Intro to Programming

Automattic Grand Meetup 2014 Code Academy

AUTOMATTIC

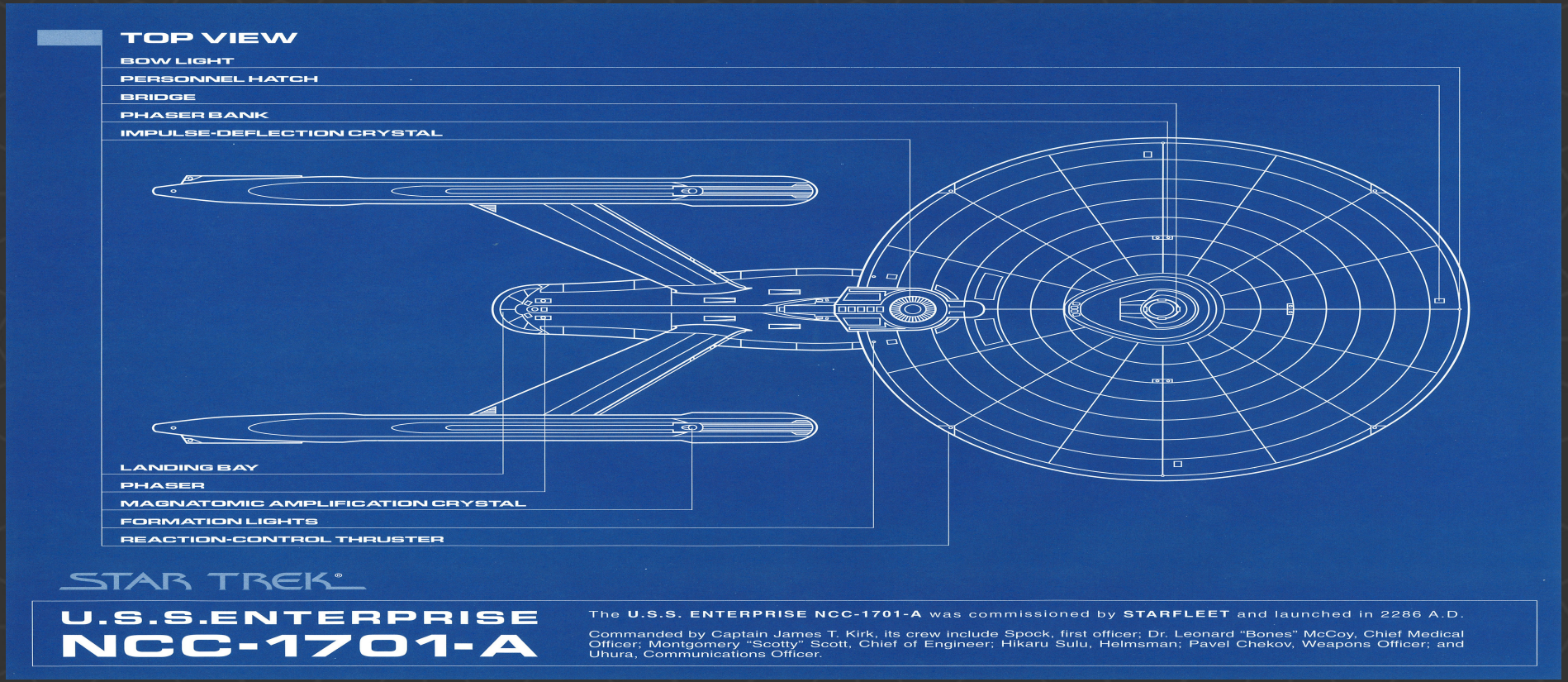
Prerequisites

- A text editor, such as Atom.io or Sublime Text
- A GitHub account
- GitHub for Mac - https://mac.github.com/
- The Virtual Machine - https://github.com/nickdaugherty/intro-to-programming-2014

