INFM 603: Information Technology and Organizational Context

Session 3: JavaScript - Structured Programming

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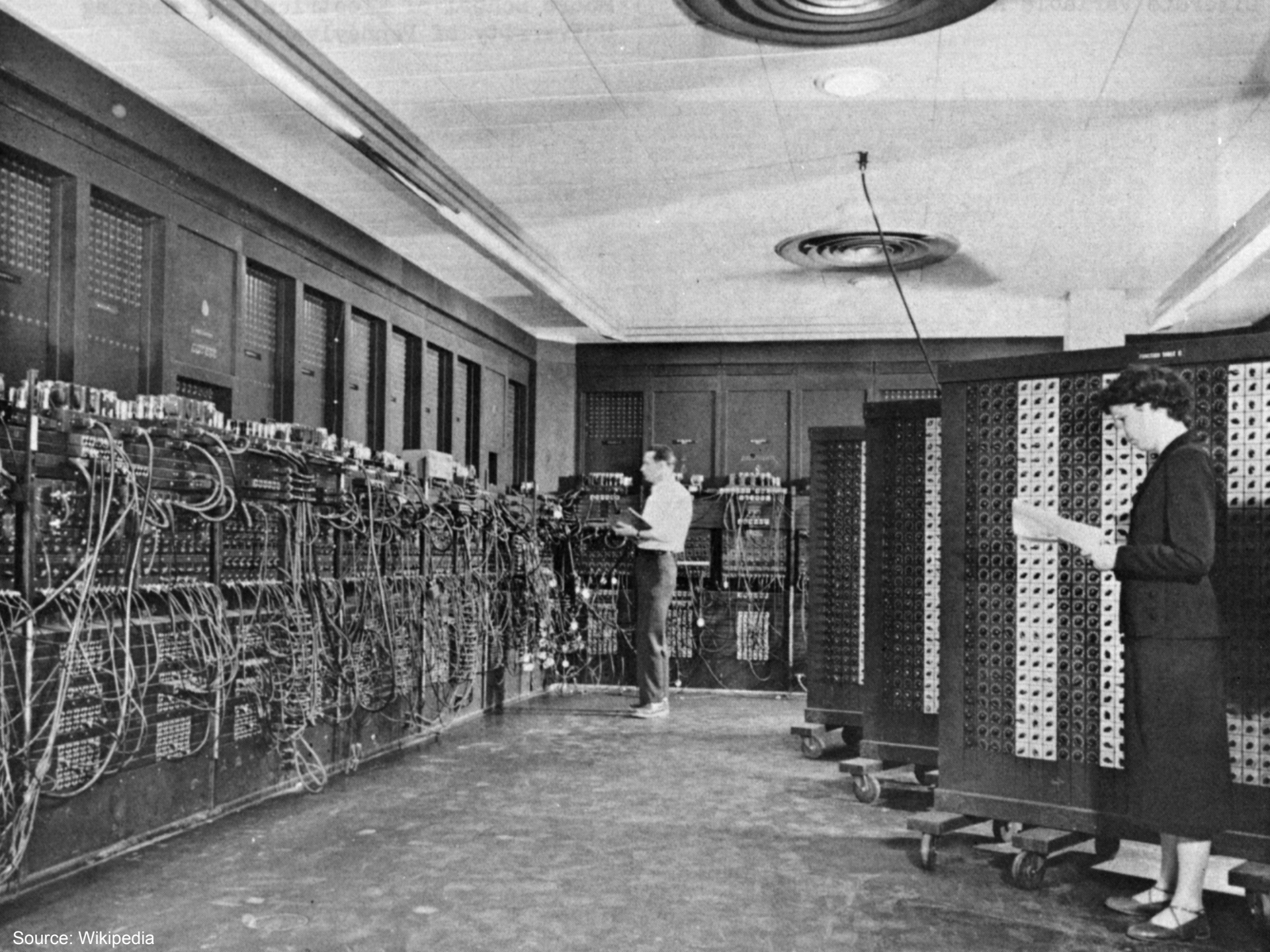


Source: Wikipedia

Types of Programming

- Low-level languages
  - Directly specifies actions of the machine
  - Example: assembly language
- High-level languages
  - Specifies machine instructions at a more abstract level
  - Compiler/interpreter translates instructions into machine actions
  - Example: JavaScript

What's JavaScript?

