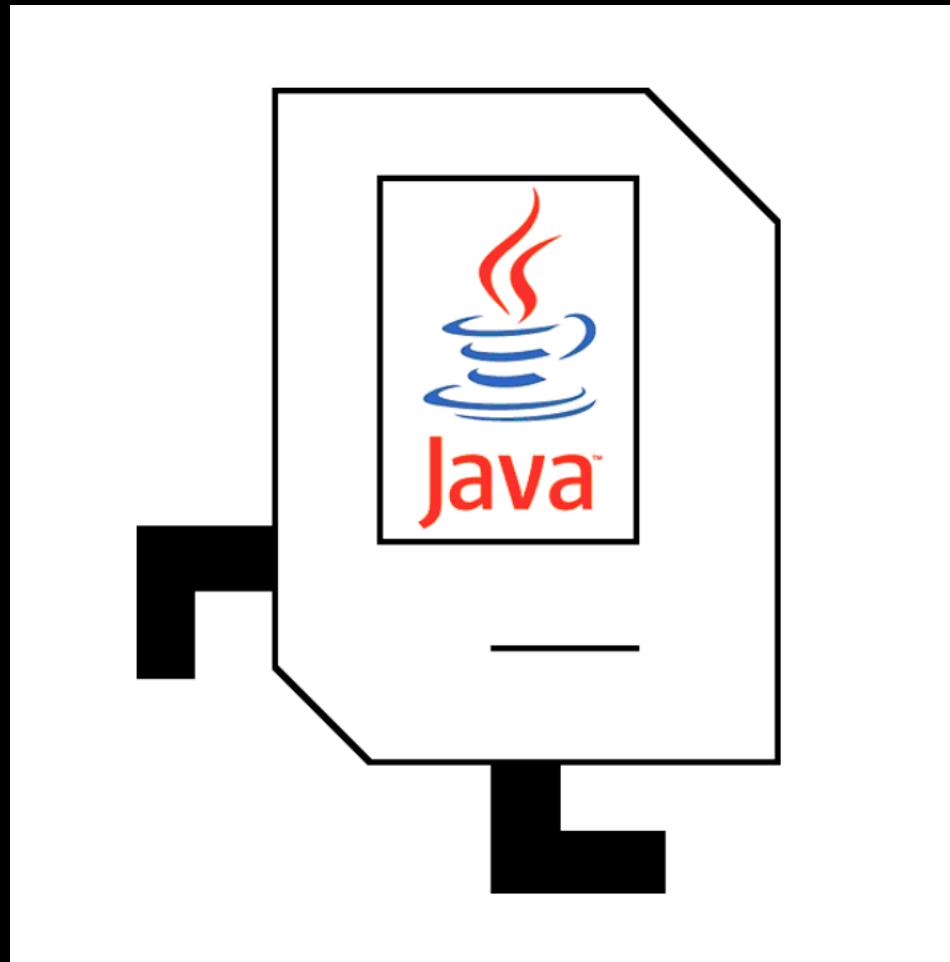


Variables

Review



Control Statements

method

```
private void solaDon() {  
    turnLeft();  
}
```

for-loop

```
for(int i = 0; i < N; i++) {  
    // to repeat N times  
}
```

while-loop

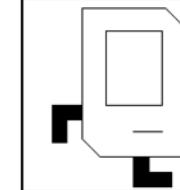
```
while(condition) {  
    // all the code in here repeats  
    // while the condition is true  
}
```

if-else
statements

```
if(condition) {  
    // do this code if true  
} else {  
    // do this code if false  
}
```

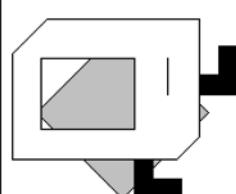
If-else statements

What do these two code snippets do?



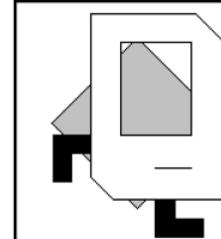
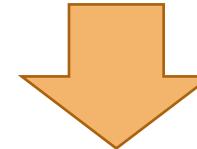
(before)

```
if(frontIsClear()) {  
    putBeeper();  
}  
turnLeft();
```



(after)

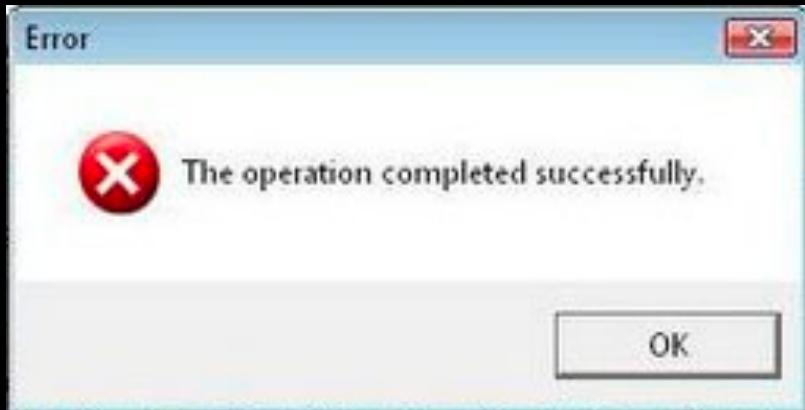
```
if(frontIsClear()) {  
    putBeeper();  
} else {  
    X turnLeft();  
}
```



(after)



Errors



What kind of bugs did you find in your code?



