**Node.js Notes**

**Introduction**

* JavaScript is normally confined to run in a browser and we’ve never used to be able to run JavaScript directly on a server or computer.
* Background context:
  + Computer can only understand machine code (which is like binary)
  + Assembly language is a bit higher level than machine code which makes it a bit easier to read/write code. Assembly is then assembled down into machine code.
  + Programming languages like C++ are higher level than machine code which makes it a lot easier to read/write code. The C++ code is then compiled down to assembly, then to machine code.
  + Js is a language which is abstracted even more away from machine code than C++ to make programming easier. But computers cannot directly understand JavaScript or compile it down to machine code so we cannot directly run JavaScript on a computer.
* While Js cannot run on a server, it can run on the browser. Running inside the Google chrome browser is an engine called the v8 engine. This v8 engine is written in C++ and it compiles JS into machine code at runtime. Thus, by passing js through the v8 engine, the browser can understand JS. Since there is no v8 engine outside the browser, js cannot run outside the browser which is a problem.
* Node is an environment that allows us to run JavaScript on the server side.
* Node is a program written in C++ that has Chrome’s v8 engine inside it.
* Graphical user interface, application

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* Thus, node takes our JS code, runs it through the v8 engine (since node has a v8 engine inside it), compiles our JS into machine code, allowing us to directly run js on our computer.
* Not only does node allow us to run js on the server side, it adds additional functionality such as reading/writing to files on a computer, connecting to a database, and acting as a server. While we get these additional features, we lose js features such as the DOM (but this is fine since node is meant to run js on the backend which doesn’t really need DOM manipulation) and the window object.

**The Role of Node js**

* The role of node in a website is to run JavaScript on the back end. Thus, we're going to be handling requests coming in from a browser.
* For example, a user might visit your website in a browser. That browser will make a request to the server, the node server will run some js to react to the request and it might communicate with a database or files or another server, then its going to formulate some respons enad send it back to the browser. That response could be an HTML page with data embedded inside it, CSS files, images, etc. Thus, node is an alternative to other server side languages like python.

**Why learn Node**

* Since we are already familiar with js from the frontend, we don’t need to learn a new server-side language as we can use js on the backend via node.
* Node is based on version. Unlike the browser apps which depend on the user’s browser, our node app depends only on the node.js version it was built on. Thus, when we are finished building our node app, we won’t worry about it being outdated or no longer supported by browsers since browsers can’t affect the node app.
* Node has a massive community behind it with lots of third-party packages and tools to help

**Installing Node js**

* To check if node is already installed, open the cmd and run ‘node -v’. If node is installed, it’ll return the version number.
* 
* If you don’t get a version number or you want to update your version of node, go to <https://nodejs.org/en/download/> and download node (LTS version). Then close the terminal, restart it, and rerun ‘node -v’.

**Running Node**

* We have two options to run code written via node, a repl (read eval print loop) or a cli executable
* Repl is for playing around and cli is for everything else
* Repl
  + Go to cmd and run ‘node’
  + We can write code in her as shown below
  + Text

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  + To exit, click Ctrl+C
* To actually run node,
  + Create a folder which will be our project folder.
  + Open the folder in vs code
  + Create a new js file inside the folder and write your code there
  + Then we run ‘node fileName’ or ‘node fileName.js’ in our terminal. Note that we can actually press the up arrow to go to our previous terminal command.
  + A screenshot of a computer

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  + Note that whenever we make a change to our code, we have to rerun the file in our terminal.

**Global Object**

* In node, there are global variables which are variables that can be accessed anywhere in our application. (much like the window object in the DOM with browser side js that allows us to have access to many functions such as querySelector)(note that node doesn’t have the window object since node runs on the server, not browser)
* An example of a global variable is the global object.
* Graphical user interface, text, application, chat or text message

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* If we want to use the setTimeout function (a property of the global object), we could say global.setTimeout, but we could also just type setTimeout since it is implied we are calling a property from the global object.
* 
* There are other global variables as shown below (there are more global variables than what is listed, but it is not necessary to know them all)
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* As of now, we are running node on our machine. But when we deploy on Heroku for example, process is useful since as of Heroku is a different environment from our local machine.

