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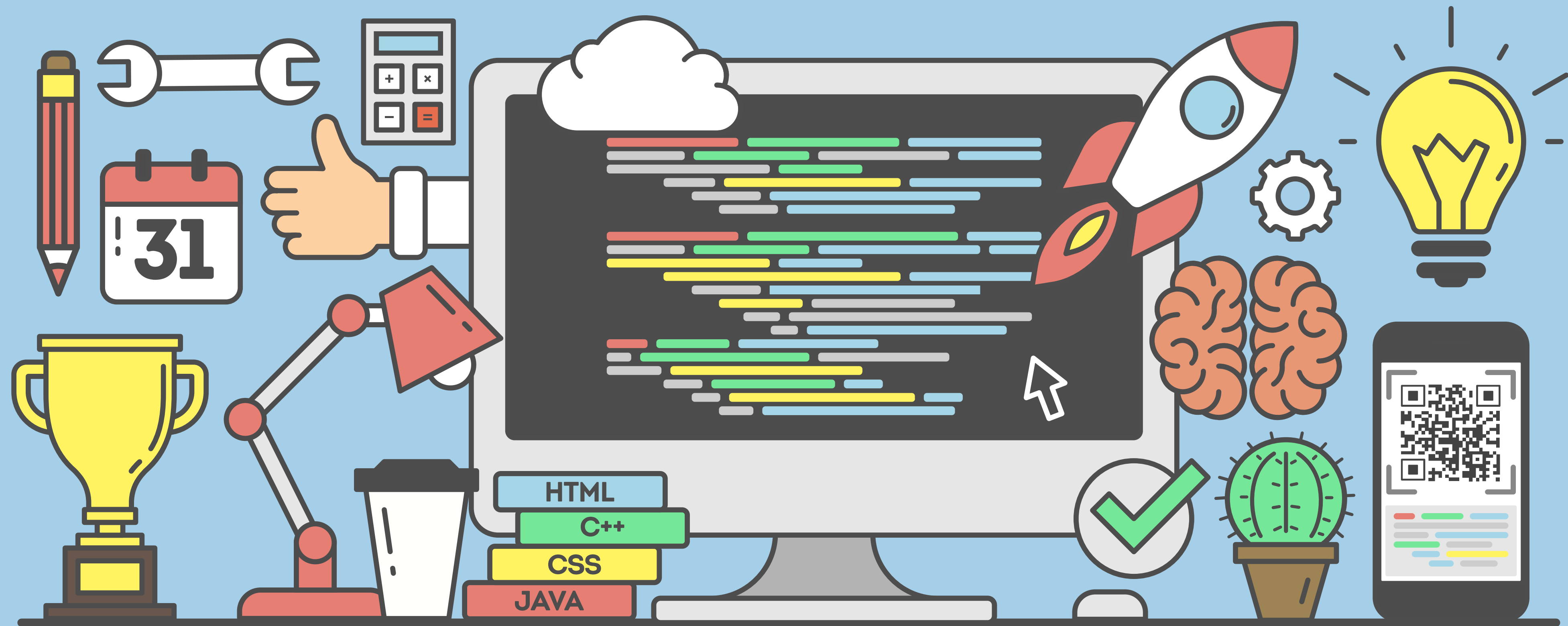
1.1