- Programming language for the web
- Client-side, runs in the browser
- Provides programmatic access to the HTML page in which it's embedded (the DOM)
- Enables richly-interactive websites!

What's a Document?

- Content
- Structure
- Appearance
- Behavior

Programming… is a lot like cooking!

Source: Iron Chef America

Data Types and Variables

- Data types = things that you can operate on
  - Boolean: true, false
  - Number: 5, 9, 3.1415926
  - String: “Hello World”
- Variables hold values of a particular data type
  - Represented as symbols (e.g., x)
  - How should you name variables?
- In JavaScript, var declares a variable
  - var b = true; create a boolean b and set it to true
  - var n = 1; create a number n and set it to 1
  - var s = “hello”; create a string s and set it to “hello”

Expressions & Statements

- Things that you can do:
  - -x — reverse the sign of x (negation)
  - 6 + 5 — add 6 and 5
  - 2.1 * 3 — multiply two values
  - “Hello” + “World” — concatenate two strings
- The simplest statements store results of expressions:
  - x = 5 — set the value of x to be 5
  - x += y — x = x + y
  - x *= 5 — x = x * 5
  - x++ — increase value of x by 1
- In JavaScript, statements end with a semicolon (;)

Cooking Analogy

- Data types are like?
- Variables are like?
- Statements are like?

Sequence of Instructions


```
var a = 2;
var b = 3;
var c = a * b;
```

Where does the JavaScript go?

```
<!DOCTYPE html>
<html>
<head>
<meta charset=utf-8 />
<title>My Title</title>
```

```
<script>
…
</script>
```

JavaScript in the header, processed before the page is loaded

```
<script src="code.js">
</script>
```

JavaScript in an external file, processed before the page is loaded

```
</head>
<body>
```

```
<script>
…
</script>
```

JavaScript in the body, processed as the page is loaded

```
</body>
</html>
```

Temperature Conversion Demo

- A few useful statements:
  - var t = prompt("message here", "default");
  - document.writeln("message here");
  - console.log("message here");
  - alert ("message here");
- Tip: what if you want to have a quote inside a quote?
- Your turn:
  - Convert the temperature now Celsius to Fahrenheit

Programming Tips

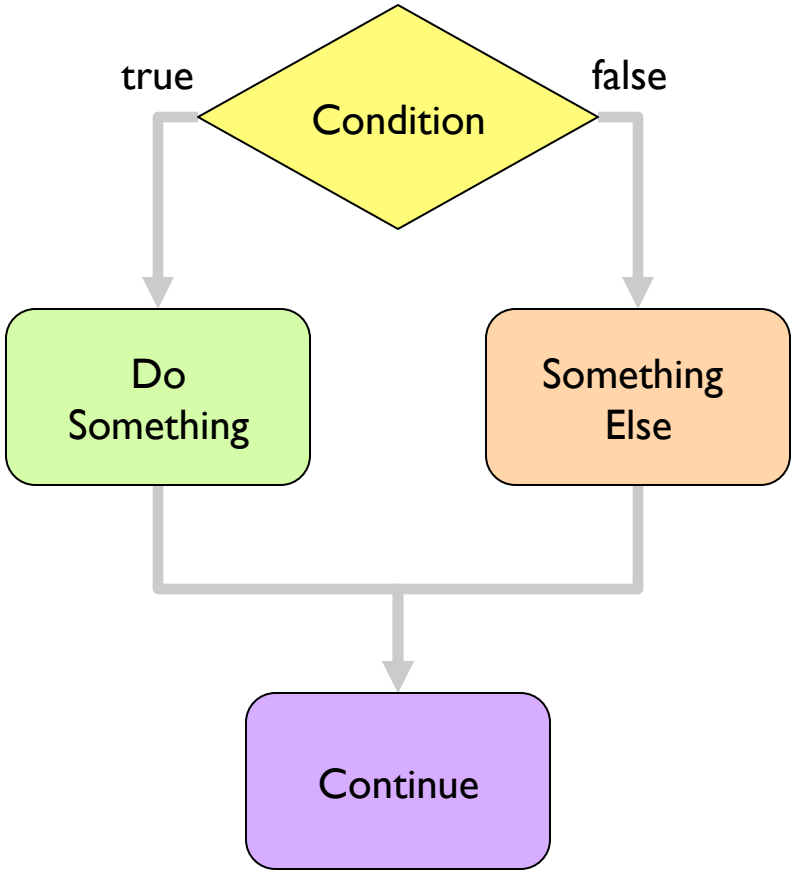
- Details are everything!
  - Careful where you place that comma, semi-colon, etc.
- Write a little bit of code at a time
  - Add a small new functionality, make sure it works, then move on
  - Don't try to write a large program all at once
  - If it doesn't work, revert back to previous version that worked
- Debug by outputting the state of the program
  - Simulate what you think the program is doing
  - Print out the value of variables using document.writeln or console.log
  - Is the value what you expected?
- Use the Chrome JavaScript console!