**Modules**

* Modules allow us to split our code up into different files, so we have smaller files with more structure. As well modules allow us to encapsulate code (hide information) so information from one file is not accessible from another file. Every file in node is a module by default.
* To export/import between modules, we will have to use the module object which is a global variable.
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* Notice the exports property in the module object which lists the different things a file exports. In the above example, our app module doesn’t export anything since the exports property of the module object is an empty object.
* To export, we have to modify the module.exports property as shown below in a new name.js module:
* Text

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* Notice that the exports property is no longer empty.
* To import modules, we use the require function. This require function’s parameter is the path of where the module we want to import is located. This require function will return the value associated with the ‘export’s property of the module object of the module we are importing from.
* Also note that when we import a module, we also execute the imported module.
* Ex:
  + So if we have the following two files and I run the app module, the output would be the following:
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  + In the above example, we run the app module. The first line in the app tells us to import the names module.
  + In the names module, we created grant and peter constants. Then we log out ‘hi’ since recall that when we import a module, we also execute it. Then we add those constants to the ‘exports’ property of the module. Notice that when we add these constants, the key is the constant name (like grant) and the value is the value of that constant (like ‘grant23’). We then log out the { grant: 'grant23', peter: 'peter23' } which is the value of the ‘exports’ property in the module object. Now, we know that the names module exports the object { grant: 'grant23', peter: 'peter23' }.
  + Back in the app module, we imported the names module via the require function. This require function returns the value of module.exports in the imported names module. We store that object in a constant called names and log it. Notice it logs out { grant: 'grant23', peter: 'peter23' } which is the value of module.exports in the imported names module. We then destructure the object and print out the ‘grant23’ and ‘peter23’.
* Note that the module object is specific to each module so there is no name conflict.
* Ex:
  + Even though the other and names modules both have export objects with a key called grant, there is no name conflict.
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* Default Exports
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  + Text

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  + Notice in the above, we are exporting a string instead of an object.
* Alternative syntax:
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  + 

**Built In Modules**

* Node has many more built in modules such as the following:
  + Os
  + Path
  + Fs
  + Http
* For more information about the modules, go to: <https://nodejs.org/en/docs/>
* We do not have to install built-in modules.
* To use these modules, we will have to import it via require.
* There are many properties and features for each module, but we will not go over them all.

**OS Module**

* The os module provides properties and methods for interacting with the operating system and the server
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* Text

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**Path Module**

* The path module provides properties and methods for interacting with paths
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**File System Module**

* The path module provides properties and methods for interacting with files
* This module’s methods come in both a synchronous and asynchronous version
* Synchronous file system methods
  + Reading files
  + To read a file synchronously, we can use the readFileSync. This function takes in two parameters. The first is the relative path to the file we want to read from. The second parameter is optional and is the encoding (generally we will go with utf8).
  + Let’s make two text files as shown below:
  + Graphical user interface

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  + Now if we run the following code, we get the following output in the terminal.
  + Text

    Description automatically generated
  + Writing to files
  + To write a file synchronously, we can use the writeFileSync. This function takes in two parameters. The first is a relative path to the file we want to write to. The second parameter is optional and is the value we want to write to the file with.
  + If the file we are writing to does not exist, a new file will be created. If the file we are writing to does exist, its content will be replaced by whatever new content we pass to the writeFileSync.
  + Suppose we have the following code (continuation from the previous example):
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  + When we run it, we get the following:
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  + Notice a new third.txt file was created. Additionally, inside the file is ‘hi from firsthi from second’ since that was the value of first + second in app.js
  + Note that if we run app.js one more time, there is no change to third.txt since the writeFileSync function replaces the existing content, it does not append to the existing content.
  + If we want do not want to replace the existing content, but rather append to the existing content, we pass a third parameter with a value of {flag : ‘a’} (this third parameter is optional).
  + Suppose we have the following code and suppose third.txt is empty:
  + Text

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  + When we run the code, we get the following:
  + Graphical user interface, text, application

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  + Since third.txt was originally empty, writeFileSync with the {flag : ‘a’} parameter has the same result as if the {flag : ‘a’} parameter was removed.
  + When we run the code again, we get the following:
  + Graphical user interface, text

    Description automatically generated
  + Notice that we appended the new text to the end of the existing text in third.txt and not replace the existing text.
* Asynchronous file system methods
  + It’s better to use asynchronous methods so there is no code-blocking.
  + Reading from a file
  + To read a file asynchronously, we can use the asynchronous readFile method. This function takes in three parameters. The first is the relative path to the file we want to read from. The second is optional and is the encoding (generally we will go with utf8). The third parameter is a callback function that is executed when we have finished reading the file. This callback function takes in two parameters, the first being an error when reading the file and the second being the data that was read from the file. If the file was successfully read, the value of the first parameter (the error) will be null and the value of the second parameter (the data) will be the data that was read from the file. If reading the file was unsuccessful, the value of the first parameter (the error) will be error and the value of the second parameter (the data) will be undefined.
  + Suppose we have the following code:
  + A screenshot of a computer

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  + Graphical user interface