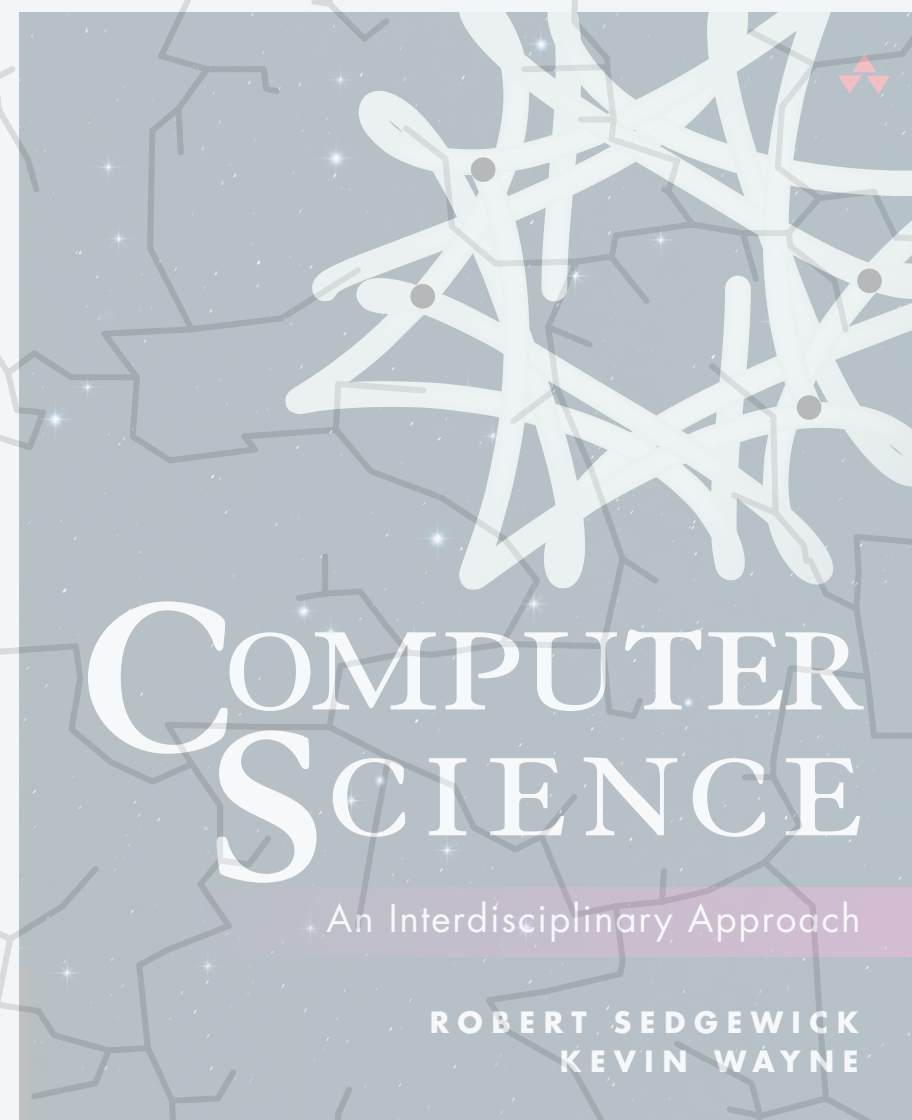
1.1 HELLO, WORLD

- ▶ *why programming?*
- ▶ *your first program*
- ▶ *program development*



PROGRAMMING





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1.1 HELLO, WORLD

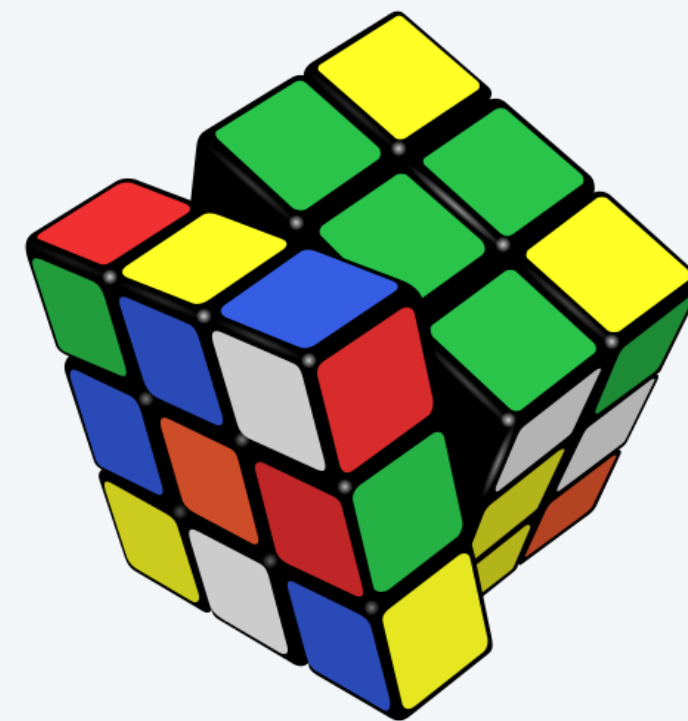
- ▶ *why programming?*
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You want to know Computer Science

CS develops problem-solving skills. You can translate these skills to other disciplines.

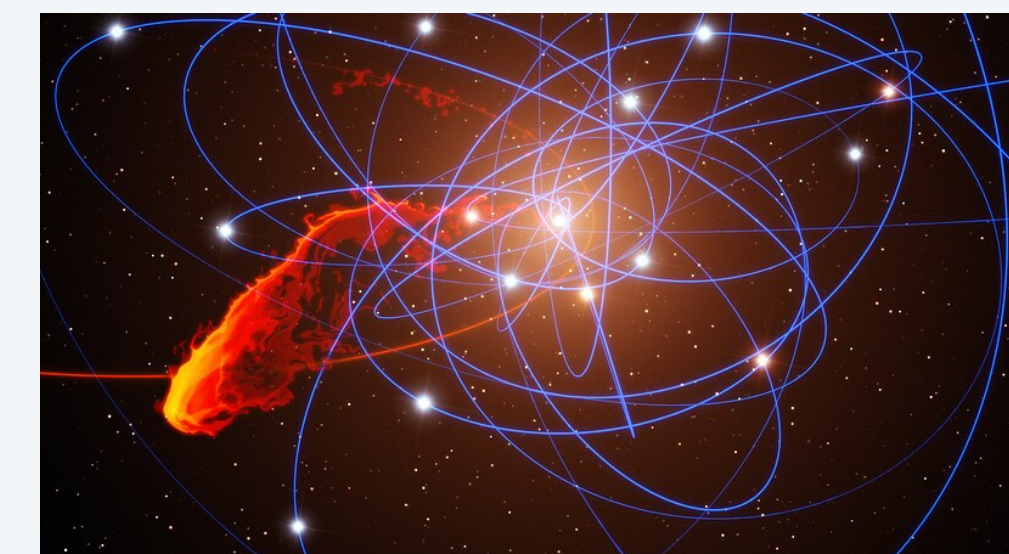
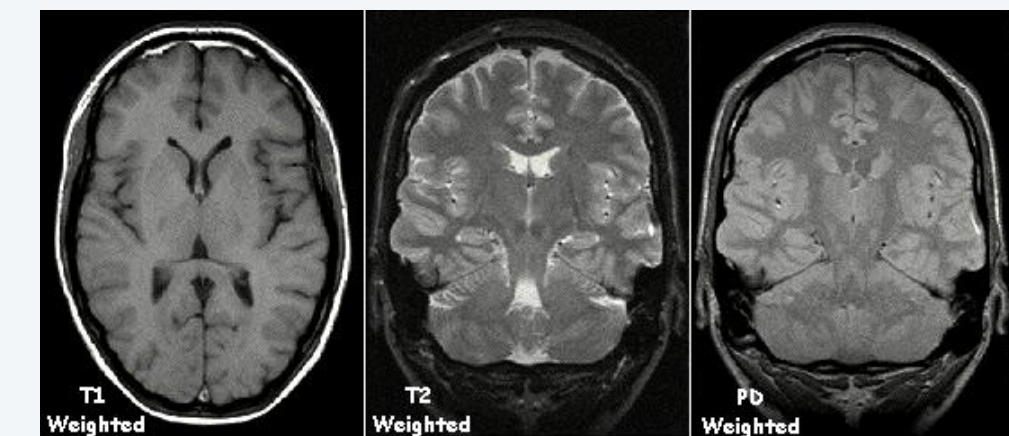
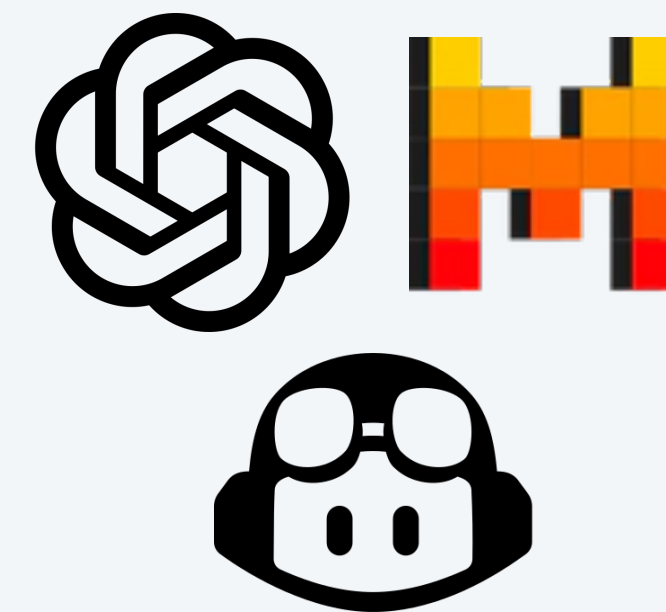
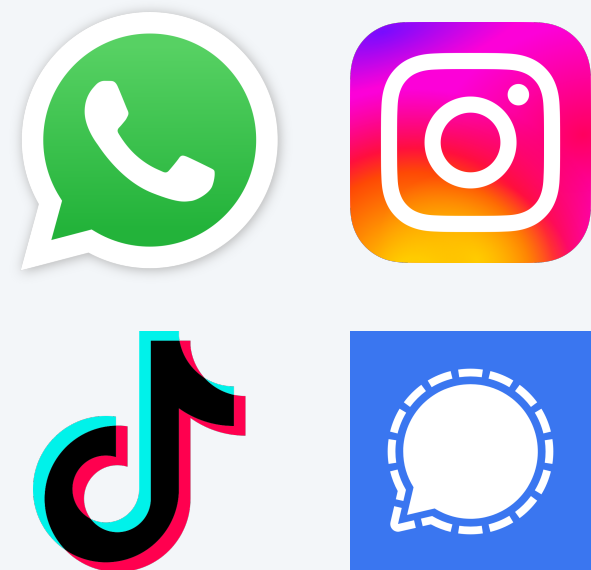


