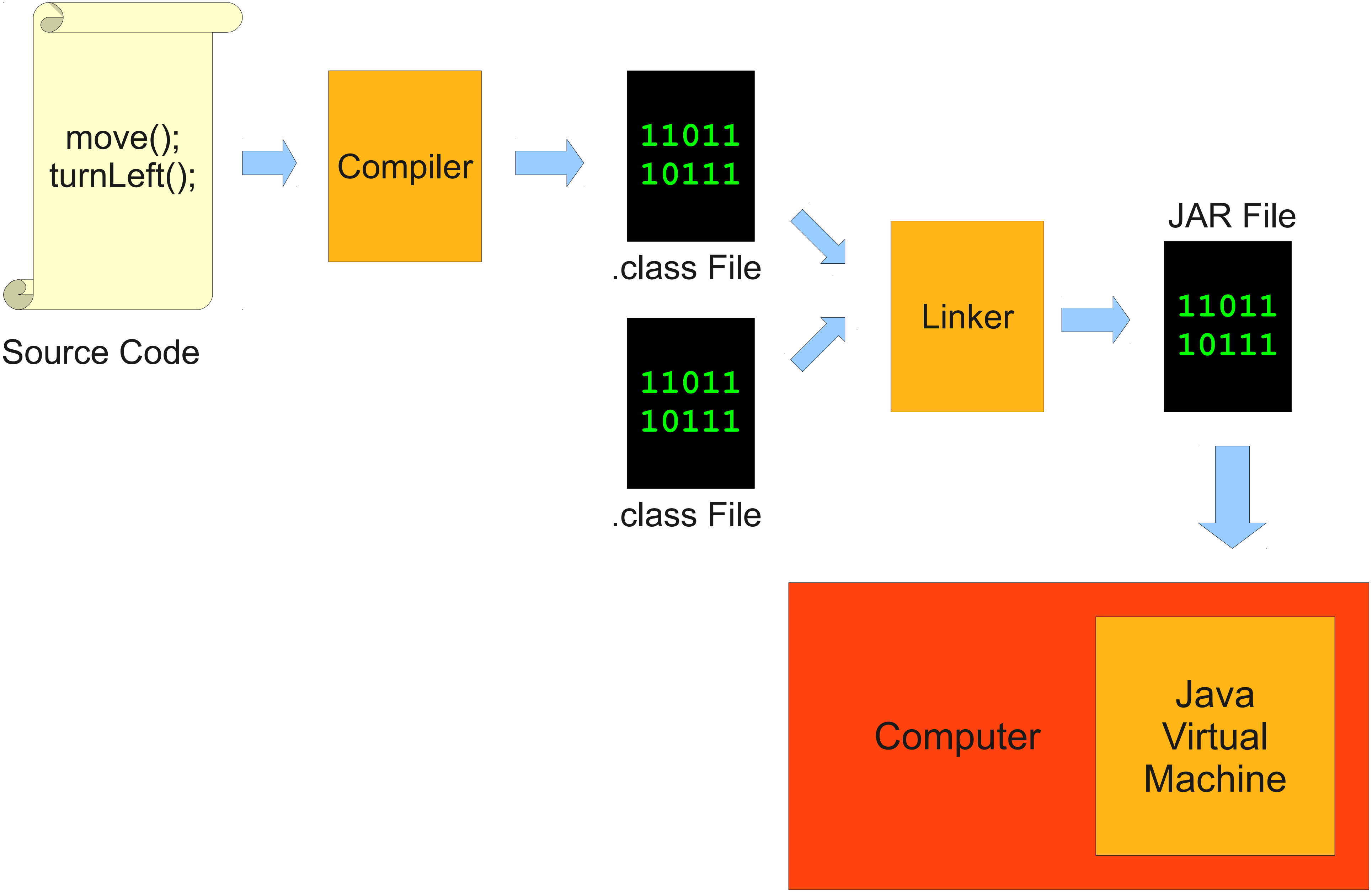


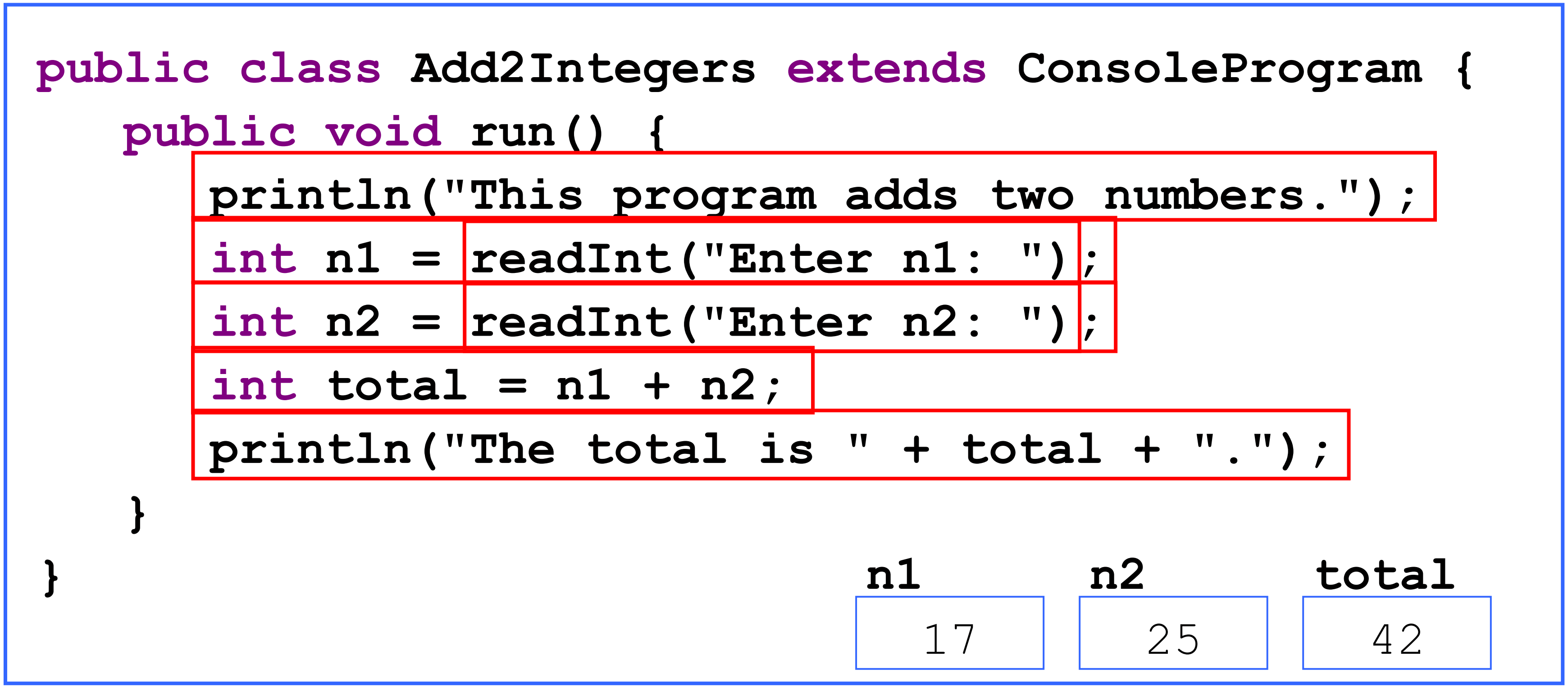
Image credit: http://upload.wikimedia.org/wikipedia/commons/d/d2/Internet_map_1024.jpg

The Java Model



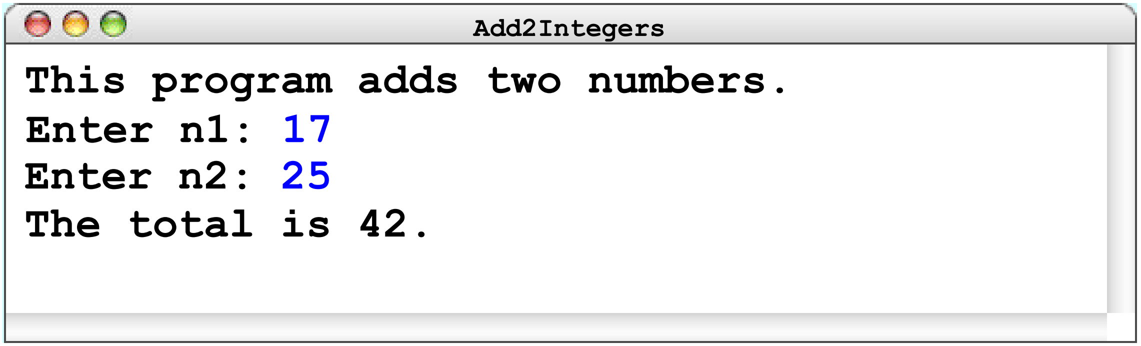
Let's See Some Java!

The Add2Integers Program



```
public class Add2Integers extends ConsoleProgram {
   public void run() {
      println("This program adds two numbers.");
      int n1 = readInt("Enter n1: ");
      int n2 = readInt("Enter n2: ");
      int total = n1 + n2;
      println("The total is " + total + ".");
   }
}
```

```
  n1      n2      total
  17      25      42
```



```
This program adds two numbers.
Enter n1: 17
Enter n2: 25
The total is 42.
```

Graphic courtesy of Eric Roberts

Variables

- A **variable** is a location where a program can store information for later use.

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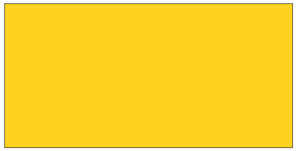

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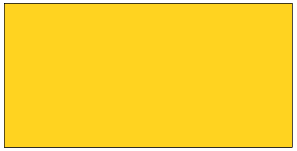

