

# JAVASCRIPT DEVELOPMENT

Sasha Vodnik, Instructor

## JAVASCRIPT DEVELOPMENT THE COMMAND LINE & DATA TYPES

### WEEKLY OVERVIEW

**WEEK 1** Installfest / The Command Line & Data Types

WEEK 2 (holiday) / Arrays & Loops

**WEEK 3** Conditionals & Functions / Scope

### **LEARNING OBJECTIVES**

At the end of this class, you will be able to

- Work with files/directories via the terminal window
- Create a Git repository and push/pull changes
- Run basic JavaScript code on the command line
- Describe the concept of a "data type" and how it relates to variables.

### AGENDA

- JS and web technology
- The terminal
- Git and GitHub
- Command line JS
- Data types

#### THE COMMAND LINE

### **EXIT TICKET QUESTIONS**

- 1. What is powershell vs command line?
- 2. How all my programs will work together

6

### Think about last class:

- We installed software from the command line by typing commands
- We also installed software by downloading an installer, double-clicking it, and following the prompts

7

#### ACTIVITY



#### **KEY OBJECTIVE**

 Use the most common commands to navigate and modify files / directories via the terminal window.

#### **TYPE OF EXERCISE**

• Turn and Talk

#### TIMING

2 min1. List at least 2 advantages to using the command line.2. List at least 2 disadvantages to using the command line.

## JavaScript & Web Technology

 $\left( \mathbf{1} \right)$ 

### WHAT CAN JAVASCRIPT DO?



10

### **VERY FEW STEPS TO RUN**



runs directly in browser within an HTML file also runs in node.js



### AND WORKS EVEN WHEN COMPUTERS ARE OFFLINE



runs directly in browser within an HTML file

also runs in node.js



### **HIGHLY RESPONSIVE INTERFACES**



### LOAD ADDITIONAL CONTENT WHEN USER NEEDS IT (AJAX)



### WHAT ELSE CAN JAVASCRIPT DO?

- Determine your browser functional limitations and react accordingly (progressive enhancement)
- Power website backends and physical devices (node.js)

## DRAWBACK: The environment in which JavaScript operates is unknown

| M      |          | Disc ×  | sear 💦   | × (🔄 To  | ri x 🔉 Buy  | × \4]t  | heix     | R Five ×  | Fixe ×    | 20+ ×     | Goc × | ~ | - |   | X   |   |
|--------|----------|---------|----------|----------|-------------|---------|----------|-----------|-----------|-----------|-------|---|---|---|-----|---|
| € →    | C        | https:  | //www.g  | google.c | om          |         |          |           |           |           | ☆     | 9 | 0 | 1 | » 3 | 2 |
| 🙂 Gett | ting Sta | arted 🗀 | Imported | From     | C Live.js C | drag th | nis link |           |           |           |       |   |   |   |     |   |
| +Cale  | b Se     | arch Im | ages M   | aps Play | y YouTube   | News    | Gmail    | Documents | s Calenda | ar More - |       |   |   |   |     | ^ |

| Goo                  |  |
|----------------------|--|
| Google Search I'm Fe |  |





### **DRAWBACK: JavaScript can be disabled**

| ng the mpic medals. | Brooks: The Great<br>Affluence Fallacy | Jacob Zuma<br>• Campaign Stops: Gary<br>Johnson to the Rescue |
|---------------------|--|---|
| Olympics            |  |   |
| 94 PM ET            |  |   |
|                     |  |   |
|                     |  |   |
|                     |  |   |
|                     |  |   |
|                     |  |   |
|                     |  |   |
|                     |  |   |
|                     |  |   |
|                     |  |   |
| bld                 |  |   |
|                     |  |   |
| nast                |  |   |
| Feam Final          |  |   |
|                     |  |   |

NOCEJS

### Node.js

- A definition (from <u>Wikipedia</u>):
  - In software development, Node.js is an open-source, cross-platform runtime environment for developing server-side Web applications.
- Enables JavaScript on the server (the backend)
- Written in C, C++, and JS (so, not a JS framework)
- Interprets JS using Chrome's V8 engine
- Module driven; see <u>Node Package Manager (npm)</u>
- All about non-blocking, asychronous input/output

### Node.js

- We will not be using Node.js as a web server (backend) see <u>Firebase</u>
- We will be taking advantage of Node's command line interface
- Allows us to run JavaScript from our terminal applications
- More at the end of class...

