

Introduction to Computers and Programming

Colorado State University
Computer Science Department



Colorado State University

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Announcements

- Reminder – readings are due before lecture
 - You don't have to do all of it - challenge problems can be challenging...
 - You can return to them.

TODO Reminders:

- Setup MS Teams
- Reading 1 (Zybooks)
- Syllabus Quiz
- Python Review Exam
- Knowledge Check – RPA 1



Opening Question

- Brainstorm industries in which computers are used in
 - How many require specialized applications?
 - Saying all is not a valid answer (for this 😊) – you must have an actual use before listing the industry
- Circle the one you think was the “first industry”
- Deeper discussion:
 - Why are computers involved in so many?
 - What do they accomplish that humans can't/don't?

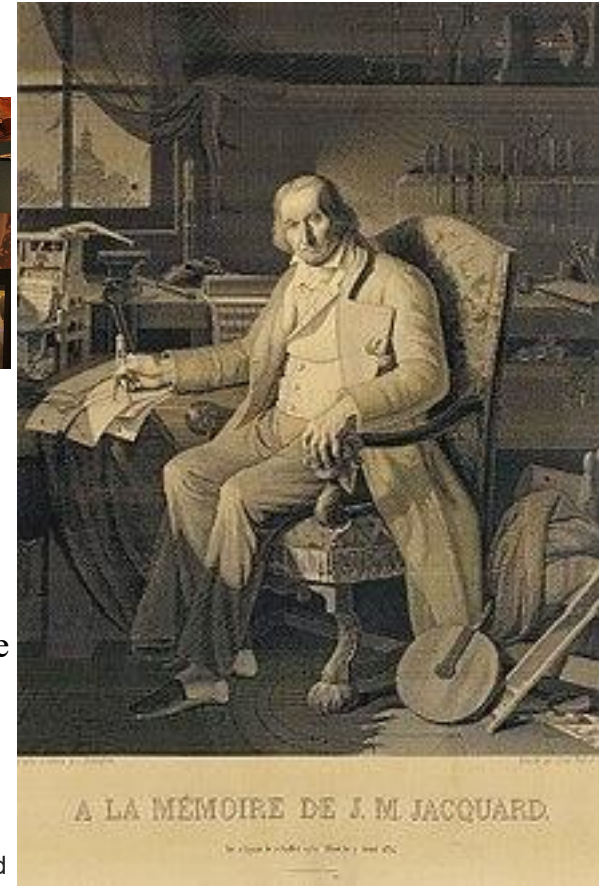
First Computer?

- The industry - Weaving!
 - Jacquard loom / machine
 - Invented by Joseph Marie Jacquard in 1804
 - Cards set the patterns, colors, etc
-
- Very specific use - not general purpose
 - Charles Babbage – First general purpose machine
 - Ada Lovelace – First programmer of the general purpose machine
 - We have come a long way over the years!!

“This portrait of [Jacquard](#) was woven in silk on a Jacquard loom and required 24,000 punched cards to create (1839).” - ref: https://en.wikipedia.org/wiki/Jacquard_loom



A Jacquard— ref:
https://en.wikipedia.org/wiki/File:A_Jacquard_loom_showing_information_punchcards,_National_Museum_of_Scotland.jpg



Computers

- Come a long way!
- Part of our everyday life
- Phones, Watches, Laptops, more
- None of it works without people!
- Technology is a human activity
 - Computers work in concert with humanity, not separate.
 - Think of a violin
 - Does it create music by itself?



Computers Hold STATE

- Think of water states
 - Liquid, Ice, Gas- it is said to have multiple states.
- Memory has two states (binary)
 - On and Off/ Yes and No / true and false/ 1 and 0
- This is stored in a **BIT**
- 8 bits = 1 byte, basic unit of information
- All the representational power of the computer
 - A bunch of **bits**
 - Representing various states!
- Would be painful to write it out / set it
 - All the time!
- We want to write English words
 - Thus the power of programming

W
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Coding

- Coding used to be literally moving physical wires
 - And was unique to every machine
- Then code became compiled
 - From English to 1s and 0s!
- Who do we have to thank for compiled code?
 - Admiral Grace Murray Hopper
 - Designed the COBOL language
- Her dream? Write once, run everywhere!
 - But it took many years for it to come to pass...