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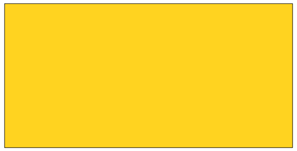

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    - **Name**: What is the variable called?

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`numVoters`

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`int numVoters`

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int numVoters
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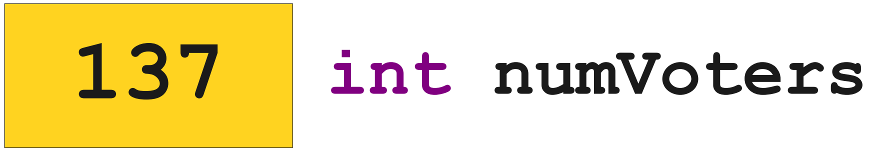

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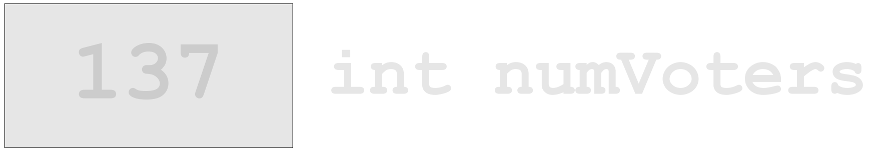

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Variable Names

```
x                         w
7thHorcrux                LOUD_AND_PROUD
Harry Potter              that'sACoolName
noOrdinaryRabbit          true
lots_of_underscores       C_19_H_14_O_5_S
```

Variable Names

- Legal names for variables
  - begin with a letter or an underscore (_)