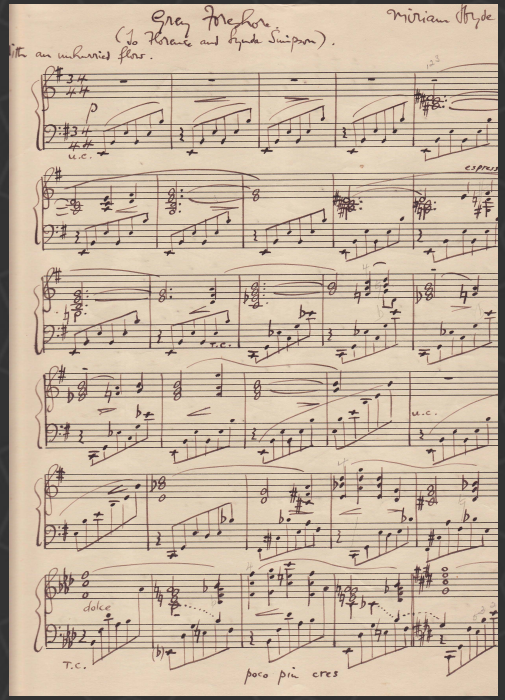
Computers only do what you tell them.

- Faithfully carry out your commands
- No free-will, behave predictably
- Won't make it up as they go
- Don't stop to consider their place in the world

A program is a blueprint.



It reads like a book, or music...



- Top to bottom
- Left to right
- Always in order
- Follows the written instructions exactly

...with its own language.

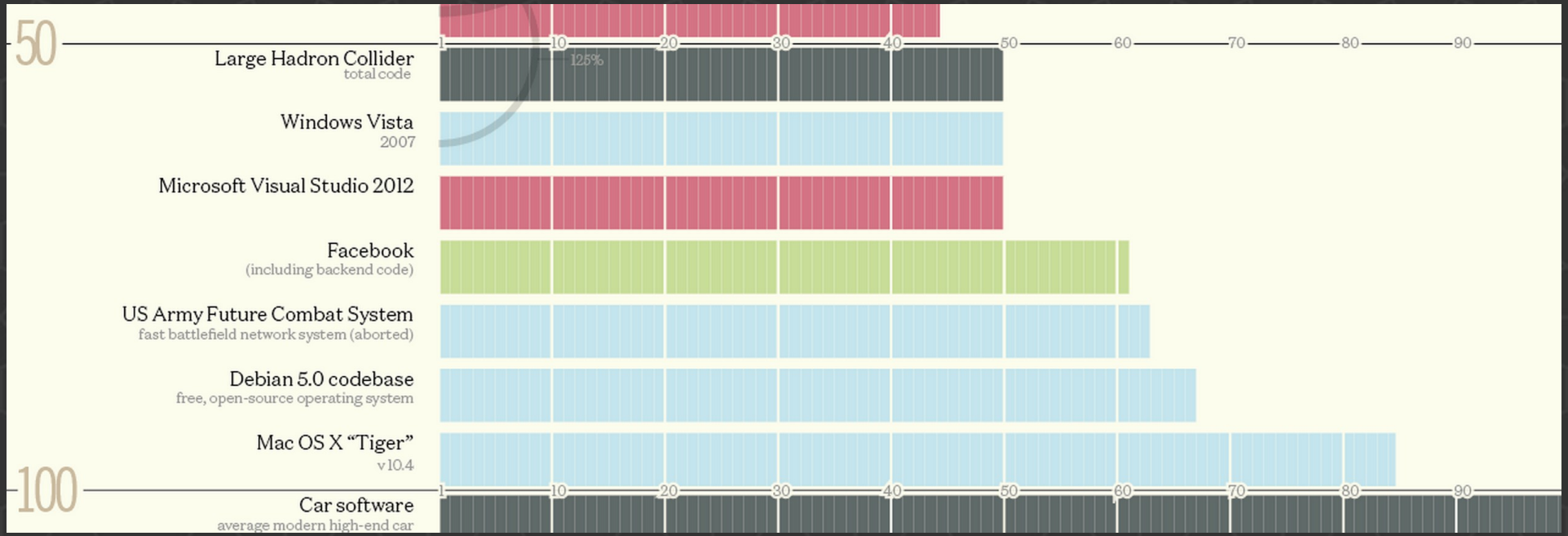
Programming concepts are universal and language agnostic.