Creativity



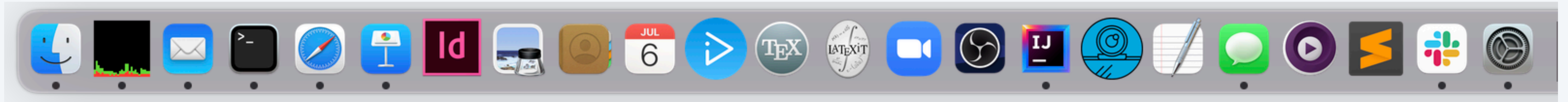
Reasoning

Computers are transforming society.

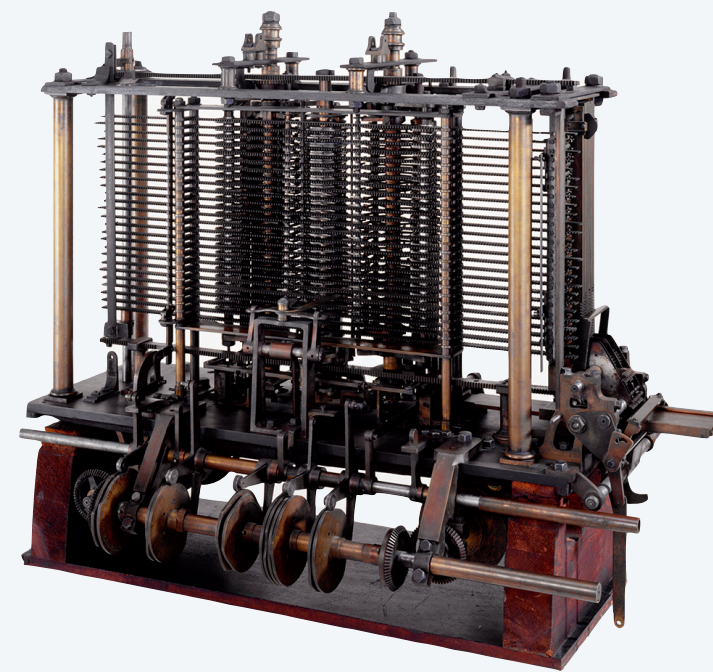


You need to know how to program

Prepackaged solutions (apps). Great when what they do is what you want.



Programming. Empowers **you** to tell a computer what **you** want it to do.



Analytical Engine
(first computer)



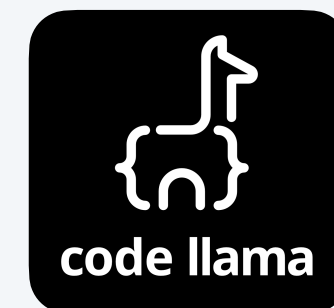
Ada Lovelace
(first programmer)

Telling a computer what to do

Machine languages. Easy for **computers**; error-prone for people.

```
00111111001000011001101110010111011100111011110100111111001100011110111111001111011110
01111011110110001100010000001001110010111001111110011011010001010011100000110000101001000
111101110111011111000011100010010100001001110000011010100110100001010110001001110010001...
```

Natural languages. Easy for **people**; error-prone for computers. ← *rapid progress in past year (but not as robust as desired)*



SC What is cos125?

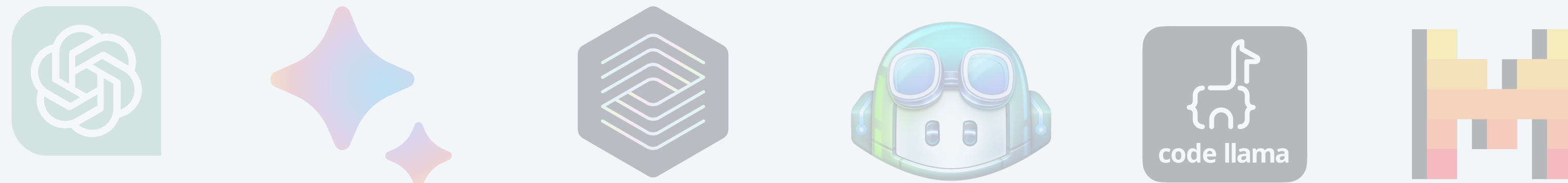
M I apologize for any confusion, but "cos125" is not a recognized term in mathematics. If you meant to ask about the cosine of the angle 125 degrees, that would be written as cos(125). If you meant something else by "cos125", could you please provide more context or clarify your question? I'm here to help!

Telling a computer what to do

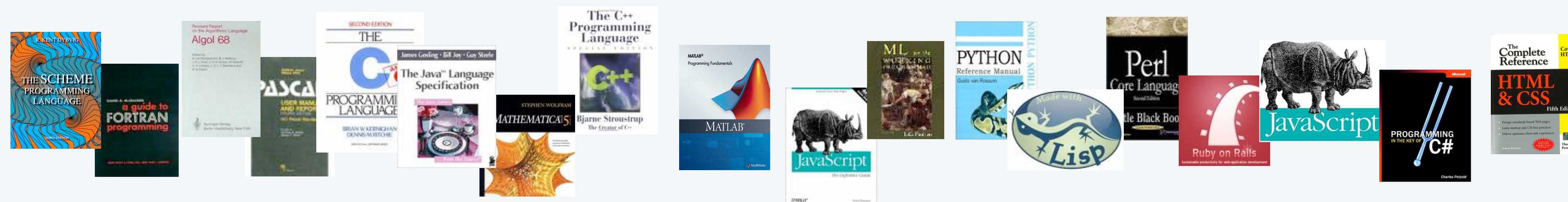
Machine languages. Easy for **computers**; error-prone for people.

```
00111111001000011001101110010111011100111011101111010011111001100011110111111001111011110  
0111101111011000110001000000100111001011100111110011011010001010011100000110000101001000  
111101110111011111000011100010010100001001110000011010100110100001010110001001110010001...
```

Natural languages. Easy for **people**; error-prone for computers.