Semicolons and Curly Braces {}

;

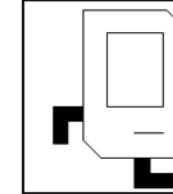
This line is a command.

{ ... }

These lines are grouped.

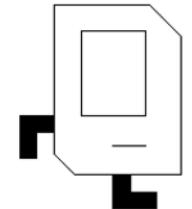
What do these code snippets do?

```
while (frontIsClear()) {  
    move();  
}
```

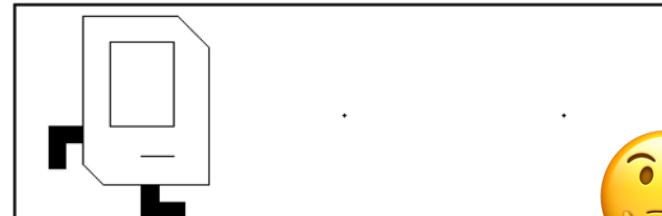


(before)

```
while (frontIsClear()); {  
    move();  
}
```



(done)

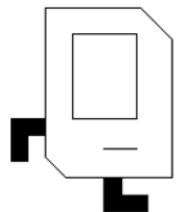


(running)

Semicolons ; and Curly Braces { }

```
while (frontIsClear()) {  
    move();  
}
```

```
while (frontIsClear())  
{  
    move(); }  
}
```

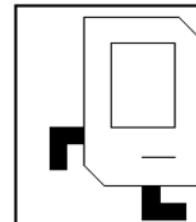


(done)

```
while (frontIsClear()); {  
    move();  
}
```

```
while (frontIsClear())  
{  
} "do nothing"  
  
{  
    move();  
}
```

⚠ We never
reach here!



(running)

Make It a Habit

```
for (int i = 0; i < N; i++) {  
    move();  
}
```

No semicolon
between () and { }

```
while (frontIsClear()) {  
    move();  
}
```

No semicolon
between () and { }

```
if (frontIsClear()) {  
    move();  
}
```

No semicolon
between () and { }

```
move();
```

A command

Questions?

Asking for Help



We love helping...

...but we love it when you help us help you.

Eclipse Is Actually Your Friend

```
BanishWinterFixed.java
1 import stanford.karel.*;
2
3 public class BanishWinterFixed extends SuperKarel {
4     public void run() {
5         while(beepersInBag()) {
6             moveToTree();
7
8             while(frontIsBlocked()) {
9                 turnLeft();
10                move();
11                turnRight();
12            }
13            placeLeaves();
14            turnRight();
15            moveToWall();
16
17            while(frontIsClear()) {
18                move();
19
20                turnLeft();
21            }
22        }
23
24    Syntax error, insert "}" to complete Block
25    }
26
27    public void moveToTree() {
28        moveToWall();
29    }
30
31    public void moveToWall() {
32        while(frontIsClear()) {
33            move();
34        }
35    }
}
```

My code
doesn't work.



Syntax error,
insert “}” to
complete
Block



Style Is Also Your Friend

```
J BanishWinterFixed.java ✘
1 import stanford.karel.*;
2
3 public class BanishWinterFixed extends SuperKarel {
4     public void run() {
5         while(beepersInBag()) {
6             moveToTree();
7
8             while(frontIsBlocked()) {
9                 turnLeft();
10                move();
11                turnRight();
12            }
13            placeLeaves();
14            turnRight();
15            moveToWall();
16
17            while(frontIsClear()) {
18                move();
19
20                turnLeft();
21            }
22
23            moveToWall();
24        }
25    }
26
27
28    public void moveToTree() {
29        moveToWall();
30    }
31
32    public void moveToWall() {
33        while(frontIsClear()) {
34            move();
35        }
36    }
37}
```



My code
doesn't work.



Okay, what
does your
code do?



I can't read it.



Yeah me
neither tbh

You Understand Your Code Best

- Section Leaders are GREAT at...
 - Clarifying logic and strategy
 - Debugging
 - Making you feel at peace
- You are just as good as Section Leaders at...
 - Reading (most) Eclipse errors
 - Fixing brackets { } and indentation
- You are BETTER than Section Leaders at...
 - Explaining your own code
 - Coding your own program

Programming takes practice.

See You Later!



I will miss you.

Enjoy Java!

Call me maybe?