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Variable Naming Conventions

- You are free to name variables as you see fit, but there are conventions.
- Names are often written in **lower camel case:**

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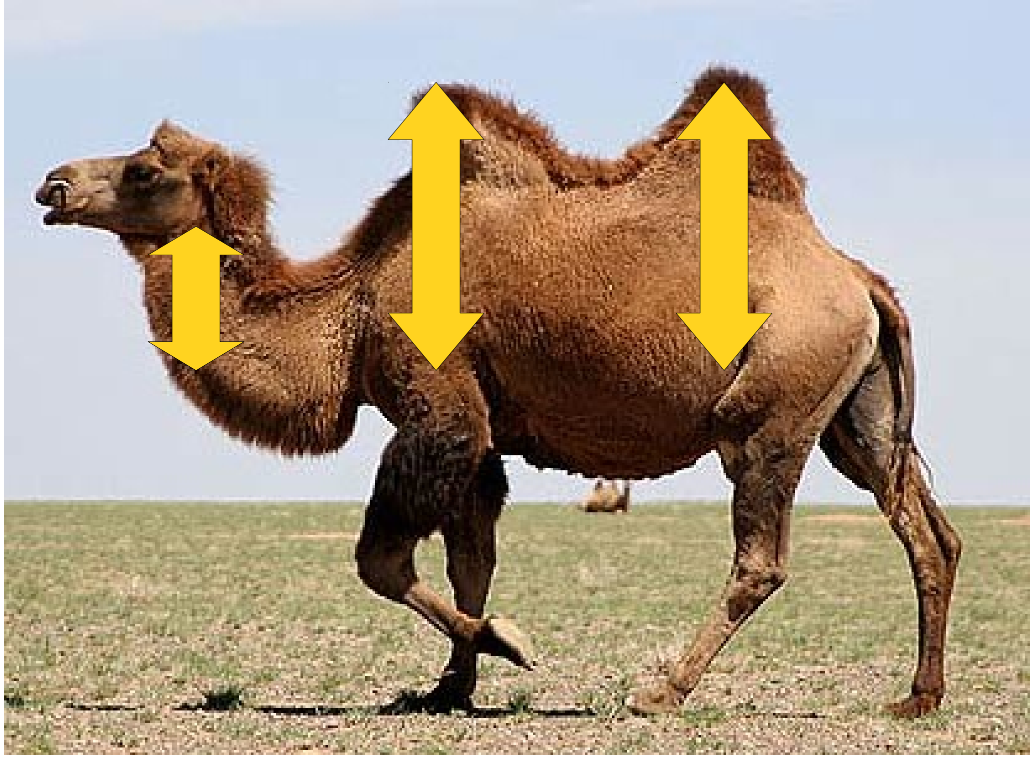

Variable Naming Conventions

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- Choose names that describe what the variable does.
  - If it's a number of voters, call it **`numberOfVoters`**, **`numVoters`**, **`voters`**, etc.
  - Don't call it **`x`**, **`volumeControl`**, or **`severusSnape`**

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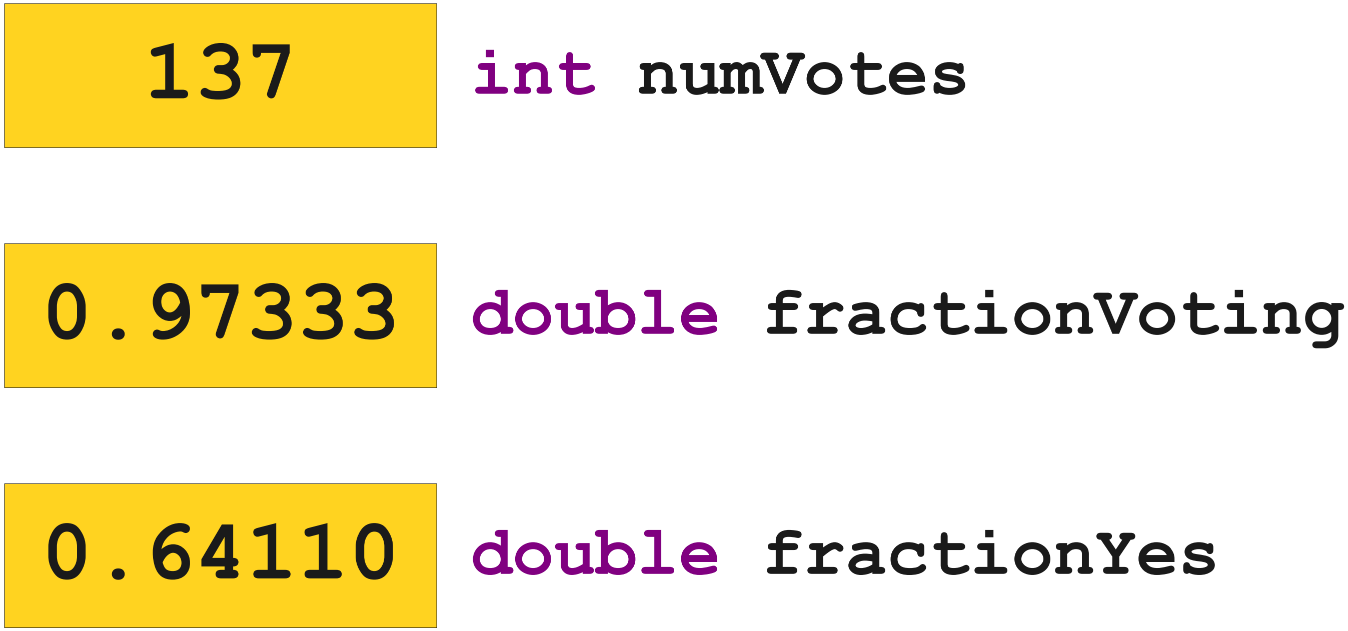
  - **`int`**: Integers. **(counting)**
  - **`double`**: Real numbers. **(measuring)**
  - **`boolean`**: Logical true and false.
  - **`char`**: Characters and punctuation.