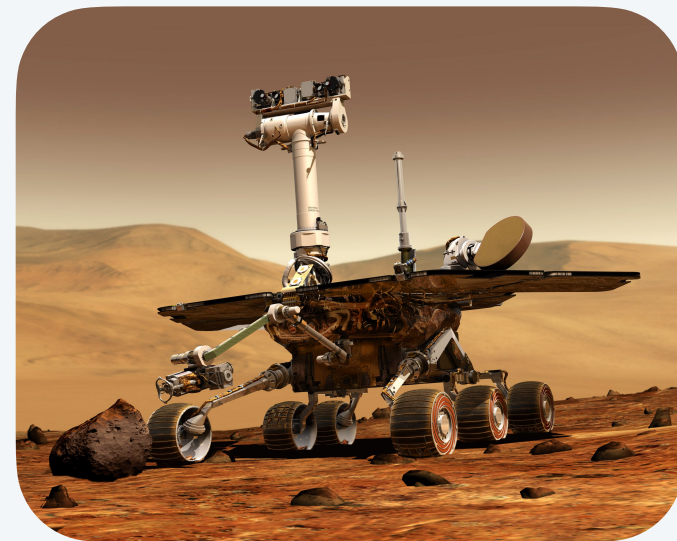
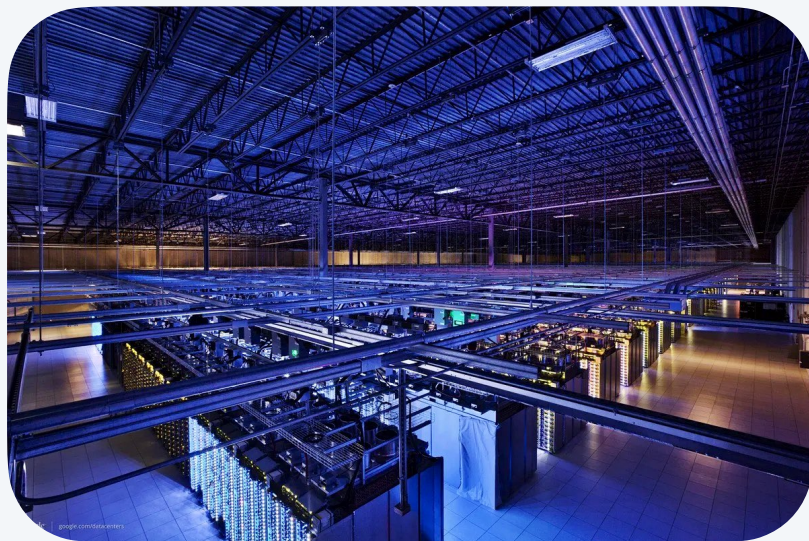
High-level programming languages. Enables **people and computers** to communicate effectively.



Java features.

- Embraces full set of modern abstractions.
- Freely available for OS X, Windows, and Linux.
- Variety of automatic checks for mistakes in programs.
- Widely used: millions of developers; billions of devices. ← among top 3 languages for past two decades

Ex. Android phones/TVs, web servers, Mars rover, medical devices, internet of things, ...



Reality. Use different programming languages, depending on domain.

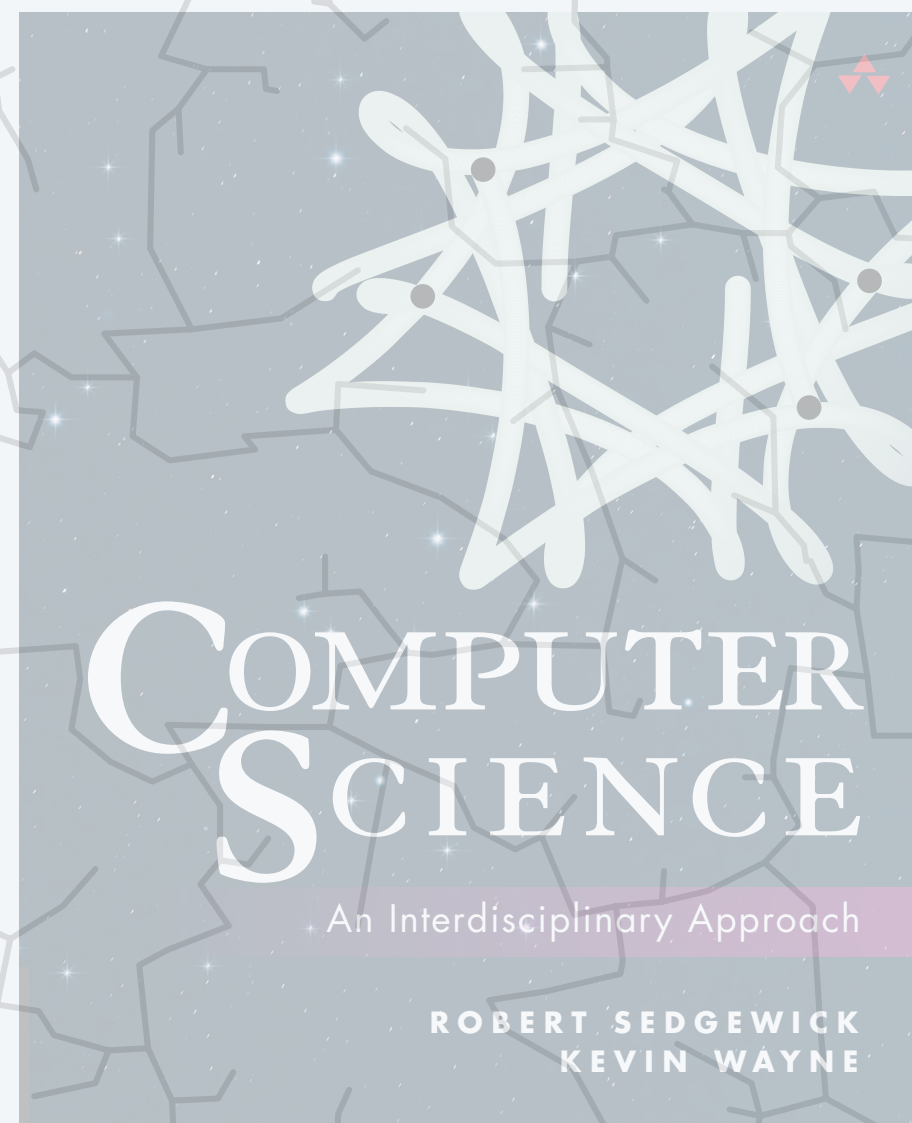
A rich subset of the Java language



Your programs will primarily consist of these plus identifiers (names) that you make up.