Controlling Execution

- Conditional
- Loops

Programming… is a lot like cooking!

Conditional




```
if (gender == "male") {
    greeting = "It's a boy!";
} else {
    greeting = "It's a girl!";
}
```

Note, the text in red is part of the "template" of the conditional

Note the indentation...

Multiple if-else clauses

```
if ( expression ) {
    …
} else if ( expression ) {
    …
} else if ( expression ) {
    …
} else {
    …
}
```

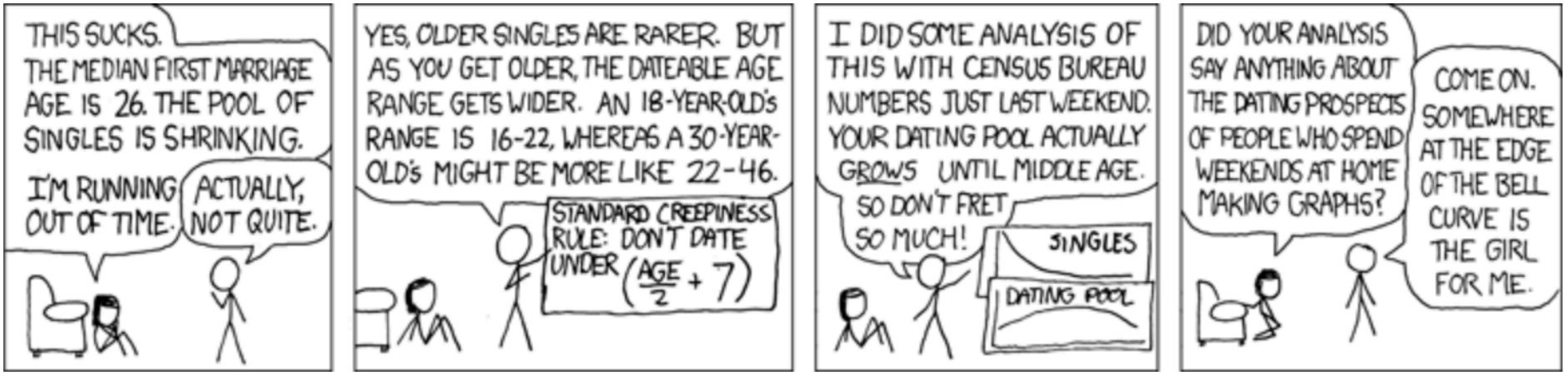
Nested if-else clauses

```
if ( expression ) {
  if ( expression ) {
    …
  } else {
    …
  }
} else if ( expression ) {
    …
} else if ( expression ) {
    …
} else {
    …
}
```