Once you begin to think like a programmer, moving between languages is learning the syntax; the same concepts always apply.

Programs can be simple...

```
echo 'hello world!';
```

Or complex...


50
1
10
20
30
40
50
60
70
80
90
125%
Large Hadron Collider
total code
Windows Vista
2007
Microsoft Visual Studio 2012
Facebook
(including backend code)
US Army Future Combat System
fast battlefield network system (aborted)
Debian 5.0 codebase
free, open-source operating system
Mac OS X "Tiger"
v10.4
100
Car software
average modern high-end car

But every program, like every problem, can be broken down into simpler, more manageable chunks, that when combined, produce complexity.

Complex programs are merely the combination of many simpler chunks of functionality.

Building Blocks

- To a computer, everything is a binary yes or no
- 1's and 0's all the way down
- Processors only do very simple calculations
- Modern programming languages abstract this away
- Layers upon layers of code to execute our code

Basic Components

- Variables
- Functions
- Flow Control (if / else, loops)
- Comparisons (gt, lt, eq)

Variables

- A program's 'memory'
- Stores information for later use
- Holds nearly anything
- Changeable at any time
- Like a Post Office Box - one of many, info is placed in and is retrieved, by address, later on

- `$is_jumping = true`
- `$color = 'blue'`
- `$price = 19.99`
- `$sum = $a + $b + $c`
- `$dog = new Dog()`

Variables

- Variables are assigned with = (**single** equals sign), the 'assignment operator'
- Many languages such as PHP signify variables with a $, followed by the name
- Variable names cannot start with a number
- A good variable name is descriptive and indicates what it will hold.
- $x_objects // Bad
- $posts // Good!

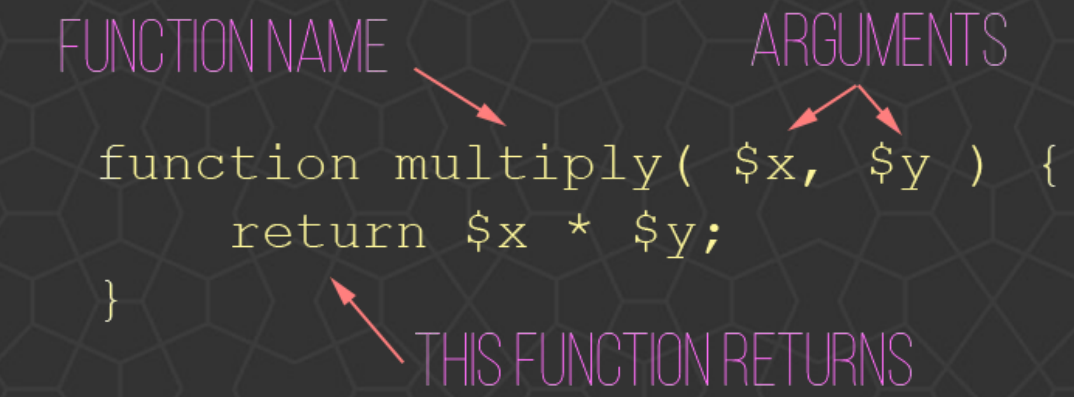
Functions

- Re-usable chunks of logic
- Represents a single, simple 'unit of work'
- A mini blueprint, for a specific task
- Can call other functions

```
function jump(){
    if ( $is_jumping ) {
        return;
    }

    $is_jumping = true;

    bend_down();

    apply_force();
}
```