← *seems like a lot,
but typical English
vocabulary is 20K words!*

<u>data types</u>	<u>arithmetic</u>	<u>boolean</u>	<u>Math library</u>	<u>objects / methods</u>	<u>strings</u>
int	+ -	true false	Math.min() Math.max()	public private	+
double	* /	&&	Math.sqrt() Math.abs()	class new	length()
boolean	++ --	! ^	Math.log() Math.exp()	static final	charAt()
char	%		Math.sin() Math.cos()	void main()	compareTo()
String			Math.PI Math.E		toString()
		<u>type conversion</u>		<u>comments</u>	
		Integer.parseInt()		/* */	
		Double.parseDouble()		//	
<u>punctuation</u>	<u>comparisons</u>	<u>arrays</u>	<u>flow control</u>	<u>System methods</u>	<u>our I/O libraries</u>
{ }	< >	[]	if else	System.out.print()	StdIn/In
()	<= >=	length	while for	System.out.println()	StdOut/Out
. ,	== !=		do return	System.out.printf()	StdPicture/Picture
' "		<u>assignment</u>	break continue		StdDraw/Draw
;		=			StdAudio

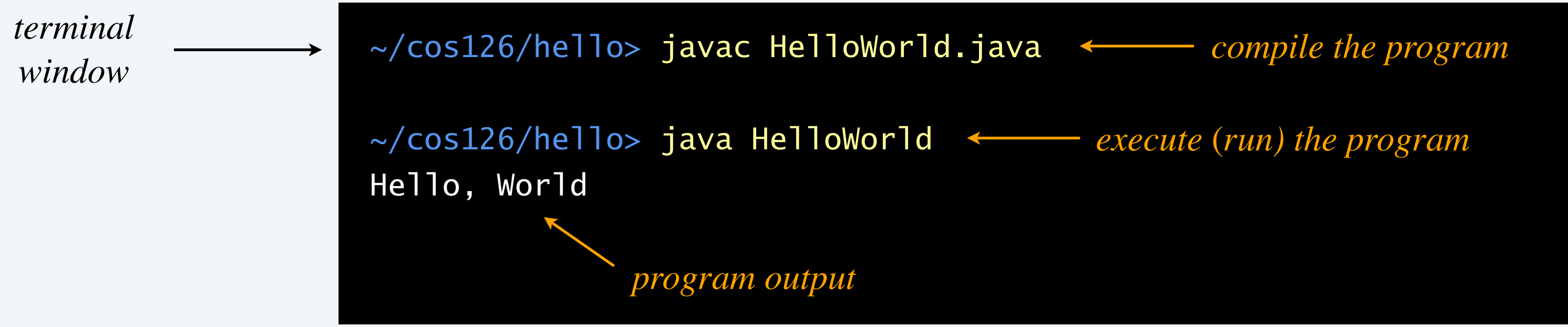
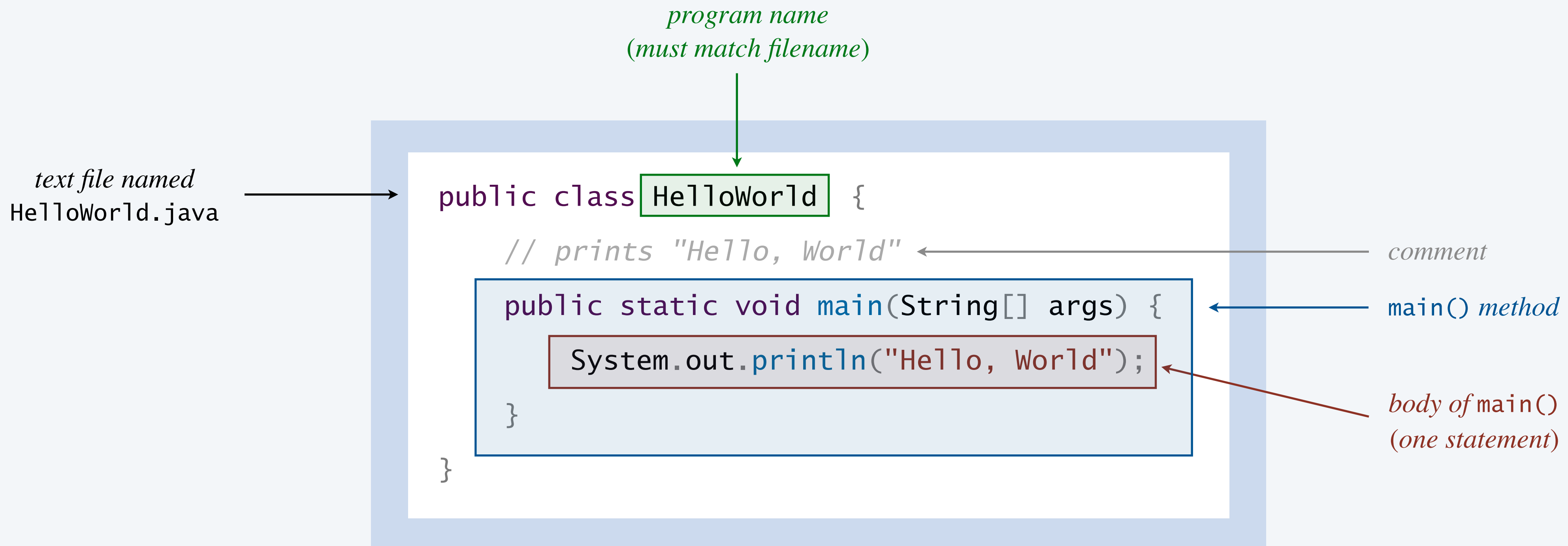