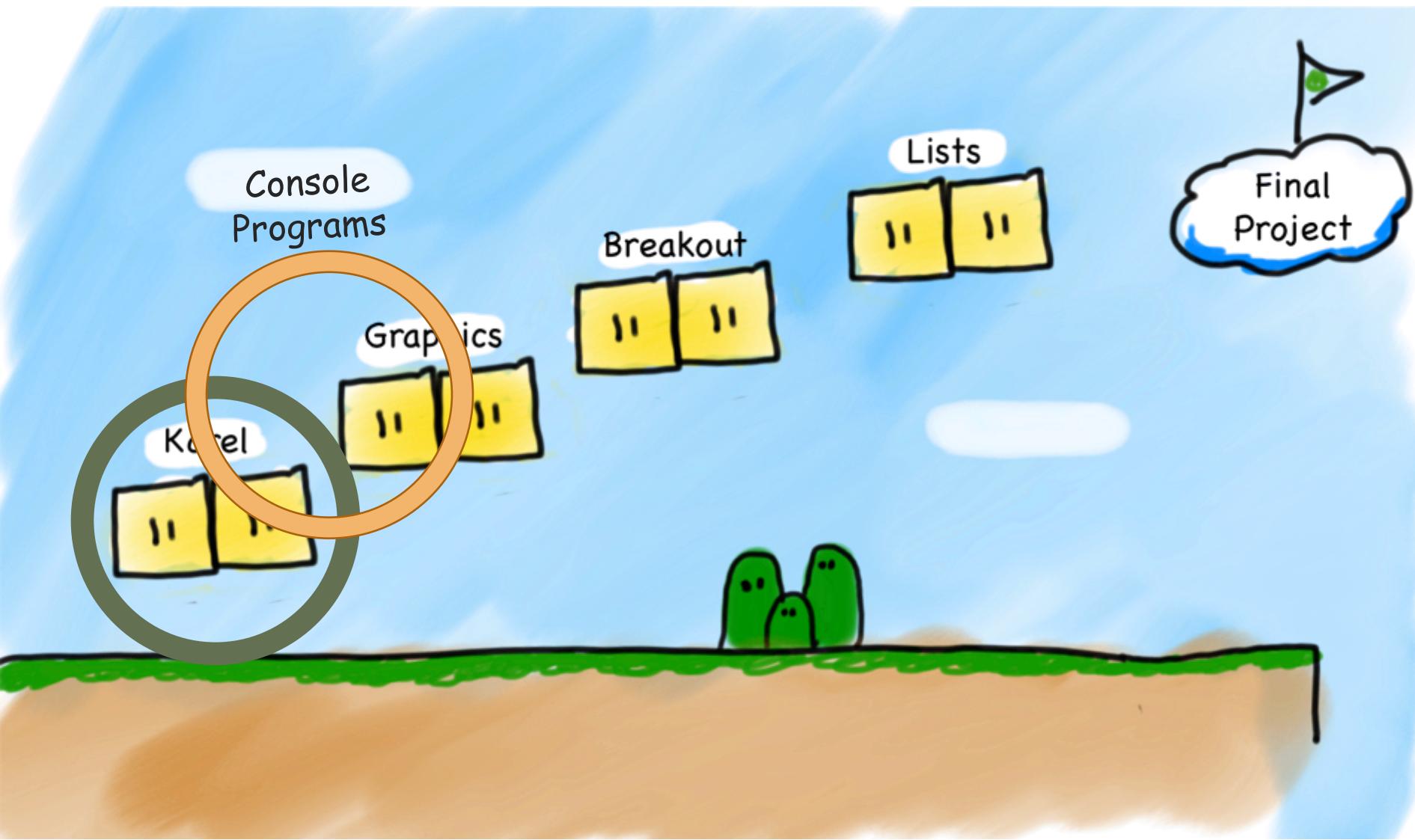


Carly Rae Jepsen - Call Me Maybe - YouTube

Java



Our First Step



Today's Goals

1. How do I write a console program?
2. What are variables and how do I use them?
3. How do I get user input in a console program?



Console Program



Takes text input

Prints text output

A screenshot of a macOS terminal window. The window title bar shows a red, yellow, and green button, followed by the path '~ — -bash — 80x24'. The main pane of the terminal displays the following text:

```
Last login: Mon Jul  3 17:20:41 on ttys007
/Users/Lisa $
```

The terminal has a light gray background and a dark gray header bar.

First Console Program: Hello World

```
import acm.program.*;

public class HelloProgram extends ConsoleProgram {
    public void run() {
        println("hello, world");
    }
}
```