Functions

- The keyword 'function', followed by a space, then the function name
- Parenthesis designate the arguments to the function
- Arguments are the optional 'input' - how high to jump or how loud to bark
- Can return a value back to the caller, or not


FUNCTION NAME
ARGUMENTS
function multiply($x, $y) {
return $x * $y;
}
THIS FUNCTION RETURNS


COMMENT
INPUT TO FUNCTION
// Outputs 10
echo multiply(2, 5);

Conditionals

- How our program makes decisions
- Represents distinct paths of execution
- Always a yes or no answer

```
if ( $is_raining ) {
    turn_on_headlights();

    $max_speed = 55;
} else {
    turn_off_headlights();

    $max_speed = 75;
}

set_max_speed( $max_speed );
```

Comparisons

- Equality
- Not equal
- Greater than / less than
- And / Or
- Used with conditionals to give decision making power

```
$a == $b // Double equal sign!

$a != $b

$a < $b // Or $a > $b

$a >= $b // Or $a <= $b

( $a == $b ) && ( $c < $d )
```

Version Control

- Version control is how we track changes in files and applications over time
- Easily view exactly what was changed, and why
- Instant backup!
- Never overwrite your work
- Identify when bugs were introduced
- Tell others why you made a change

HTML Primer

- Series of nested tags
- Most tags have an open and a close
- Name of tag determines what it does
- Tags can have attributes that modify them

```
<div>
    <em>Italic</em>
    <strong>Bold</strong>
    <br />
    <img src=”/image.jpg” />
</div>
```

PHP Primer

- Always needs an opening `<?php` tag
- Then a closing `?>` tag
- Each line ends with a semi-colon `;`
- Whitespace is ignored

- Runs on the server
- 'Language of the web'
- What WP is written in
- Ubiquitous
- `<?php echo 'hi'; ?>`

Exercises!

- See exercises 1-3 in the VM

Arrays

- Arrays represent a list of data as a single variable
- Can be looped over
- Can be searched

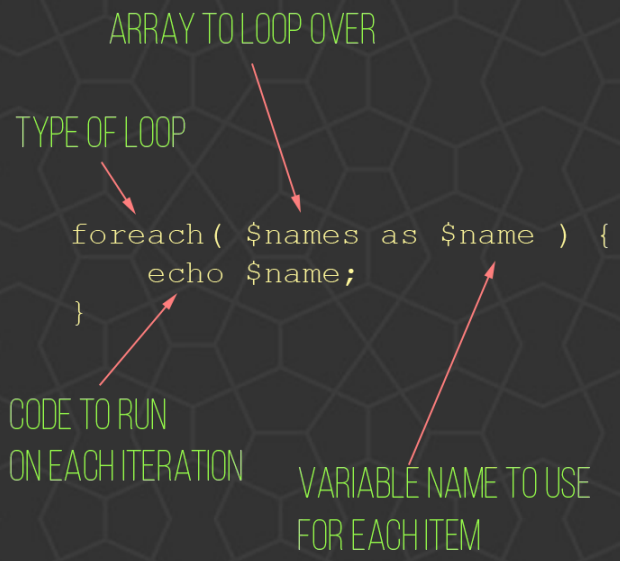
```
$names = array(
    'John',
    'Sue',
    'Jill',
    'Bob'
);

$prime_numbers = array(
    2,
    3,
    5,
    7,
    11
);
```