Values



137 int numVotes

0.97333 double fractionVoting

0.64110 double fractionYes

Declaring Variables

Declaring Variables

```
public void run() {









}
```

Declaring Variables

```
public void run() {
   double ourDouble = 2.71828;



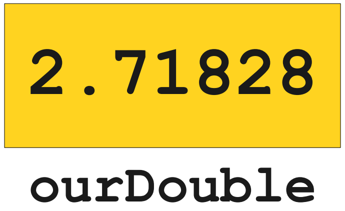







}
```

Declaring Variables



2.71828

ourDouble

```
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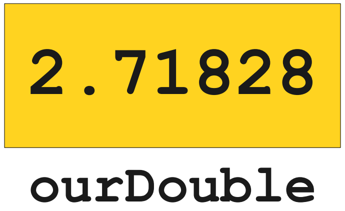
Declaring Variables



2.71828

ourDouble

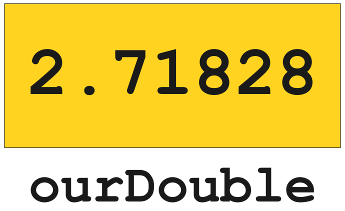
```
public void run() {
    double ourDouble = 2.71828;
```

The syntax for declaring a variable with an initial value is

type name = ***value*** ;

```
}
```

Declaring Variables



2.71828

ourDouble

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public void run() {
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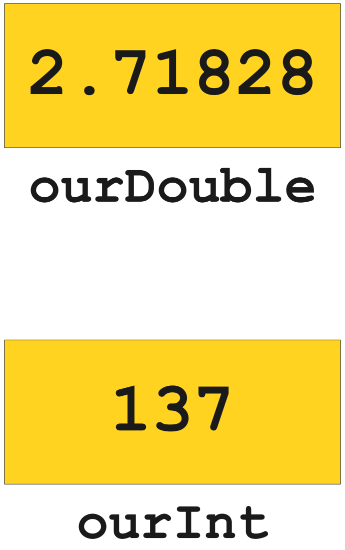
}
```

Declaring Variables



```
public void run() {
   double ourDouble = 2.71828;
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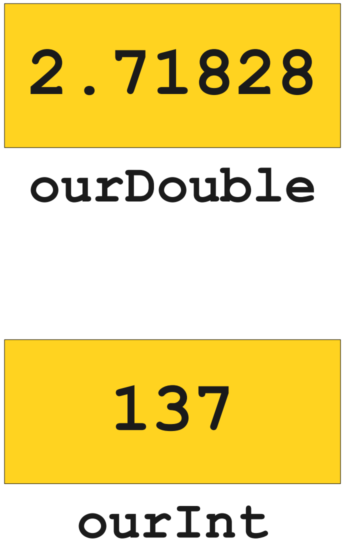
}
```

Declaring Variables



2.71828

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ourInt

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   int anotherInt;







}
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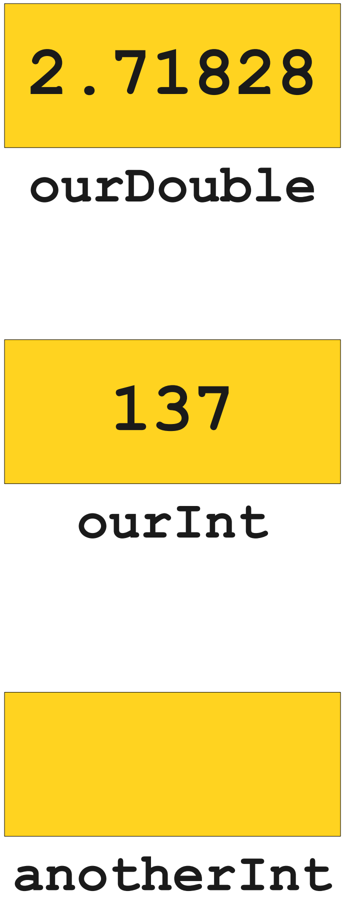
Declaring Variables



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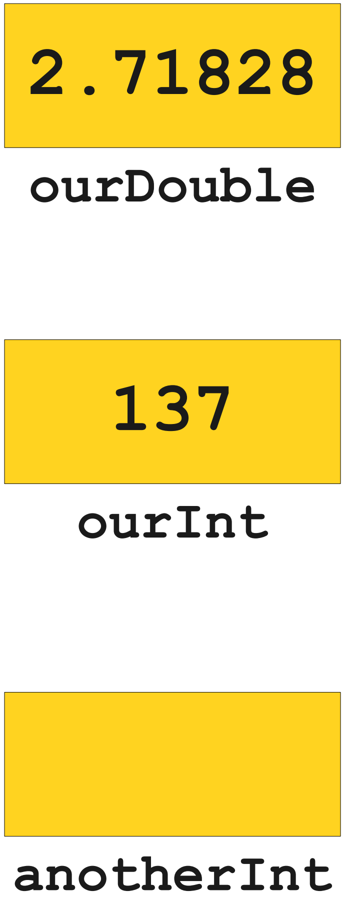
Declaring Variables



```
public void run() {
    double ourDouble = 2.71828;
    int ourInt = 137;

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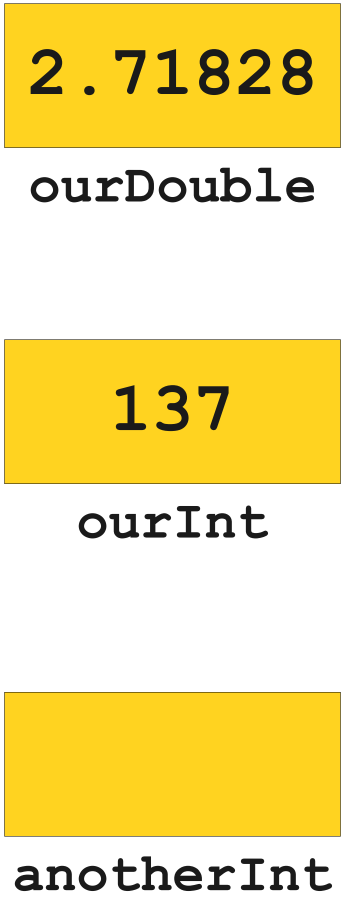
}
```