## JavaScript Frameworks & Libraries

21

#### **INTRODUCTION TO REACT**

### **LIBRARIES VS FRAMEWORKS**

### Libraries



#### **INTRODUCTION TO REACT**

### **LIBRARIES VS FRAMEWORKS**

### Libraries







## The Terminal

25

### **INTRODUCTION TO THE TERMINAL**



- Terminal allows you to interact with your computer faster
- Terminal === Command Line === Console

### UNIX



 Family of operating systems, including all Linux systems and OS X/macOS

### SHELL



 A generic name for the primary program that runs inside a terminal

### BASH



#### Bourne-Again Shell: a specific shell program

### **ANATOMY OF THE TERMINAL**

#### Sashas-MacBook-Pro:JS-SF-14 sasha\$

### **ANATOMY OF THE TERMINAL**

### Host (computer) name

Sashas-MacBook-Pro<mark>:</mark>JS-SF-14 sasha\$

### **ANATOMY OF THE TERMINAL**

### Working directory (current folder)

Sashas-MacBook-Pro: JS-SF-14 sasha\$

### **ANATOMY OF THE TERMINAL**

### Username

Sashas-MacBook-Pro:JS-SF-14 sasha

### **ANATOMY OF THE TERMINAL**

### **Bash prompt**

Sashas-MacBook-Pro:JS-SF-14 sasha 🖇 📕

### **ANATOMY OF THE TERMINAL**

### Command (program)

Sashas-MacBook-Pro:JS-SF-14 sasha\$ ls

### **ANATOMY OF THE TERMINAL**

### **Argument (input)**

Sashas-MacBook-Pro:JS-SF-14 sasha\$ ls 00-installfest
### **ANATOMY OF THE TERMINAL**

## Option

Sashas-MacBook-Pro:JS-SF-14 sasha\$ ls -a 00-installfest

### **ANATOMY OF THE TERMINAL**

## Output

| Sashas-MacBook-Pro:JS-SF-14 sasha\$ ls -a 00-installfest |           |                       |           |  |
|--|-----------|-----------------------|-----------|--|
| •  | .DS_Store | <pre>index.html</pre> | slides.md |  |
| • •  | img       | install.md            |           |  |
| Sashas-MacBook-Pro:JS-SF-14 sasha\$                      |           |                       |           |  |
|  |           |                       |           |  |
|  |           |                       |           |  |
|  |           |                       |           |  |
|  |           |                       |           |  |
|  |           |                       |           |  |



## **Command line codealong**

### For Mac

**Open the Terminal app (Applications > Utilities > Terminal)** 

## For Windows

**Open the PowerShell application** 

#### LAB — COMMAND LINE



#### **KEY OBJECTIVE**

 Use the most common commands to navigate and modify files / directories via the terminal window.

#### **TYPE OF EXERCISE**

Individual/Pairs

#### TIMING

*10 min* Follow the <u>instructions</u> posted on the class website to navigate and modify files and directories using the command line.

#### EXERCISE — COMMAND LINE

## EXERCISE

#### **KEY OBJECTIVE**

 Use the most common commands to navigate and modify files / directories via the terminal window.

#### **TYPE OF EXERCISE**

Whole class brainstorm

#### TIMING

2 *min* 1. Name a command line command and explain what it does. Let's hear from everyone at least once!

# Introduction to Git/GitHub

43

#### GIT

- A version control program that saves the state of your project's files and folders
- Basically, it takes a "snapshot" of what all your files look like at a moment and stores a reference to that "snapshot"







#### GITHUB

- A web app/platform that makes it easy to manage git repositories.
- Similar to Dropbox or Google Drive, but for code.
- Stores a history of files and the changes that happen within each changed document.
- Hosts files on the cloud so you can share the finished product with other people.
- Git the technology that Github is based on top of was designed to allow for multiple engineers to work on the same project.



## Why use GitHub?

HISTORY

 Since GitHub stores a history of the code, it allows developers to go back in time if something breaks. **COLLABORATION** 

- Allows multiple developers to work on the same project. Much like Google Drive lets multiple people collaborate on the same document, GitHub allows this for code.
- You can see who worked on what.

 GitHub allows for feedback to be given on the code which, hopefully, increases code quality.