In Pop Culture

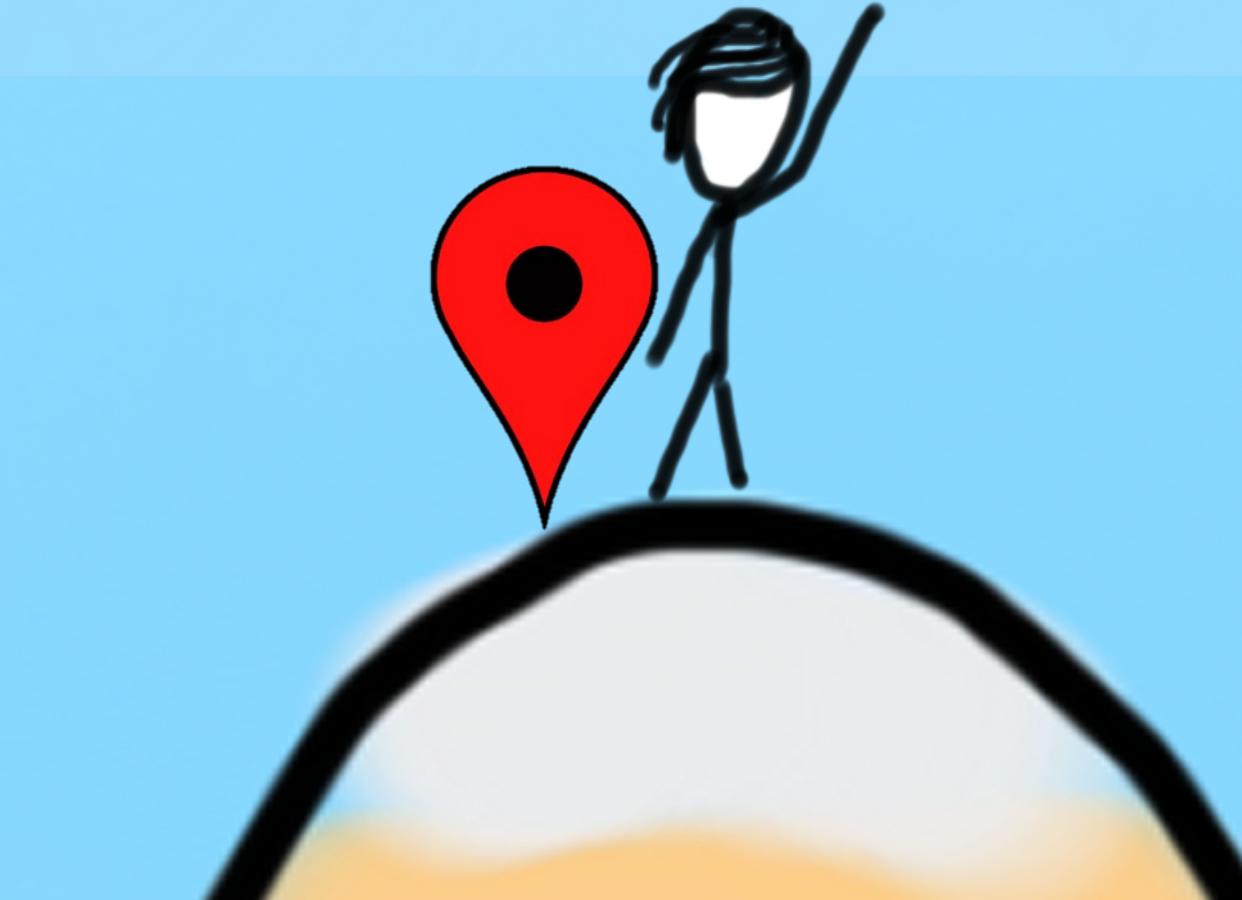


You had me at
"Hello, world"

Today's Goals



1. How do I write a console program?
2. What are variables and how do I use them?
3. How do I get user input in a console program?



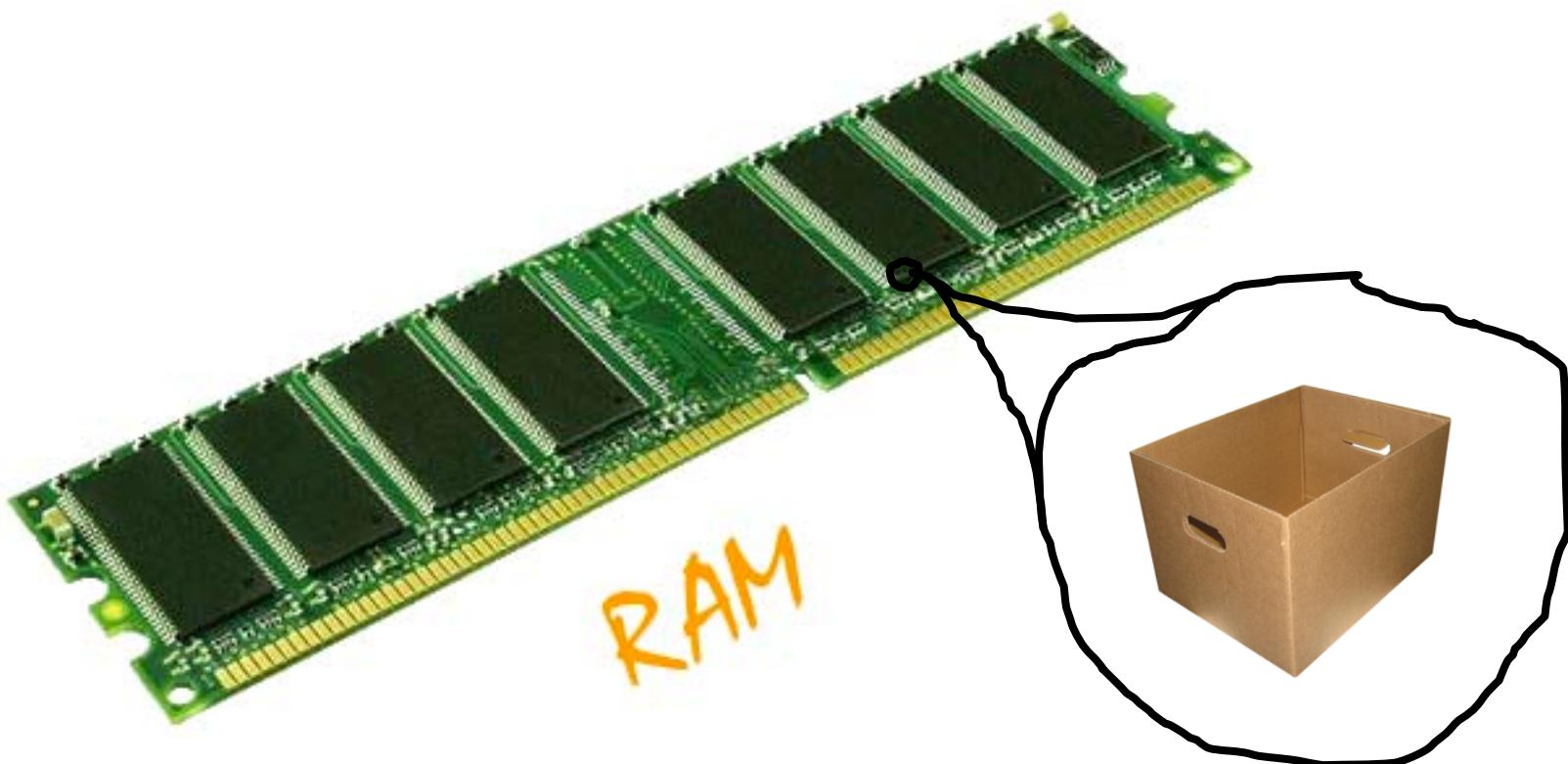
What is a variable?