    Description automatically generated
  + When we run the app.js file, we get the following output:
  + 
  + Writing to files
  + To write a file asynchronously, we can use the asynchronous writeFile method. This function takes in four parameters. The first is a relative path to the file we want to write to. The second parameter is the value we want to write to the file with. The third parameter is optional and we can add the {flag : ‘a’} object to indicate to append to the end of the file instead of replacing the existing file. The fourth parameter is a callback function that is executed when we finish writing to the file. This callback function takes in two parameters, the first being an error when reading the file and the second being the data that was read from the file. If the file was successfully written to, the value of the first parameter (the error) will be null and the value of the second parameter (the data) will be undefined. If writing to the file was unsuccessful, the value of the first parameter (the error) will be error and the value of the second parameter (the data) will be undefined.
  + If the file we are writing to does not exist, a new file will be created.
  + Suppose we have the following code (and an empty third.txt file):
  + Text

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  + When we run the code, the output will be:
  + Graphical user interface, text

    Description automatically generated
  + When we run the code again, the output will be:
  + Text

    Description automatically generated
  + Notice that the content is getting appended to third.txt
  + Asynchronous Nature
  + Because readFile and writeFile are both asynchronous, their callback functions are pushed into the task queue in the event loop.
  + Ex:
  + Text

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  + When we run this code, we get the following output:
  + Text

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  + Note that ‘hi’ is immediately printed, then there is a massive pause after (because of the for loop). After the for loop is done executing, either ‘wrote to file undefined read file hi from first’ or ‘read file hi from first wrote to file undefined’ is printed, depending on which of readFile and writeFile finished first.

**Http Module**

* IP addresses and domains
  + IP addresses are a series of numbers that act as an address for any computer connected to the internet
  + A screenshot of a computer

    Description automatically generated with medium confidence
  + Some computers host websites and they will also have an IP address to identify it.
  + If we want to connect to the server on the host computer, we could type the server’s IP address into the browser
  + However, instead of typing the IP address of the server, we type its domain name like ‘gmail’. When we enter a domain name in the browser (the browser is the client), the browser will look up the IP address associated with the domain and use that IP address to connect to the server. The browser will send a request to the server that runs that website. The server looks at that request to determine what to send back to the browser (usually html).
  + The communication between the browser and server is via HTTP (hyper-text transfer protocol) which is a set of instructions that dictate how communication occurs. This is analogous to human communication where two people will both speak English to communicate with each other. Clients and servers will use HTTP to talk to each other.
* The http module allows node to transfer data over the HTTP.
* To create a server, we use the createServer method from the http module. This function returns an instance of the server that we can store in a constant if we need. The createServer takes in a parameter which is a callback function which gets executed every time a request comes into our server. This callback function parameter takes in two arguments. The first is the request object and the second is the response object. The request object contains information about the request. The response object is what we will use to send a response back to the client. We will explore this callback parameter function below in more depth.
* If we just create a server and do nothing else, the server is not actively listening for requests.
* To make the server actively listen for requests, the listen method will be invoked. The listen method is a function that we can access from an instance of a server. This listen method takes in three arguments. The first argument is the port number that the server will listen to (generally port 3000 will be used). The second argument is optional and is the hostname (default value is ‘localhost’). The third argument is optional and is callback function that is executed when the server starts listening.
* Text

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* Before we run the code, we will go explain localhost and port numbers.
* Localhost and port numbers
  + Localhost is like a domain name on the web such as ‘facebook’
  + This domain name takes us to a loopback IP address which is 127.0.0.1 which points to our own local computer.
  + When we connect to the localhost domain in our browser, the browser will connect to the computer with an IP address of 127.0.0.1 which is our own computer so the browser will connect back to our computer. Our own computer acts as a host for our website.
  + A screenshot of a computer

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  + A port number represents a specific channel gateway/port on our computer that our server should communicate through.
  + Port numbers are like different doors into your computer through which internet communications can be made to different applications.
  + For example, on your computer, you've probably got a lot of different applications that connects to the internet and receives and sends data. For example: Skype, discord, mail, etc. These applications will connect to the internet via different port numbers to keep information separate from one another.
  + Our nodejs server will also need its own port number to communicate through. While our nodejs port number is arbitrary (as long as its not being used by some other app), 3000 is a convention for local web development.
  + Thus, when we use localhost, we also type the port number after it to indicate the port we are using. Ex: localhost:3000
* We can now continue from where we left off (right before the localhost and port numbers section) and run the app.js file.
* Output: A screenshot of a computer

  Description automatically generated with medium confidence
* Since we logged ‘started listening for requests on port 3000’, the server is running and actively listening for requests to localhost:3000
* Also notice that the terminal program does not terminate since the server is ongoing (we haven’t told the server to shut down).
* Now, if we open our browser and go to <http://localhost:3000/>, the webpage doesn’t load anything. The loading icon is spinning since we are waiting for a response from our server, but we never actually sent back a response.
* While the webpage doesn’t load, we do get the following response in the terminal:
* Text