By James S. Davis [Public domain], via Wikimedia Commons. [Source](#)

Java Bytecode

- Write once - run most anywhere
 - James Gosling lead designer
- Programs are a set of instructions
 - Written in English- very specific instructions

Hello.java

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

javac - compiler

```
0001100001010101010101010101010101  
010101010101010101010010101010101  
010101010101010101001010101010101  
0101010100101010101010101010101  
01010010101010101001001010001
```

Hello.class

Fun Fact

Android is the most used operating system in the world

- Written in Java



James Gosling lead designer for
the javac compiler
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Warm Up Problem

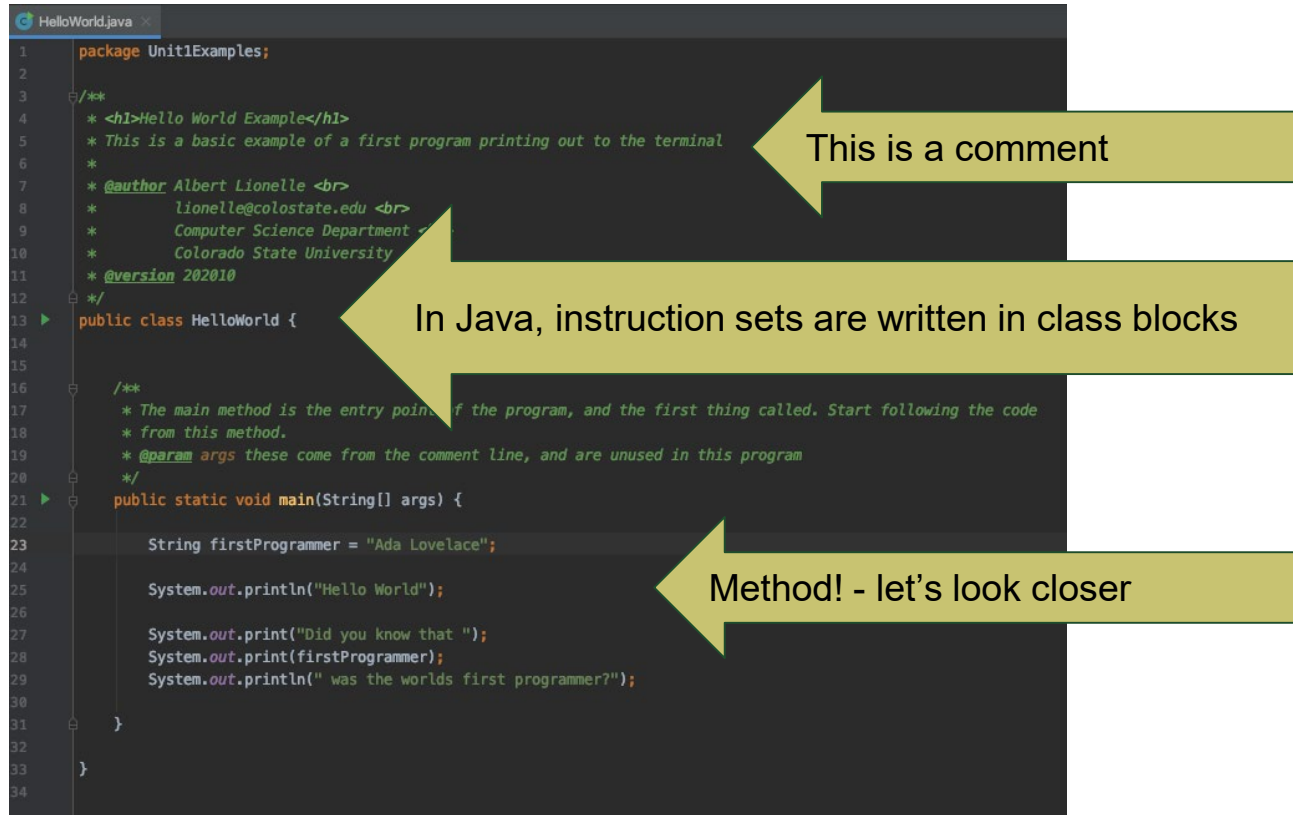
- A farmer with a pet fox goes to the market and buys, a bag of grain and a chicken.
- On the way home, she comes to a river, and a boat where she can only put one in at a time.
 - HOWEVER:
 - If left alone, the chicken will eat the bag of grain
 - If left alone, the fox will eat the chicken.
- Think-pair-share
 - How can she get all three items over the river, without losing any
 - She has to use the boat, and she has to row it– so what she doesn't take is alone on the river's edge.
- Part 1: Think About it
- Part 2: with a partner(s) attempt to solve it
- Part 3: write it down – in a step, by step series of instructions others can follow!
- Part 4: share with the class different ideas