Variables can be declared without an initial value:

type name ;

Declaring Variables



2.71828

ourDouble

137

ourInt

anotherInt

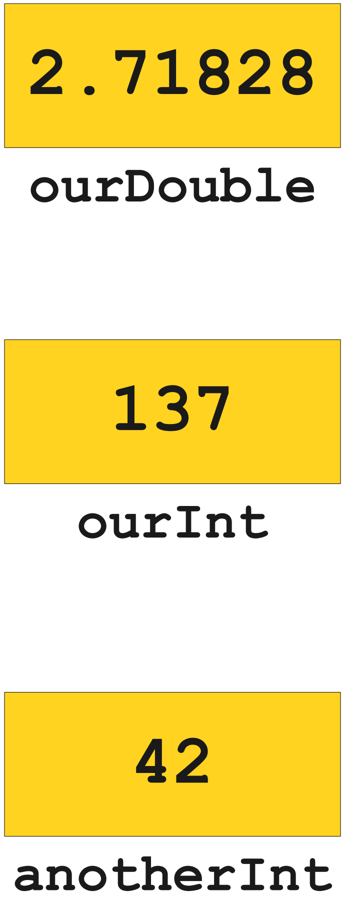
```
public void run() {
    double ourDouble = 2.71828;
    int ourInt = 137;

    int anotherInt;
    anotherInt = 42;



}
```

Declaring Variables



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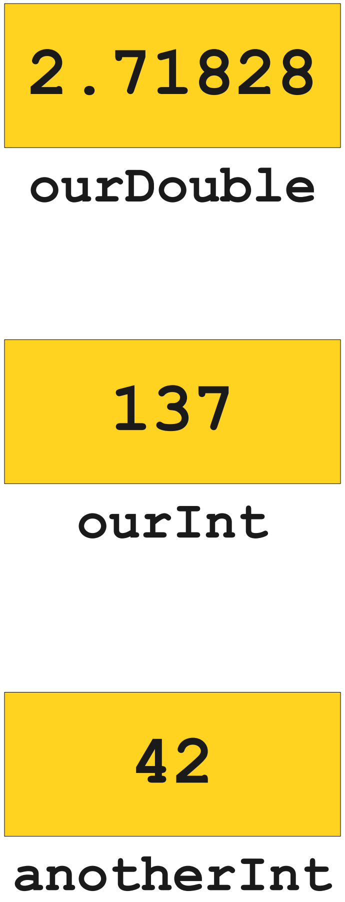
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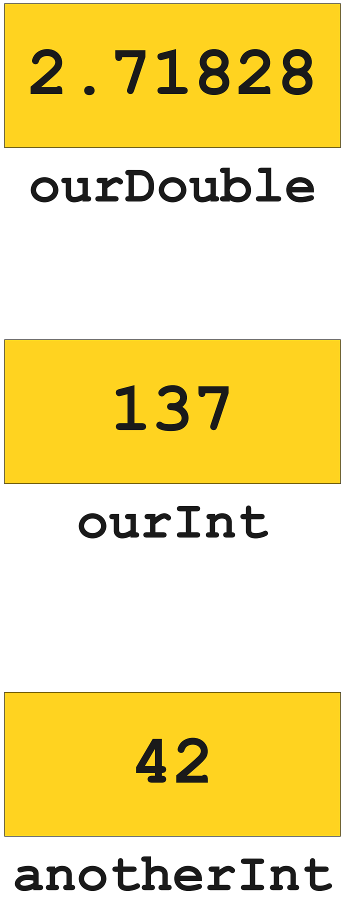
An assignment statement has the form

***variable* = *value*;**

This stores ***value*** in ***variable***.

Declaring Variables



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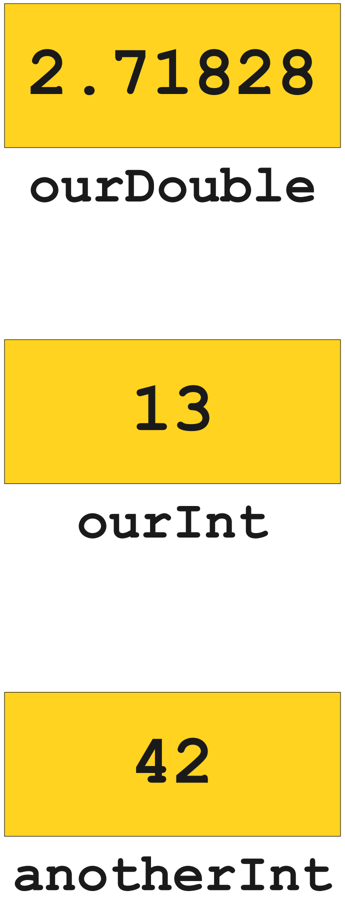