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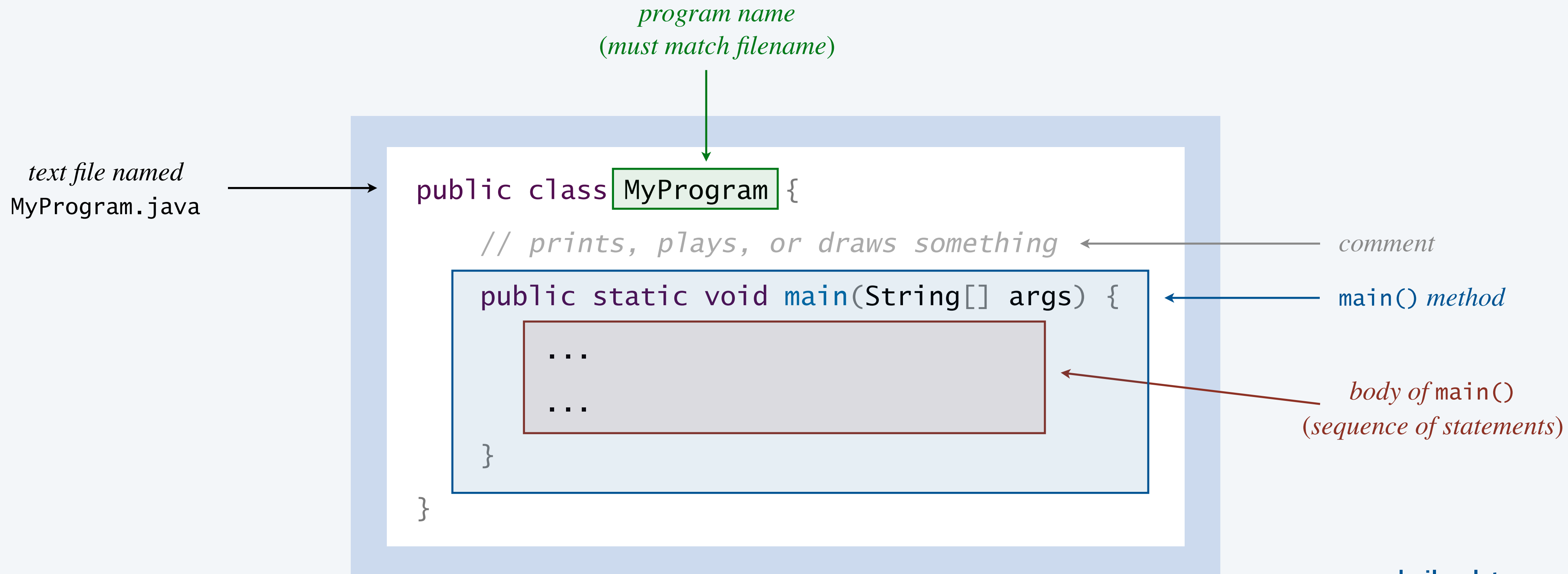
1.1 HELLO, WORLD

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- ▶ *program development*

Anatomy of your first Java program



Anatomy of your first few Java programs



```
~/cos126/hello> javac MyProgram.java  
  
~/cos126/hello> java MyProgram  
[program output]
```

boilerplate

- public
- class
- static
- void
- main
- String[]

← don't worry, we'll learn about these in due time

Hello World with audio

Standard picture. Our course library for working with images.

```
public class HelloWorldWithPicture {
```

```
    // prints and shows a pic of "Hello, World"
```

```
    public static void main(String[] args) {
```

```
        System.out.println("Hello, World");
```

```
        StdPicture.read("HelloWorld.png");
```

```
        StdPicture.show();
```

```
    }
```

```
}
```

comment

main() method

*body of main()
(three statements)*

an image file

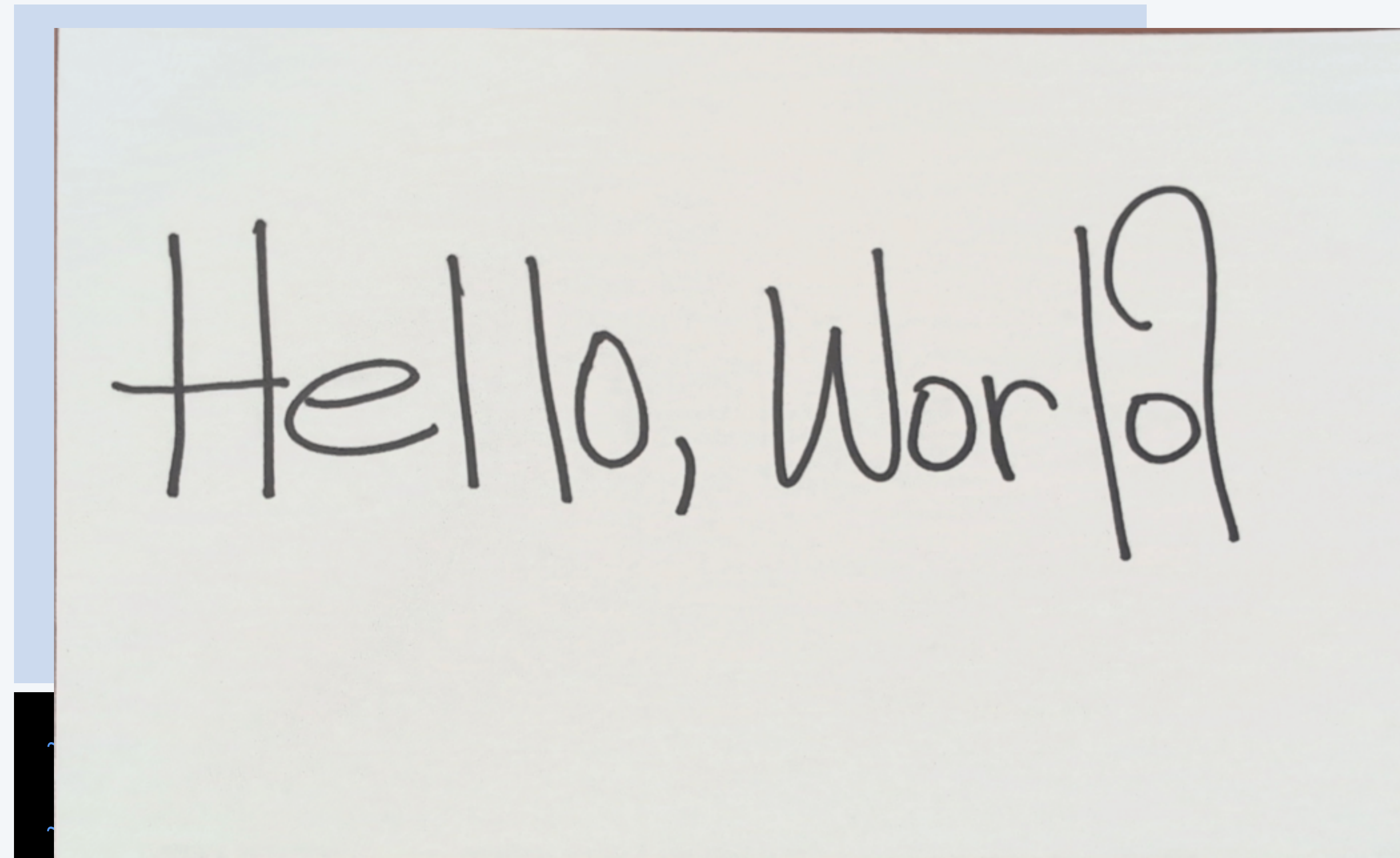
```
~/cos126/hello> javac-introcs HelloWorldWithPicture.java
```

```
~/cos126/hello> java-introcs HelloWorldWithPicture  
Hello, World
```