Note this is where indentation become important…

Test Conditions: Boolean Expressions

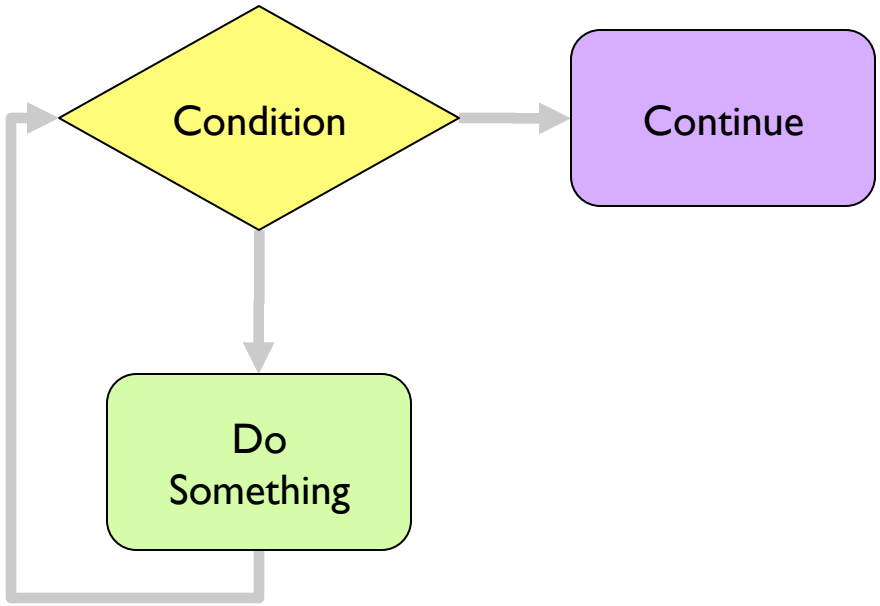
- x == y true if x and y are equal (note common gotcha!)
- x != y true if x and y are not equal
- x > y true if x is greater than y
- x <= y true if x is smaller than or equal to y
- x && y true if both x and y are true
- x || y true if either x or y is true
- !x true if x is false


THIS SUCKS. THE MEDIAN FIRST MARRIAGE AGE IS 26. THE POOL OF SINGLES IS SHRINKING.
I'M RUNNING OUT OF TIME.
ACTUALLY, NOT QUITE.
YES, OLDER SINGLES ARE RARER. BUT AS YOU GET OLDER, THE DATEABLE AGE RANGE GETS WIDER. AN 18-YEAR-OLD's RANGE IS 16-22, WHEREAS A 30-YEAR-OLD's MIGHT BE MORE LIKE 22-46.
STANDARD CREEPINESS RULE: DON'T DATE UNDER (AGE/2 + 7)
I DID SOME ANALYSIS OF THIS WITH CENSUS BUREAU NUMBERS JUST LAST WEEKEND. YOUR DATING POOL ACTUALLY GROWS UNTIL MIDDLE AGE.
SO DON'T FRET SO MUCH!
SINGLES
DATING POOL
DID YOUR ANALYSIS SAY ANYTHING ABOUT THE DATING PROSPECTS OF PEOPLE WHO SPEND WEEKENDS AT HOME MAKING GRAPHS?
COME ON. SOMEWHERE AT THE EDGE OF THE BELL CURVE IS THE GIRL FOR ME.

Creepy Guy Formula: Exercises

- Add some error checking
  - Tip: x == ""
  - Tip: exit()
- Add some age appropriate pictures

Loops




```
var n = 1;
while (n <= 10) {
  document.writeln(n);
  n++;
}

for (var n = 1; n <= 10; n++) {
  document.writeln(n);
}
```

Note, the text in red is part of the "template" of the loop

FYI: Computer scientists like to start at zero…

Ice Cream Scoops: Exercises

- What happens if there's only one scoop?
- Change from for loop to while loop
- Alternate scoops of ice cream, chocolate and vanilla
  - Helpful tip: modulo (remainder) operation (%)
  - 3%2 = 1, 4%2 = 0, 5%2 = 1
- Randomize scoops of ice cream
  - To generate random number between 0 and 3:
    Math.floor((Math.random()*3));