Farmer Solution

1. Row the boat with chicken across the river
2. Take chicken out of boat and set on bank
3. Row the boat back
4. Put the fox in the boat
5. Row the boat with fox across the river
6. Take the fox out of the boat
7. Put the chicken in the boat
8. Row the boat back with chicken across the river
9. Take chicken out of boat
10. Put the grain in the boat
11. Row the boat with grain across the river
12. Take the grain out of the boat
13. Row the boat back
14. Put chicken in the boat
15. Row the boat with chicken across river
16. Take chicken out of boat
17. Return home with grain, chicken, fox

17-21 steps! (maybe some for farmer)

Program is a set of instructions



```
1 package Unit1Examples;
2
3 /**
4  * <h1>Hello World Example</h1>
5  * This is a basic example of a first program printing out to the terminal
6  *
7  * @author Albert Lionelle <br>
8  *         Lionelle@colostate.edu <br>
9  *         Computer Science Department <br>
10 *         Colorado State University
11 * @version 202010
12 */
13 public class HelloWorld {
14
15     /**
16      * The main method is the entry point of the program, and the first thing called. Start following the code
17      * from this method.
18      * @param args these come from the command line, and are unused in this program
19      */
20     public static void main(String[] args) {
21
22         String firstProgrammer = "Ada Lovelace";
23
24         System.out.println("Hello World");
25
26         System.out.print("Did you know that ");
27         System.out.print(firstProgrammer);
28         System.out.println(" was the worlds first programmer?");
29
30     }
31 }
32
33 }
34
```

This is a comment

In Java, instruction sets are written in class blocks

Method! - let's look closer

Method

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

```
    String firstProgrammer = "Ada Lovelace";
```

Setting "Ada Lovelace" to the variable
firstProgrammer

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

```
    System.out.print("Did you know that ");
```

```
    System.out.print(firstProgrammer);
```

```
    System.out.println(" was the worlds first programmer?");
```

Printing out to the console/terminal

```
}
```

```
Hello World
```

```
Did you know that Ada Lovelace was the worlds first programmer?
```

Program is a set of instructions – one more example

```
/*  
Program is a set of instructions.  
In Java the set of instructions are written inside  
class blocks.  
The starting point of any Java program is the main method.  
*/
```

← This is a comment block

```
public class MyFirstProgram {  
    public static void main(String [] args){  
        String name = "Ada Lovelace";  
        int birthYear = 1815;
```

← MyFirstProgram is the class name

← main method is the starting point of any Java Program

```
        System.out.println("Hello World, Stranger!");  
        System.out.print(name);  
        System.out.println(" was the first programmer and she was born in " + birthYear + ".");  
    }  
}
```

Program is a set of instructions – one more example

```
/*  
Program is a set of instructions.  
In Java the set of instructions are written inside  
class blocks.  
The starting point of any Java program is the main method.  
*/
```

```
public class MyFirstProgram {  
    public static void main(String [] args){  
        String name = "Ada Lovelace";  
        int birthYear = 1815;  
  
        System.out.println("Hello World, Stranger!");  
        System.out.print(name);  
        System.out.println(" was the first programmer and she was born in " + birthYear + ".");  
    }  
}
```

String is a class in Java

int is a primitive type

What is the difference among those instructions?

Program is a set of instructions – one more example

/*

Program is a set of instructions.

In Java the set of instructions are written inside class blocks.

The starting point of any Java program is the main method.

*/

```
public class MyFirstProgram {  
    public static void main(String [] args){  
        String name = "Ada Lovelace";  
        int birthYear = 1815;  
  
        System.out.println("Hello World, Stranger!");  
        System.out.print(name);  
        System.out.println(" was the first programmer and she was born in " + birthYear + ".");  
    }  
}
```

System.out.println – output to the console and go to the next line

System.out.print – output to the console and stay in the same line

+ used to concatenate Strings



Your Turn

Break up into pairs at the table. Only one person needs to code, the other will guide.

Select “in class” activity in canvas

Work together on building your ASCII Art