FEEDBACK

## Git vs GitHub

- Git is version control software
- GitHub is a website and platform for utilizing Git in a collaborative way



## **Git/GitHub Vocabulary**

- Repository
- Clone
- Commit
- Push
- ▶ Pull

## What is a repository (repo)?



Basic element of GitHub

- Contains all of a project's files (all the code)
- One or more users can contribute to a single repository
- Repositories are either public or private
- By the end of class today, you will create your own repo

## clone



- Git command that copies/clones a remote repo to your machine
- This copy/clone is called a Iocal repo
- Changes to the Iocal repo will not affect the remote

## commit



## $\bigcirc \rightarrow \bigcirc \rightarrow \bigcirc \rightarrow \bigcirc$

- Git command that creates a snapshot of changes to a repo
- Think of it as saving your changes with a timestamp
- Contains a message describing the changes

made



remote repo

- Git command that sends your commits (saved changes) to a remote repository
  - Allows other developers to see your changes and copy ("pull") them to their own local repos

local clone with changes





remote repo with changes

local clone

 Git command that copies (pulls) changes by other developers from a remote repository to your local clone

 Allows you to see changes made by other developers and incorporate them into your local clone

## How will we use GitHub in JSD13?



JS-SF-14-resources

- contains start and solution files
- you will pull changes at the start of each class



- JS-SF-14-homework
  - currently empty
  - you will push your completed homework and receive feedback here



You will create your own additional repos for the 3 projects during this course.

## **GIT COMMANDS**



#### EXERCISE — GIT/GITHUB



#### **KEY OBJECTIVE**

 Understand how to initialize a local Git repository and push/ pull changes to a remote Git repository.

#### **TYPE OF EXERCISE**

Pairs

#### TIMING

- 2 min
  1. What command do you use to initialize a local Git repository? (Hint: Check the handout.) What does initializing do?
  2. What command do you use to push changes to a repose to
  - 2. What command do you use to push changes to a remote Git repository? What does pushing do?
  - 3. What command do you use to pull changes from a remote Git repository? What does pulling do?
  - 4. BONUS: Draw a diagram illustrating all 3 commands

# Intro to Node.js and command line JS

58



## How is Node different from JS in the browser?

- No browser-specific functionality
- Same JS engine as Chrome



## What is Node good for?

- Creating a backend server for a web application
- Running a script to do data analysis
- File management
- Making command line programs



## Ways to run commands in Node

**THE COMMAND LINE & DATA TYPES** 

Your command Node's response



Interactive command line



## **Executing JavaScript**<br/>Code

63

## Variables

- Containers that allow us to store values
- Let us tell our program to remember values for us to use later on
- The action of saving a value to a variable is called assignment



## Declaring a variable

## let age;

## Assigning a value to a variable

## age = 29;

## Declaring and assigning in a single statement

## let age = 29;

## Printing things out for our own inspection

## console.log("Hello!");

## Printing a variable value out for our own inspection

## console.log(age);

i api Ethilumintis O Falent to load r

Faled to load Faled to load Faled to load

Falled to load Falled to load Falled to load

## When do you use console.log?

- When you are developing a program and need help figuring out what's going on (aka debugging)
- When you want to print things to the command line

| us. A gludialization canadium control agend 20                      | 🔝 se Pieloñar — ugumin (a.6-1018  |
|---|---|
| aburbe: the server responsed with a marus of 4e4 (Not Found)        | https://www.iveendworkweil.cvm/ntc/designaliavw/trans/ciendios/hexdlibs/styles/main/ons/tudger-omen.woft  |
| source: the server responsed with a status of 494 (Noti-Found)      | MILES //www.iveandwerk/en.com/en/designs/terr/trans/crentiles/tread/besitives/trans/tonts/truige-bold.kott  |
| source: the semen responded with a status of 454 (NotiFound)        | Ytzs://www.liveandwwrkwell.com/etcidesigns/lawwitrans/clientilis/headibs/styles/main/fonts/fru/get-roman.tt/  |
| source: the server responded with a status of 464 (Not Found)       | https://gicbalivev.proti.com/wgnv/28/argu/ur-kile.mag   |
| source: the server responded with a status of 454 (Not Found)       | https://www.liveandwwrkveil.com/etc/designs/laww/trans/clientiils.headibsistylesimain/fontsthuiger-light.woff   |
| source: the semen responded with a status of 464 (Not Found)        | https://www.lveandworkwel.com/usarts/bntu/FutigerL7W01.55Romal475738.woff2  |
| source: the server responded with a status of 454 NotFound!         | https://www.liveandvorkwel.com/assets/fiints/Materialicons-Regular.woff2  |
| source: the server responded with a status of 491 (Unautherized)    | https://www.liveandwarkiveil.com/services/wauthToker  |
| y Front AD1   | atripta.min.ja:0576   |
| source: the server responded with a status of 454 (NotFound)        | btuse. It work is an absorbed, a seriet a Manapeal bero it analytise that have all its invite iterations. The pulse well its invite iteration and the pulse of |
| 4 Eighlith Count - 11/eukhowfeid flag - felse signineeurity - felse | egn.min.ju/624348   |
| apurps: the server responded with a status of 464 (Hot Found)       | htps://www.liveendworowell.com/rtc/besigns/herwitrana/clent/bahwedliba/stylea/main/funtarflutiyer-bold.tt/  |
| source: The server responded with a status of 404 (Hut Pound)       | Island in embren shout well as early to design deem to each be filled to all a tradestraic during the hydrall   |
| source: the server responded with a status of 494 (Hot Found)       | taas. Leven, livearabwork veli Jorniet, Idealgra, livenitzerai, zier tilas headilaalat jeta mainiforita. Maar tekorra Repula. st  |
|   |   |