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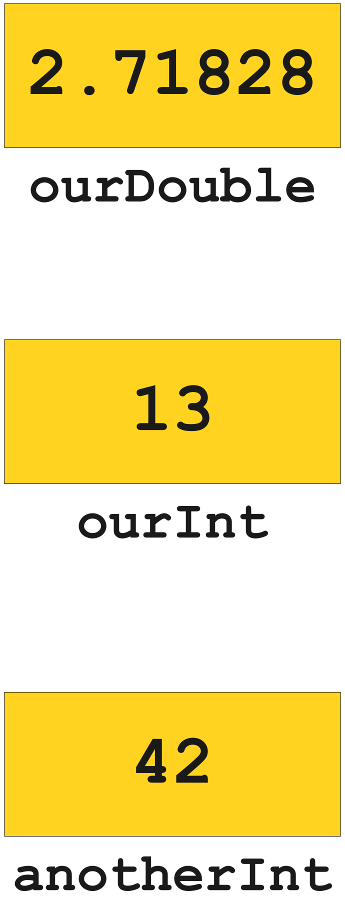

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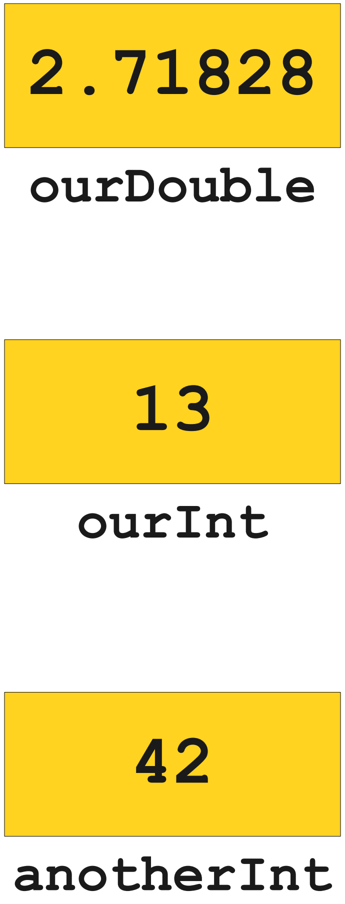

```
public void run() {
   double ourDouble = 2.71828;
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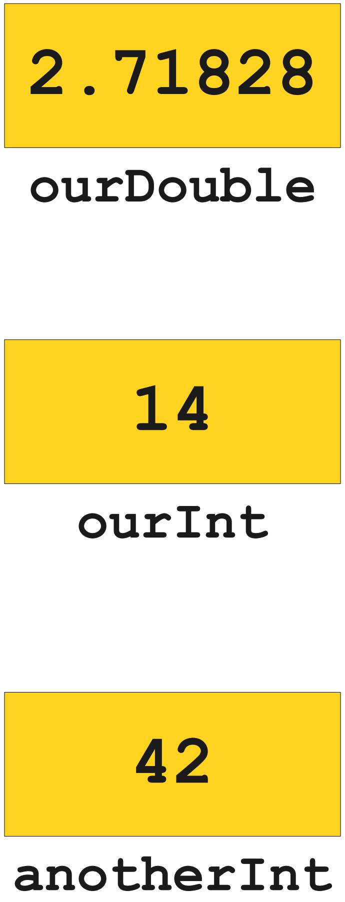
   ourInt = 13;
   ourInt = ourInt + 1;



}
```

Declaring Variables



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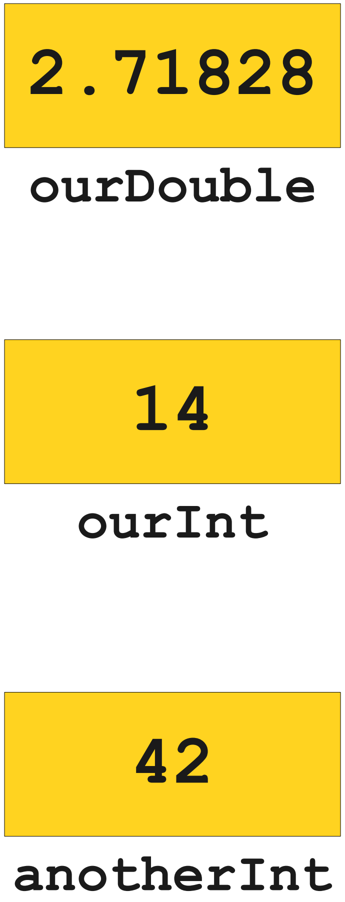

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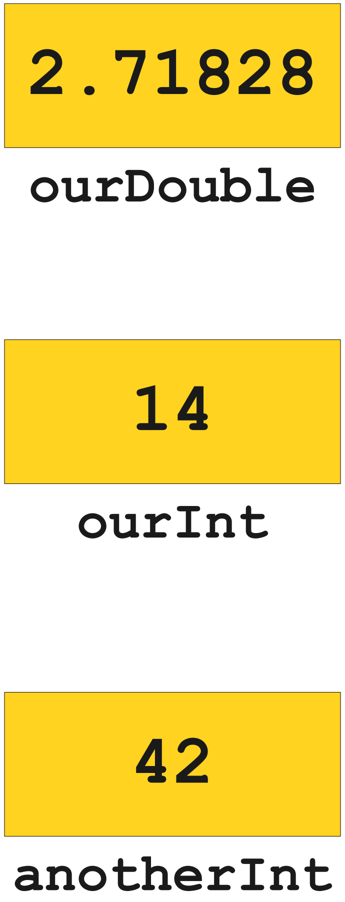
    ourInt = 13;
    ourInt = ourInt + 1;



}
```

Declaring Variables



```
public void run() {
   double ourDouble = 2.71828;
   int ourInt = 137;