*the javac-introcs and java-introcs commands
tell Java where to find our course libraries*

Hello World with audio

Standard picture. Our course library for working with images.



ment

method

*main()
tements)*

hello, world

*the javac-introcs and java-introcs commands
tell Java where to find our course libraries*

Hello World with user input

Command-line arguments. Can specify string inputs when executing the program.

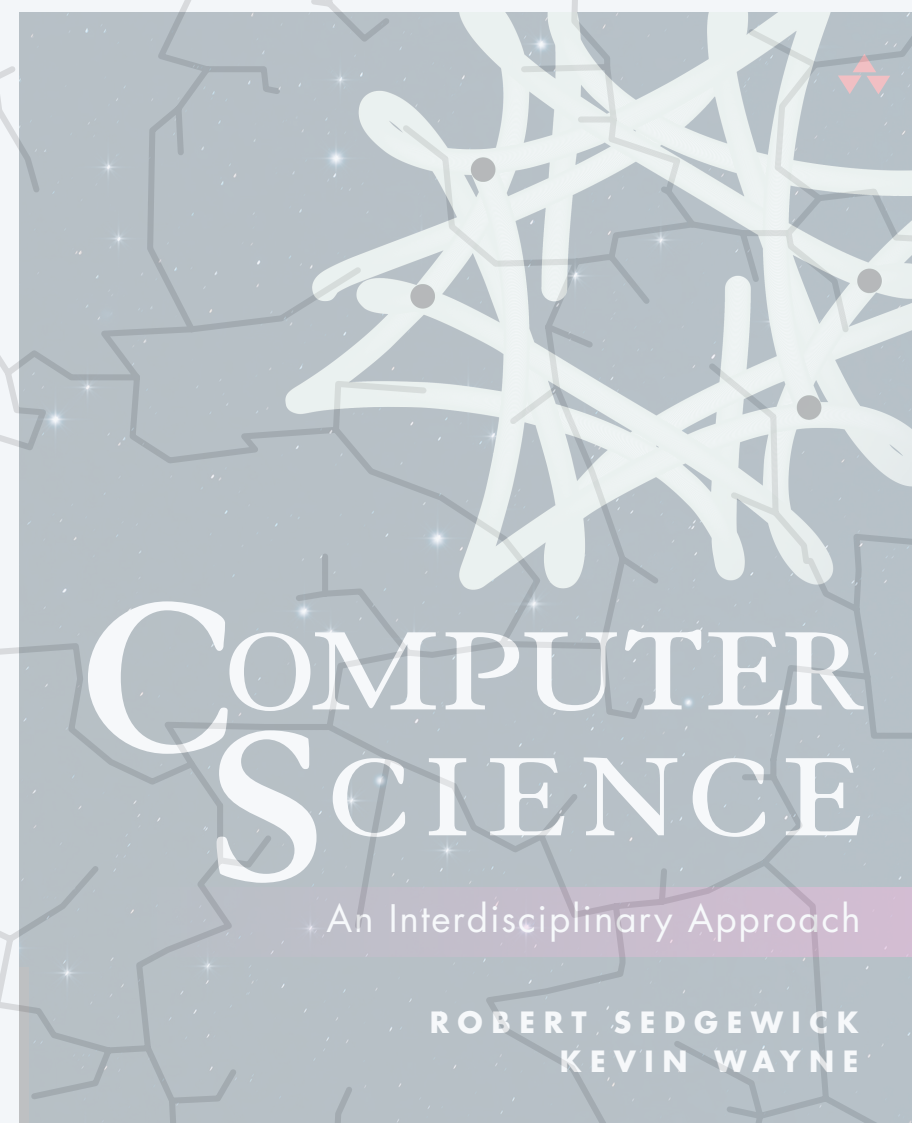
```
public class UseArgument {  
    public static void main(String[] args) {  
        System.out.print("Hi, ");  
        System.out.print(args[0]);  
        System.out.println(". Bye.");  
    }  
}
```

← System.out.print() does not end the line

← args[0] is the first string command-line argument

← System.out.println() ends the line

```
~/cos126/hello> javac UseArgument.java  
  
~/cos126/hello> java UseArgument Sebastian  
Hi Sebastian. Bye.  
  
~/cos126/hello> java UseArgument Victoria  
Hi Victoria. Bye.
```