[suspense]

Variables are Like Boxes



Teeny Tiny Boxes



My computer has space for about 64 trillion boxes

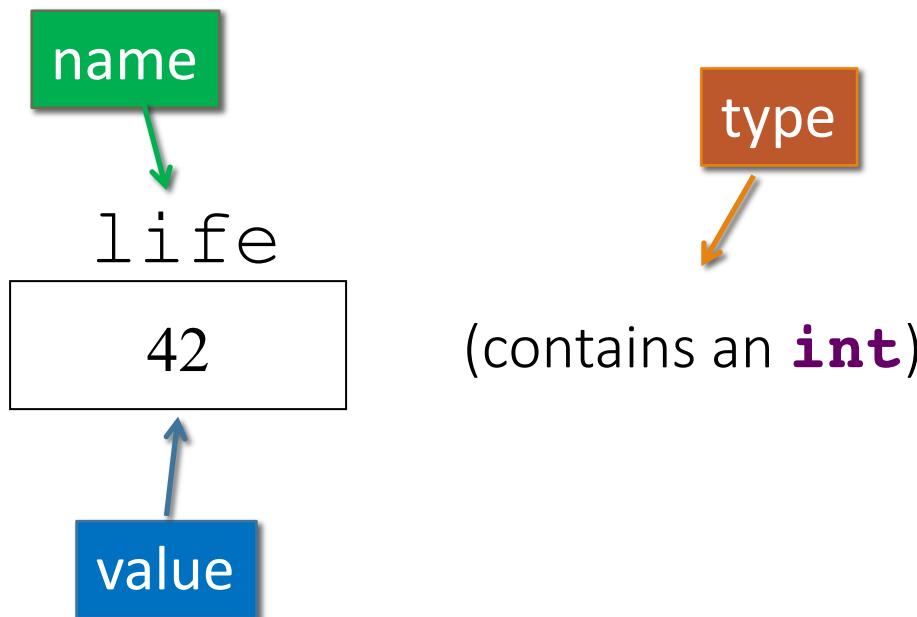
Variables are Like Boxes

type

name

value

```
int life = 42;
```



Types

```
// integer values  
int num = 5;
```

```
// real values  
double fraction = 0.2;
```

```
// letters  
char letter = 'c';
```

```
// true or false  
boolean isLove = true;
```

double: How Much Do I Weigh?



* Answers could be real valued numbers

int: How Many Children Do I Have?



* It is weird to say something like 1.7

Binary Operators

+	Addition	*	Multiplication
-	Subtraction	/	Division
		%	Remainder

Binary Operators

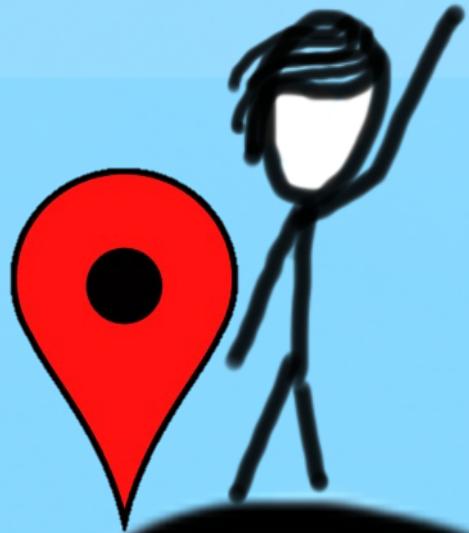
```
→ double width = 2.5; // meters  
→ double height = 3.0;  
→ double area = width * height;
```

name	width	height	area
value	2.5	3.0	7.5
type	double	double	double

Today's Goals



1. How do I write a console program?
2. What are variables and how do I use them?
3. How do I get user input in a console program?