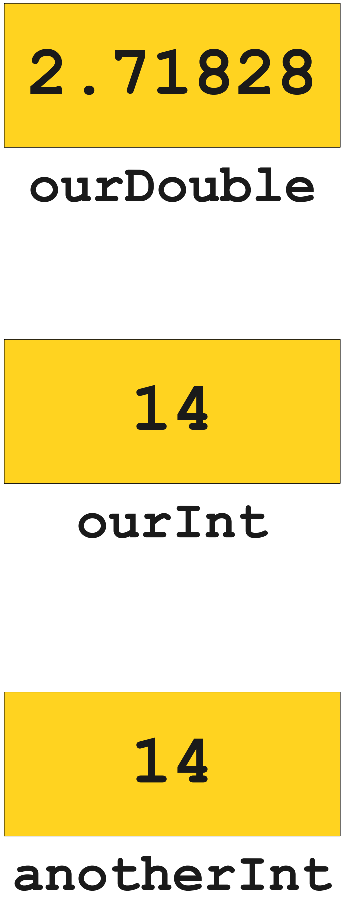
   int anotherInt;
   anotherInt = 42;

   ourInt = 13;
   ourInt = ourInt + 1;

   anotherInt = ourInt;

}
```

Declaring Variables



2.71828

ourDouble

14

ourInt

14

anotherInt

```
public void run() {
    double ourDouble = 2.71828;
    int ourInt = 137;

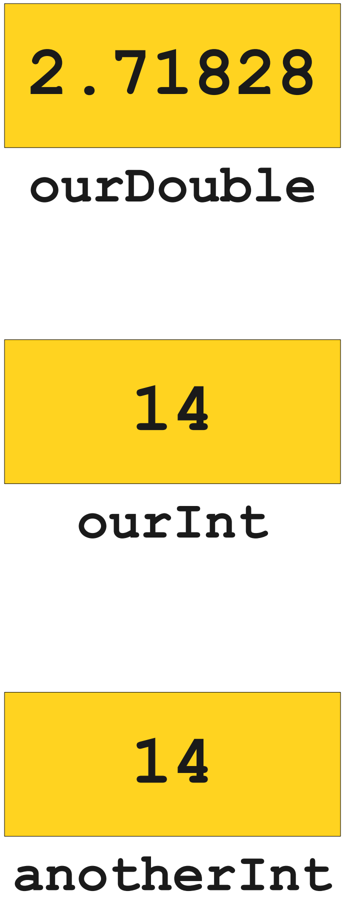
    int anotherInt;
    anotherInt = 42;

    ourInt = 13;
    ourInt = ourInt + 1;

    anotherInt = ourInt;

}
```

Declaring Variables



2.71828

ourDouble

14

ourInt

14

anotherInt

```
public void run() {
   double ourDouble = 2.71828;
   int ourInt = 137;

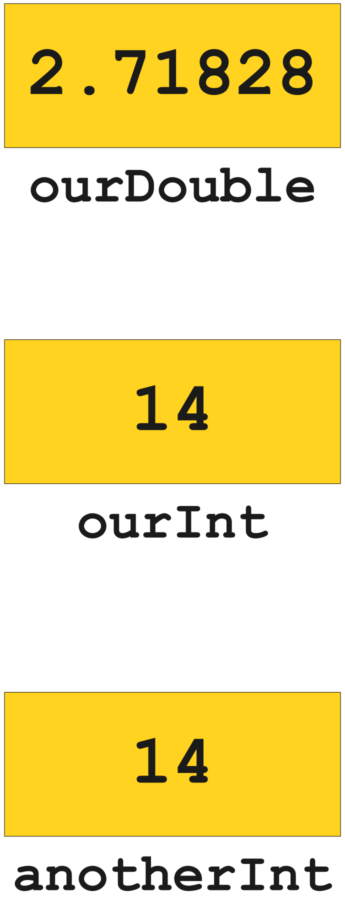
   int anotherInt;
   anotherInt = 42;

   ourInt = 13;
   ourInt = ourInt + 1;

   anotherInt = ourInt;

}
```

Declaring Variables



2.71828

ourDouble

14

ourInt

14

anotherInt

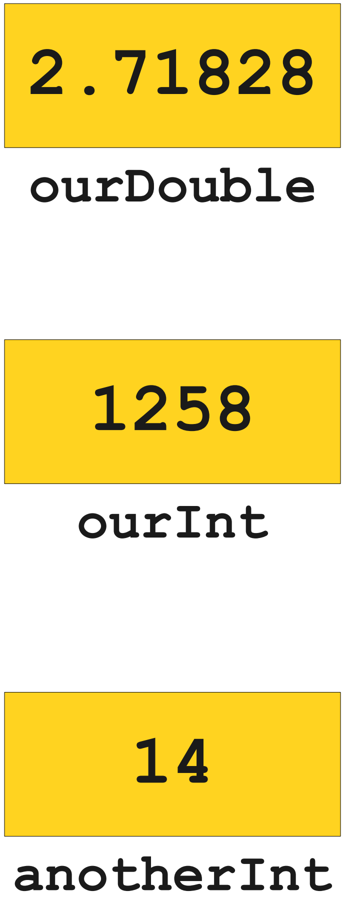
```
public void run() {
   double ourDouble = 2.71828;
   int ourInt = 137;

   int anotherInt;
   anotherInt = 42;

   ourInt = 13;
   ourInt = ourInt + 1;