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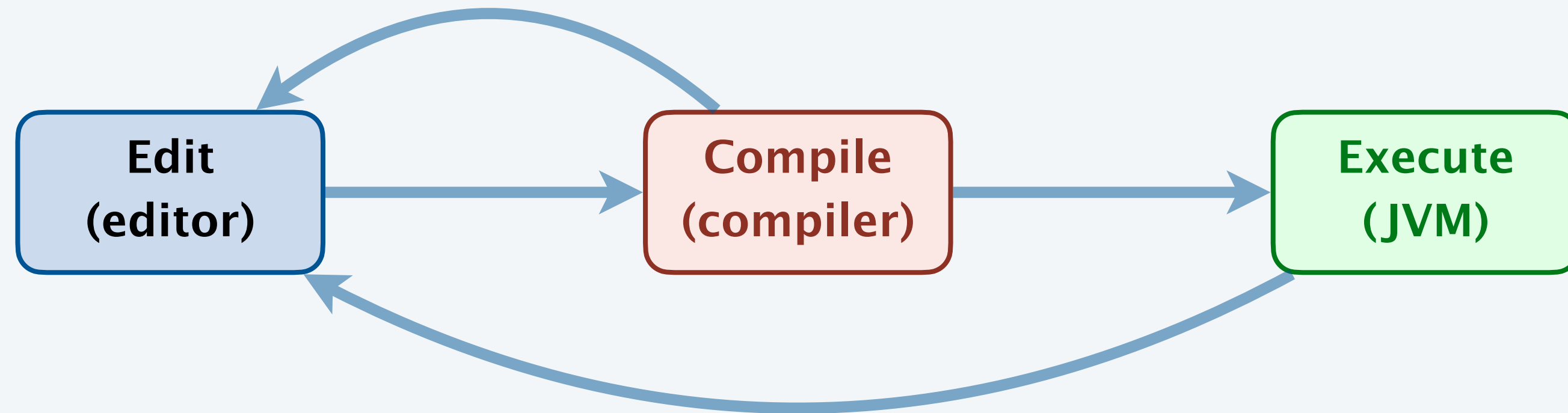
1.1 HELLO, WORLD

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Program development in Java

Developing a Java program involves three steps:

- **Edit:** write your program.
- **Compile:** create a “machine-language” version of your program.
- **Execute:** run your program, taking input and producing output.



Almost always requires cyclic refinement:

- Not a legal Java program (compile-time error) \Rightarrow need to re-edit.
- A legal Java program that does the wrong thing \Rightarrow need to re-edit.

*run-time error or
produces incorrect output*



analogous to other creative processes
(Write-bomb-film Netflix special)

Coding style

Coding style. Indentation, whitespace, naming conventions, comments, ...

Goal. Make it easier for programmers (including you!) to read and understand the code.

textbook

Program 1.1.1 Hello, World

```
public class HelloWorld
{
    public static void main(String[] args)
    {
        // Prints "Hello, World" in the terminal window.
        System.out.println("Hello, World");
    }
}
```

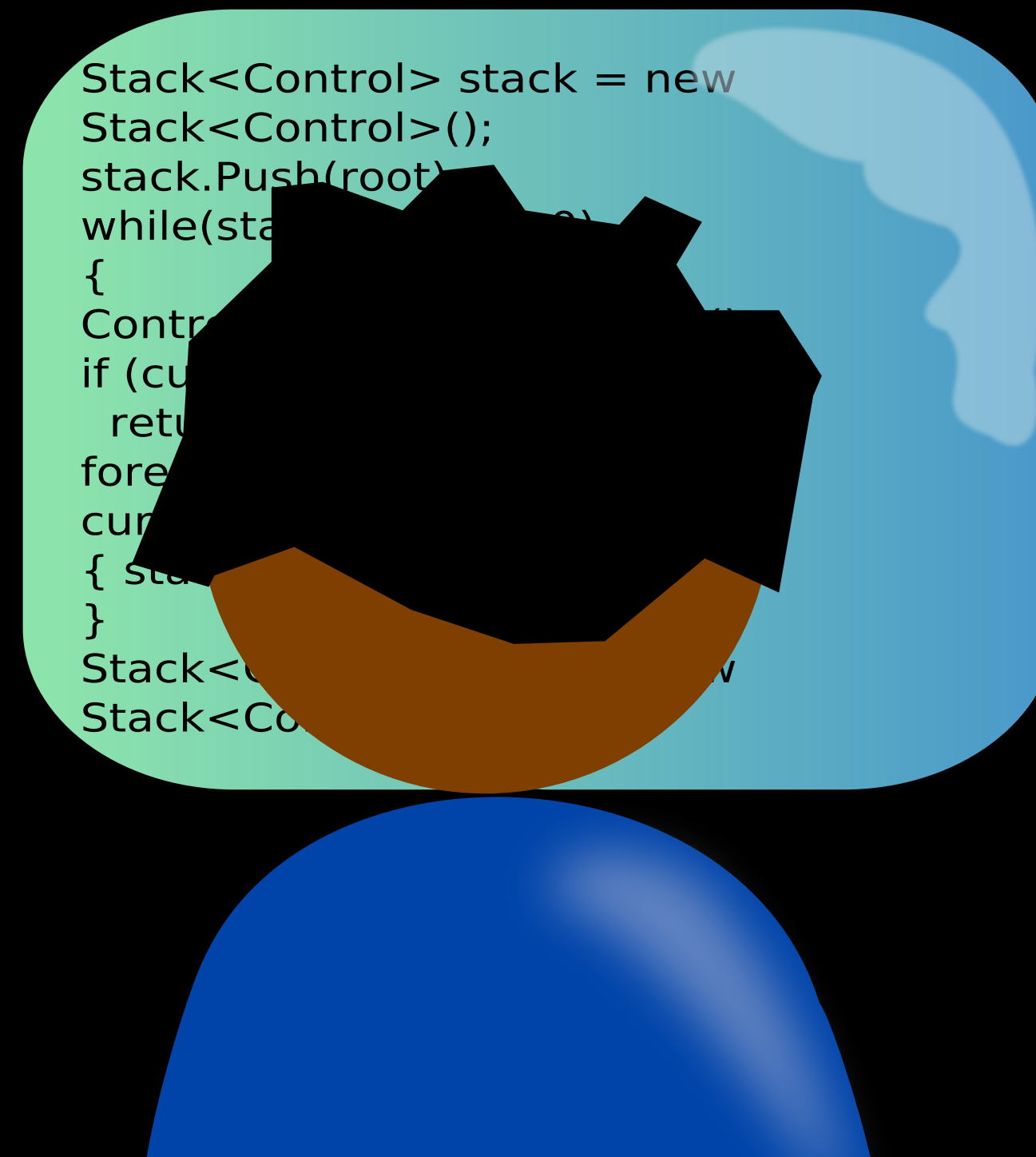
IntelliJ

```
1  /*****
2  * Prints "Hello, World". By tradition, this is everyone's first program.
3  *
4  * These first 6 lines of text are comments. They are not part of the program;
5  * they serve to remind us about its properties.
6  *****/
7
8  public class HelloWorld {
9      public static void main(String[] args) {
10
11          // Prints "Hello, World" in the terminal window.
12          System.out.println("Hello, World");
13      }
14  }
```

compiler

```
public class HelloWorld { public static void main ( String [ ] args { System . out . println ( "Hello, World" ) ; } }
```

YOU'RE NOW READY TO PROGRAM!



More questions



attend office hours (or stay after lecture)



ask on Ed



Credits

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