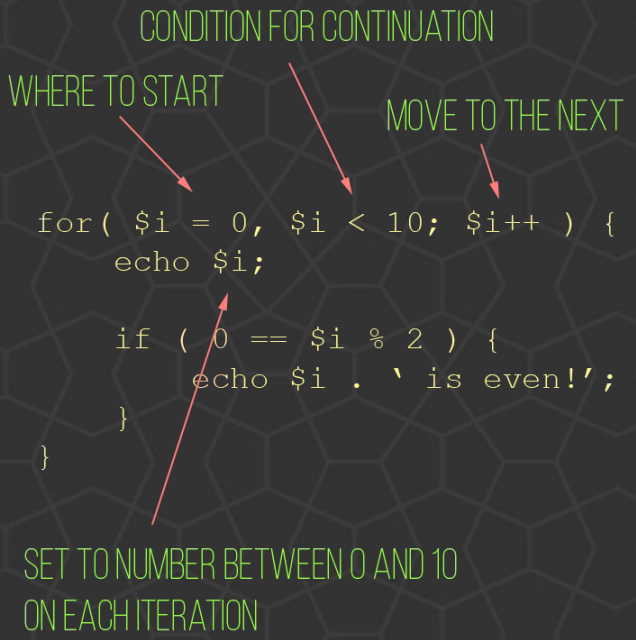
Loops

- Iterate over an array
- Execute a section of code x times
- Loop while a condition is true

- foreach loops over an array
- for executes x number of times
- while runs while a condition is true

Loops


ARRAY TO LOOP OVER
TYPE OF LOOP
foreach($names as $name) {
echo $name;
}
CODE TO RUN
ON EACH ITERATION
VARIABLE NAME TO USE
FOR EACH ITEM


CONDITION FOR CONTINUATION
WHERE TO START
MOVE TO THE NEXT
for($i = 0, $i < 10; $i++) {
echo $i;
if (0 == $i % 2) {
echo $i . ' is even!';
}
}
SET TO NUMBER BETWEEN 0 AND 10
ON EACH ITERATION

Exercises!

- See exercises 4-6 in the VM

The Internet

- Based on client/server model
- Client (browser) requests a page from the server
- Server processes the request, returns HTML, browser decides how to present it to the user

JavaScript

- Programming language of the browser
- Similar syntax to PHP (based on C)
- Useful for handling user interactions, ajax requests, animations, etc

- Sent in HTML, wrapped in <script> tags
- Or, in a standalone file, included via <script src="/path/to/file.js">

jQuery

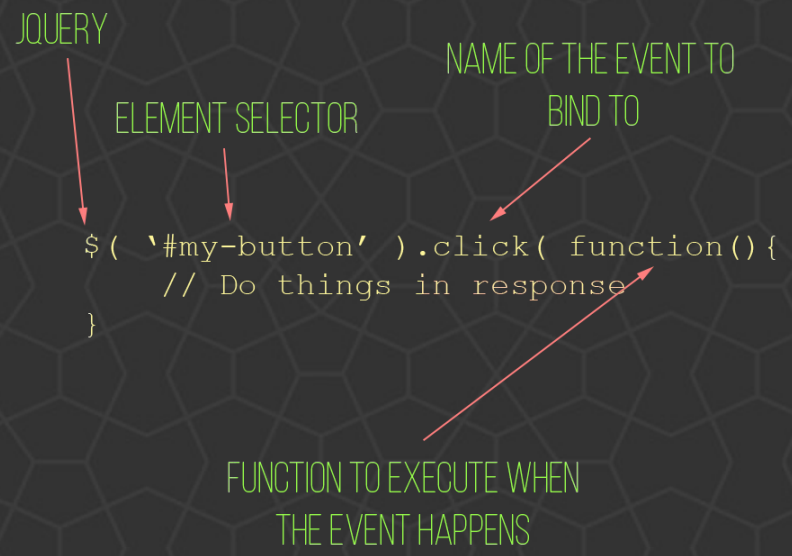
- JavaScript library designed to make our lives easier and more fulfilling
- Simplifies user interaction, ajax, animations
- Don't leave home without it!

User Interaction

- Events can happen in the lifetime of a page
- JavaScript can respond to these events by executing code, known as callbacks

- User clicks a button
- User enters text
- An image loads
- Remote content is dynamically loaded

User Interaction



Exercises!

- See exercise 7 in the VM

Game of Life

- http://en.wikipedia.org/wiki/Conway's_Game_of_Life
- Grid of 1x1 cells
- Each cell is alive or dead
- Follows simple rules for each generation