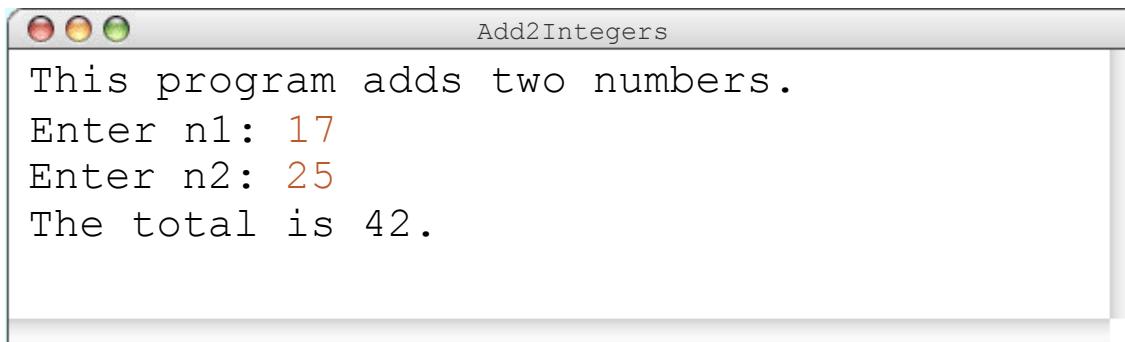
User Input

```
int a = readInt("Give me an int!");  
  
double b = readDouble("And a double");
```

Add2Integers

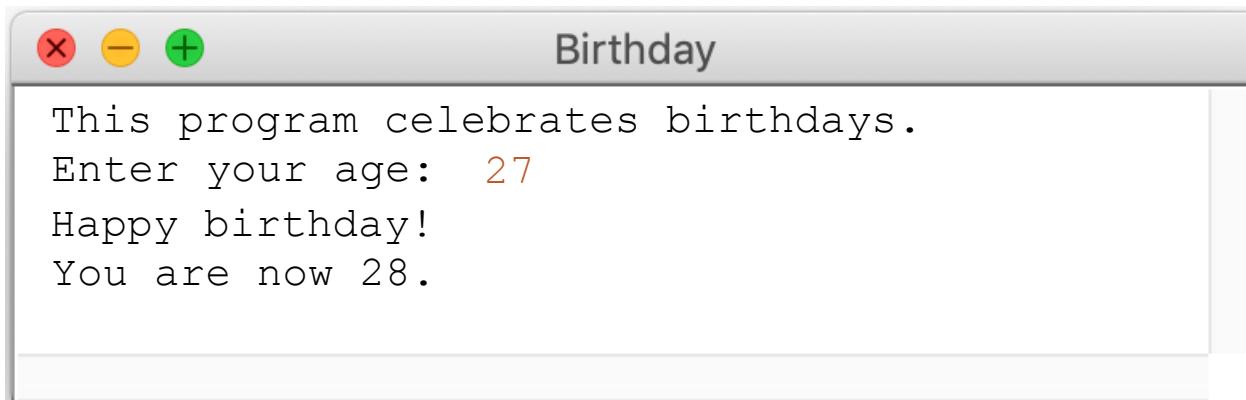
```
public class Add2Integers extends ConsoleProgram {  
    public void run() {  
        println("This program adds two numbers.");  
        int n1 = readInt("Enter n1: ");  
        int n2 = readInt("Enter n2: ");  
        int total = n1 + n2;  
        println("The total is " + total + ".");  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

n1	n2	total
17	25	42



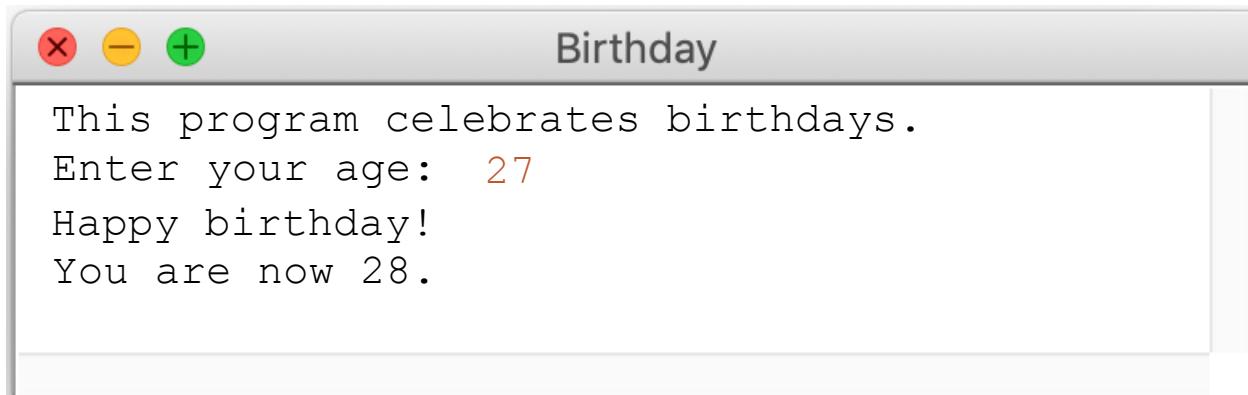
Questions?

Birthday



Birthday

```
public class Birthday extends ConsoleProgram {  
    public void run() {  
        println("This program celebrates birthdays.");  
  
        // creates a new int variable age  
        ????????????? = readInt("Enter your age: ");  
  
        // increments the age variable by one  
        ?????????????  
  