   anotherInt = ourInt;
   ourInt = 1258;
}
```

Declaring Variables



2.71828

ourDouble

1258

ourInt

14

anotherInt

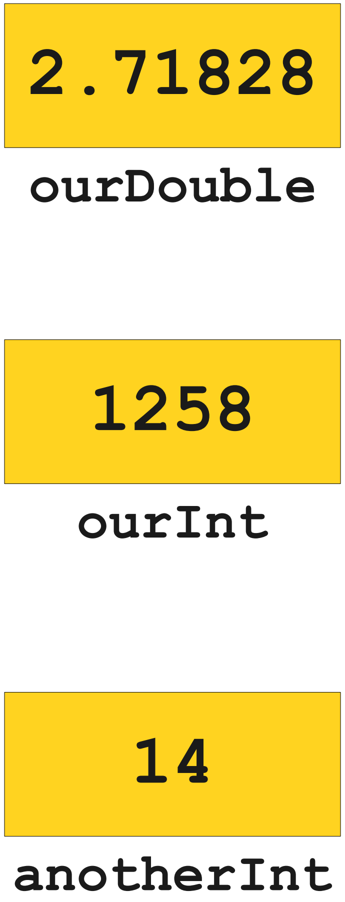
```
public void run() {
    double ourDouble = 2.71828;
    int ourInt = 137;

    int anotherInt;
    anotherInt = 42;

    ourInt = 13;
    ourInt = ourInt + 1;

    anotherInt = ourInt;
    ourInt = 1258;
}
```

Declaring Variables



2.71828

ourDouble

1258

ourInt

14

anotherInt

```
public void run() {
    double ourDouble = 2.71828;
    int ourInt = 137;

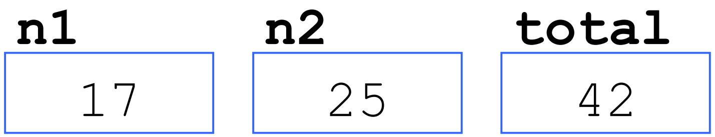
    int anotherInt;
    anotherInt = 42;

    ourInt = 13;
    ourInt = ourInt + 1;

    anotherInt = ourInt;
    ourInt = 1258;
}
```

The **Add2Integers** Program

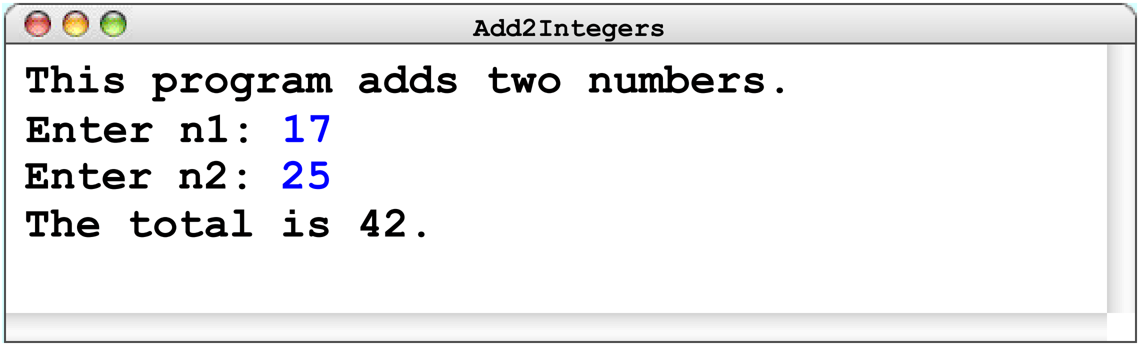
```
public class Add2Integers extends ConsoleProgram {
   public void run() {
      println("This program adds two numbers.");
      int n1 = readInt("Enter n1: ");
      int n2 = readInt("Enter n2: ");
      int total = n1 + n2;
      println("The total is " + total + ".");
   }
}
```



n1 17

n2 25

total 42

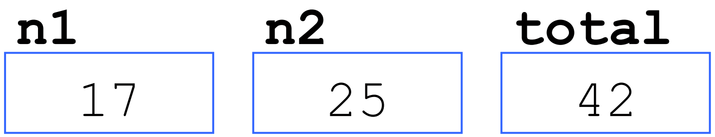


```
This program adds two numbers.
Enter n1: 17
Enter n2: 25
The total is 42.
```

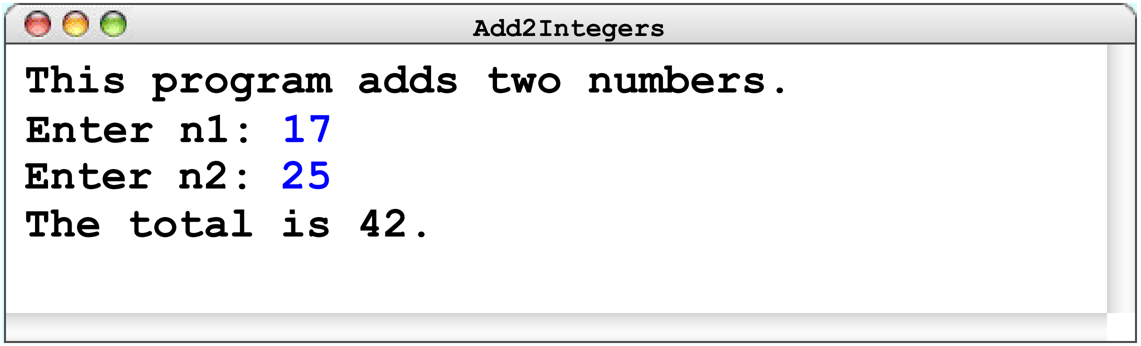
Graphic courtesy of Eric Roberts

The **Add2Integers** Program

```
public class Add2Integers extends ConsoleProgram {
   public void run() {
      println("This program adds two numbers.");
      int n1 = readInt("Enter n1: ");
      int n2 = readInt("Enter n2: ");
      int total = n1 + n2;
      println("The total is " + total + ".");
   }
}
```



n1	n2	total
17	25	42



```
This program adds two numbers.
Enter n1: 17
Enter n2: 25
The total is 42.
```

Graphic courtesy of Eric Roberts