#### command line

#### browser developer tools

## Let's write some JavaScript!



71


#### THE COMMAND LINE & DATA TYPES

### Exit the Node console



### EXERCISE — NODE



#### **KEY OBJECTIVE**

• Run basic JavaScript code on the command line using Node.

#### **TYPE OF EXERCISE**

• Turn and talk

#### TIMING

2 min
1. What is Node?
2. What did we use it for today?
3. BONUS: How else can it be used?

# DATA TYPES

### THE DATA TYPE IDENTIFIES THE KIND OF DATA

"I just pushed my changes to the repo."

string

"red", "orange", "yellow", "green", "blue", "violet" array

42

number

### STRINGS

"a"

"satisfied"

"none of the above"

"The only difference between me and a madman is that I'm not mad. - Salvador Dali"

### NUMBERS

1.5 3.1415926535 27.36

45

525600

# SOME LANGUAGES TREAT INTEGERS AND FLOATS AS SEPARATE TYPES, BUT NOT JAVASCRIPT



### **WORKING WITH DATA IN JAVASCRIPT**

LIBRARY OF Objects

Array()
Date()
Math()

. . .

LANGUAGE Elements

Operators (+ - \* / % ...)

Statements for function return

. . .

DOM Manipulation

- create elements
- place elements in the browser window
- change properties of elements in the browser window
- respond to user events

### **IDENTIFYING DATA TYPE**

- typeof() function
- Returns a string naming the data type of the data you pass to it
- Syntax:
  - typeof(data), where data is a number, string, or other data



### **ARITHMETIC OPERATORS**

- + add (also concatenates strings)
- subtract
- \* multiply
- / divide
- % modulus (remainder)



#### THE COMMAND LINE & DATA TYPES



### **SPECIAL NUMBER OPERATORS**

# The Math object provides methods for additional operations

| Math.pow(m,n) | Returns m to the power of n  |
|---------------|--|
| Math.sqrt(n)  | Returns the square root of n                                       |
| Math.random() | Returns a random number between 0 (inclusive)<br>and 1 (exclusive) |
| Math.floor(n) | Returns largest integer less than or equal to n                    |
| Math.ceil(n)  | Returns smallest integer greater than or equal to n                |

#### THE COMMAND LINE & DATA TYPES



### **ARRAYS & LOOPS**

# VARABLES

87

- We can tell our program to remember (store) values for us to use later on.
- The 'container' we use to store the value is called a variable



#### **DECLARING A VARIABLE**

## let age = 29;

#### **RULES:**

- 1. Should be "camel case" First word starts with a lowercase letter and any following words start with an uppercase letter.
- 2. Names can only contain: letters, numbers, \$ and \_
- 3. No dashes, no periods.
- 4. Cannot start with a number
- 5. Case sensitive numberofstudents is not the same as numberOfStudents



*Guideline: Names should be descriptive:* 





### **CAMEL CASE**

- Use when creating a name based on multiple words
- Remove spaces, then capitalize the first letter of the second and subsequent words





### Declaring a variable: let host = "Sasha";

Update the value of the variable:

host = "Ray";

#### **ARRAYS & LOOPS**

### **KEYWORDS FOR DECLARING VARIABLES**

| keyword | when will we learn it?                         |
|---------|--|
| let     | We will use let today                          |
| var     | We will learn about var<br>and const next week |
| const   |  |