        println("Happy birthday!");  
        println("You are now " + age + ".");  
    }  
}
```

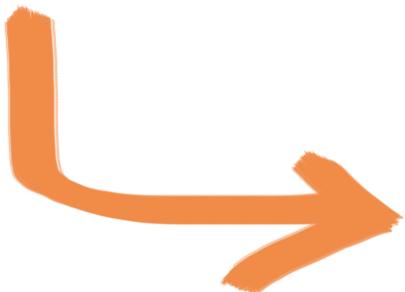


Let's try it!

Birthday

(1)

```
int age = readInt("Enter your age: ");
```

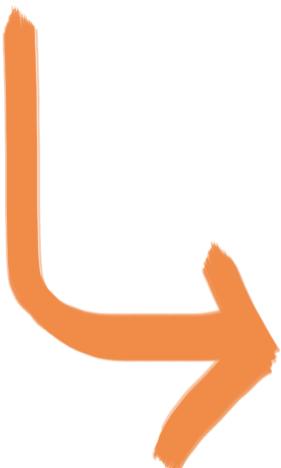


(1) Get a new **int** box.

Birthday

(1) (2)

```
int age = readInt("Enter your age: ");
```



age

(1) Get a new **int** variable.

(2) The variable's name is **age**.

Birthday

(1) (2)

(3)

```
int age = readInt("Enter your age: ");
```

age



(1) Get a new **int** box.

(2) The variable's name is **age**.

(3) Evaluate the right-hand side.

Birthday

(1) (2) (4)

(3)

```
int age = readInt("Enter your age: ");
```

age

27



(1) Get a new **int** box.

(2) The variable's name is **age**.

(3) Evaluate the right-hand side.

(4) Set the value of **age**'s to the right-hand side.

Incorrect Birthday

```
int age = readInt("Enter your age: ");
```

(1) (2)

```
int age = age + 1;
```

(1) Get a new **int** box.

(2) The variable's name is **age**.



Birthday

```
int age = readInt("Enter your age: ");
```

(1) (3) (2)
age =  age + 1;

(1) Get the variable named **age**.

(2) Evaluate the right-hand side. **28**

(3) Set the value of **age**'s to the right-hand side.

age

28

Questions?

What do you think this does?

```
println(1 / 2);
```

AHHHHHHHH!!!!!!

```
println(1 / 2);
```

Resulting Type

int + int results in an **int**

double + double results in a **double**

int + double results in a **double**

* The general rule is: operations always return the most expressive type

Pitfalls of Integer Division

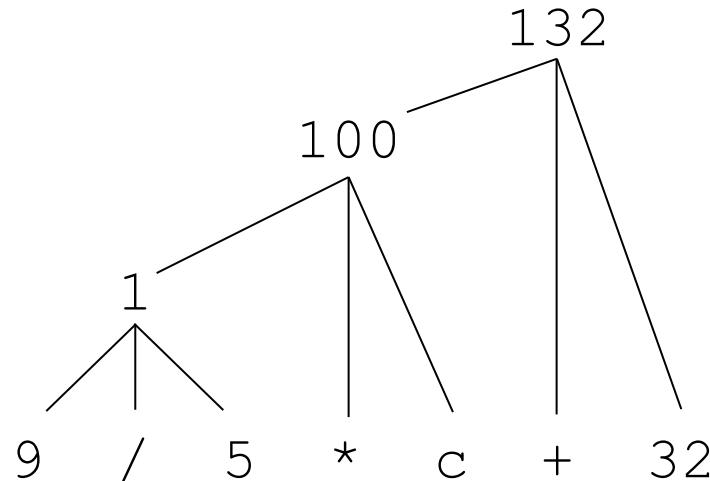
Convert 100 °Celsius temperature to its °Fahrenheit equivalent:

```
double c = 100;  
double f = 9 / 5 * c + 32;
```



The computation consists of evaluating the following expression:

The problem arises from the fact that both 9 and 5 are of type int, which means that the result is also an int.

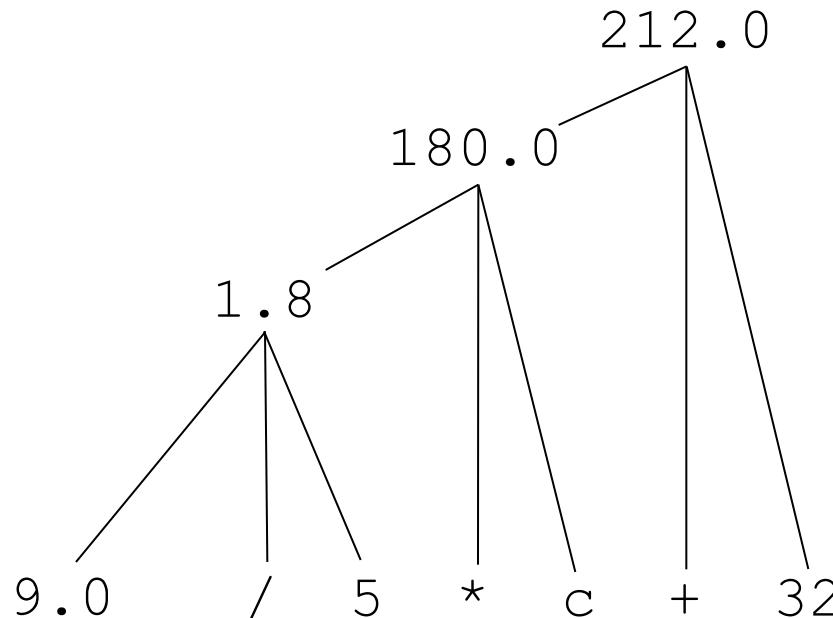


Pitfalls of Integer Division

You can fix this problem by converting the fraction to a **double**, either by inserting decimal points or by using a type cast:

```
double c = 100;  
double f = 9.0 / 5 * c + 32;
```

The computation now looks like this:



Conditions

Conditions

<	Less Than	==	Equal To
>	Greater Than	>=	More or Equal
		<=	Less or Equal

Equal or Equals equals?

Set variable

“equals”

=

```
double c = 100;
```

```
c = 25;
```

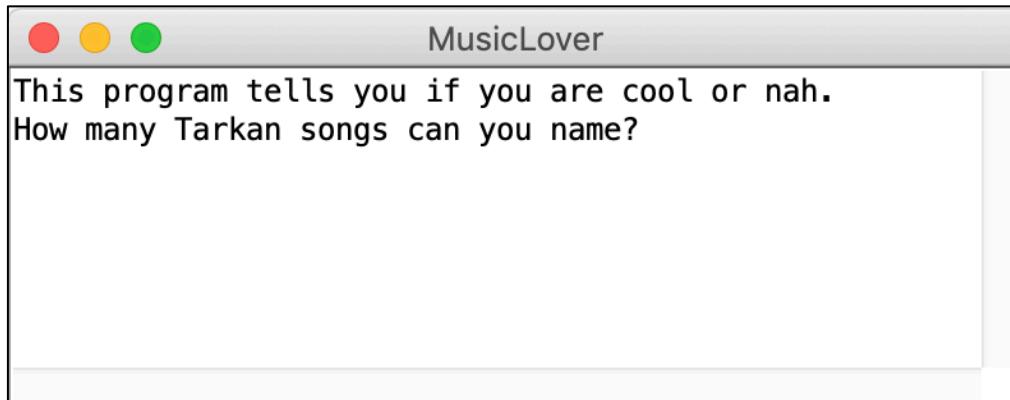
Equivalent

“equals equals”

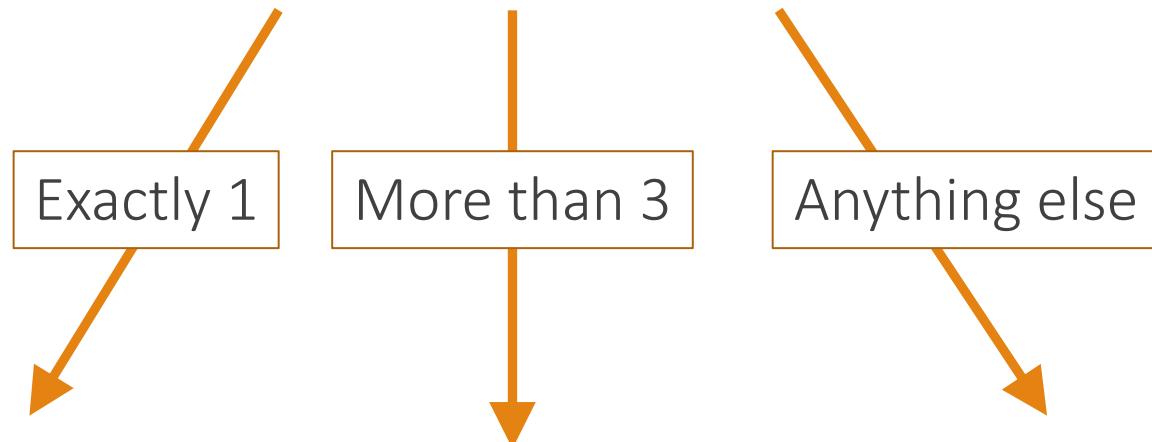
==

```
if (c == 100) {  
    println("Hi!");  
}
```

Music Lover



User enters
an **int**:



Print out:

You only
know Yolla!

Okay, you're
pretty cool.

I don't know
anymore.

Demo

Music Lover

```
public void run() {  
    println("This program tells you if you are cool or nah.");  
    int numberOfSongs = readInt("How many Tarkan songs can you name?");  
  
    if (numberOfSongs == 1) {  
        println("You only know Yolla!");  
    }  
    if (numberOfSongs > 3) {  
        println("Okay, you are pretty cool.");  
    } else {  
        println("I don't know anymore.");  
    }  
}
```

Today's Goals



1. How do I write a console program?
2. What are variables and how do I use them?
3. How do I get user input in a console program?



Sandcastles



Website

The screenshot shows a dark-themed navigation bar with the following items:

- CS Bridge
- Handouts ▾
- Projects ▾
- Examples ▾
- Slides ▾

Below the navigation bar, there are two circular icons: a red spiral icon on the left and the Stanford University seal on the right. To the right of these icons, the text "Intro to Comp" is visible, followed by a large orange arrow pointing upwards.

The "Slides ▾" menu is currently expanded, showing three options:

- Karel
- ControlFlow
- Variables