### Printing text out for our own inspection

## console.log("Hello!");



### Printing a variable value out for our own inspection

## console.log(age);

## When do you use console.log?

- When you are developing a program and need help figuring out what's going on (aka debugging)
- When you want to print things to the command line

| >_ |  |
|----|--|
|    |  |

| 1 epi Ehduninihilan. Uphielenne on selandar as milan as milan (20                          | 🔝 se Pielokor — ugumin. (s. 8-1018   |
|--|--|
| Faied to load resource: the server responsed with a starus of 4i44 (votiFound)             | https://www.iveandworkwei.com/etc/designatiawwittans/cientics/hexdlike/atyles/main/orms/tuciper-omen.aut/  |
| Prated to bad resource: the server responded with a status of 494 (Noti-Joung)             | Stas://www.iveardwwrk/es.com/etc/designs/tevertrans/creatines/teadlogistives/marvtorts/trugge-boid.xot   |
| Faled to load resource: the server responded with a status of 494 (Not Found)              | https://www.liveardwwrkwell.com/etc/designs/laww/trans/clientilis/headlibs/styles/main/fonts/fru/get-roman.tt/   |
| Faled to bad resource: the server responded with a status of 484 (Not Found)               | https://gidbalsav.prot.com/vgnv/28/argulur-kle.nap   |
| Faled to load resource: the server responded with a status of 484 (Not Found)              | Mtss://www.liveandwwrkireil.com/etc/designs/laww/trans/clientiils/headibs/styles/main/fonts/frusige-light.xoff   |
| Faled to bad resource: the server responded with a status of 484 (Not Found)               | https://www.lveandworkwel.com/ussets/bntt/FutlgerL7W01.65Romal4215738.woff2  |
| Faled to load resource: the server responded with a status of 484 Not Found:               | https://www.liveandvorkwel.com/assets/finits/Materialicone-Regular.woff3   |
| Faled to bad resource: the server responded with a status of 4P1 (Unautherized)            | https://www.liveandwarkowell.com/services/vauth7cker   |
| 🕼 in Error: Security Error 401   | atripta.min.ja/8636  |
| © Faled to load resource: the correr responded with a statue of 454 (KotFound)             | $\label{eq:loss_based} bis a strict a strict a large stars (translatential based) is trajer as training and the strict as the s$ |
| 1 Eliphility Pype - 4 Eliphility Count - 11/exithoute1d flag - fulse signineourity - fulse | egn.min.ju:624348  |
| Feled to load resource: the server responded with a status of 484 (Hot Found)              | htps://www.lveandworowell.com/sto/beagns/laww/nana/clent/lba/hex/lba/ity/ea/main/forta/futiger-bold.tt/  |
| Pated to load resource: the server responded with a status of 494 (Not Pound)              | Islaws/Incom/Intercolmentation/Insigns/Intercollige  |
| Preled to load resource: the server responded with a status of 494 (Hot Found)             | ttas. Leves, liveandworkveli Jondet, kiralgra (evel transistientilas) teadilasistyles mehritoria Materialismo Repula. Ist  |

#### browser developer tools

#### **ARRAYS & LOOPS**

### **KNOW YOUR EQUAL SIGNS**

- = assigns value on right to object on left
- === evaluates whether values on left and right are the same

### let minutes = 17;



### **ARRAYS & LOOPS**

### **COMPOUND OPERATORS**

| += | adds a number to a variable and assigns the new value to the same variable        |
|----|---|
| -= | subtracts a number from a variable and assigns the new value to the same variable |
| ++ | adds 1 to a value   |
|    | subtracts 1 from a value  |

### TRANSFORMING A VALUE INTO A STRING

- **toString()** function
- Returns the original value as a string
- Syntax:
  - data.toString(), where data is the name of a variable



#### **ARRAYS & LOOPS**



### "Bill" = let name;

### let name = "Bill";

### let total score = 20;

### let totalScore = 20;

### let fullName = Suzie Smith;

### let fullName = "Suzie Smith";

### Let fullName = "Bill Smith";

### let fullName = "Bill Smith";
## **COMMON MISTAKES**

# let score = "5"; score += "6";

## **COMMON MISTAKES**

# let score = 5; score += 6;

## ACTIVITY — VARIABLES & DATA TYPES

#### **KEY OBJECTIVE**

 Describe the concept of a "data type" and how it relates to variables.



#### TYPE OF EXERCISE

Turn & Talk

#### EXECUTION

- 2 *min* 1. Describe variables. Explain why we would want to use variables in our programs.
  - 2. What are the three data types in JS? Can you think of an example of each?

## THE COMMAND LINE & DATA TYPES

# Exit Tickets!

(Class #1)

# **LEARNING OBJECTIVES - REVIEW**

- Work with files/directories via the terminal window
- Create a Git repository and push/pull changes
- Run basic JavaScript code on the command line
- Describe the concept of a "data type" and how it relates to variables.

# Next class preview: Arrays & Loops

- Declare, assign to, and manipulate data stored in a variable.
- Create arrays and access values in them.
- Iterate over and manipulate values in an array.
- Build iterative loops using for statements.

## THE COMMAND LINE & DATA TYPES