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* This is because our callback function to the createServer method got executed since a request was made when we went to <http://localhost:3000/>. Executing the callback function logged ‘request made’, confirming a request was made.
* Also note that nothing is logged to the browser console since when we are logging to the server console, not the browser console.
* Request object
  + Recall that the callback parameter function to the createServer method took in two parameters, the first of which was the request object. This request object contains information about the request.
  + We could log out the request object in callback parameter function and it would log a massive object.
  + Some notable methods within this request object include the ‘url’, and ‘method’ methods.
  + To get the url path after the domain name and port number that the client requested for, we can use the ‘url’ method.
  + To get the method of that request (GET, POST, PUT DELETE, ETC), we can use the ‘method’ method.
  + Ex:
  + Suppose we have the following code and we run the app js file and then we enter <http://localhost:3000/about> in google chrome.
  + Text

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  + We would get the following output:
  + Text

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  + Notice that the request method was a GET request. Notice that the url path after the domain name and port number that the client requested for is ‘/about’.
* Response object
  + Recall that the callback parameter function to the createServer method took in two parameters, the second of which was the response object. This response object is what we use to send a response to the client.
  + We could log out the response object in callback parameter function and it would log a massive object.
  + Some notable methods within this reponse object include the ‘setHeader’, ‘write’, and ‘end’ method.
  + When we provide a response to client, we need to include response headers. Response headers let the client have more information about what kind of response the server is responding with. For example, is the data the server sends back text, HTML, JSON, etc?. We can also use the response headers to set cookies.
  + To include response headers in our response to the client, we can use the setHeader method. There are many different types of response headers. For instance, we could set the Content-Type header to be one of html or text or json, etc.
  + To include data within our response to the client, we can use the write method.
  + To end the response and send it back to the client, we can use the end method.
  + Ex:
    - Suppose we have the following code and then we go to <http://localhost:3000/>:
    - Text

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    - The server terminal output would be:
    - A screenshot of a computer

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    - The webpage output would be:
    - Graphical user interface, text, application, chat or text message

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    - We can inspect the webpage and go to the network tab and see the request the client made.
    - Graphical user interface, text, application

      Description automatically generated
    - We can then click on it and under the headers tab and in the response headers tab, we can see the content-type response header that we specified.
    - Graphical user interface, text, application, email

      Description automatically generated
    - Note there were other response headers that are set by default, and in fact there are other requests to our server, but those can be ignored for now.
  + Ex:
    - Suppose we have the following code and we go to <http://localhost:3000/about>:
    - Text

      Description automatically generated
    - The server terminal output would be:
    - A screenshot of a computer

      Description automatically generated with low confidence
    - The webpage output would be:
    - Text

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      Description automatically generated
    - When we go to <http://localhost:3000/about>, the request path/url is ‘/about’. Thus, it satisfies the condition in line 4. Inside the if statement, we log out ‘GET request made from /about’ since req.method is a GET request mthod and the req.url is ‘/about’.
    - Then, we prepare to send back a response to the client. We use the setHeader method to indicate that the type of data in the response will be html. Then, we use the write method to include html elements as the data within our response. Then, we use the end method to indicate we are done with our response and that we should send the response back to the client. Notice that we can also add data to our response by passing the data as a parameter to the end method (much like the write method).
    - When the client receives the response, the above html page is loaded. Notice that the default html structure and head tags are automatically generated. We could write our own head tag and it would replace the head tags that were automatically generated.
* Returning HTML Pages
  + In the above section, we were able to send back html within the createServer callback function parameter. But writing html like that is not scalable. Instead, our html pages should be created in a separate file and node should read those files and send the html within those files to the client.
  + To read those files, we need to import the file system module.
  + Ex:
  + Suppose we have the following files:
  + Graphical user interface, application, website

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  + Text

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  + Text

    Description automatically generated
  + When we run this file and we go to <http://localhost:3000/about>, we get the following
  + Terminal output: Text

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  + Webpage output: Graphical user interface, text, application

    Description automatically generated
* Routing
  + Suppose we want to return different html pages based on the path the client requested. For example, if they went to ‘/store’, we render the store.html page.
  + The code would look like the following:
  + Text

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  + Text

    Description automatically generated
  + When we run the code and go to <http://localhost:3000/>, we get the following:
  + Text

    Description automatically generated
  + Graphical user interface, text, application, email

    Description automatically generated
  + If we then go to <http://localhost:3000/store>, we get the following:
  + Text

    Description automatically generated
  + Graphical user interface, text, application, email

    Description automatically generated
  + Note that ‘GET request made from /favicon.ico’ is a request that browsers will send by default in order to get the website icon, this can be ignored as its not that important.
* Status Codes
  + Status codes describe the type of response to the browser
  + Some of the common status codes are shown below:
  + Graphical user interface, text, application

    Description automatically generated
  + There are many more status codes as show below:
  + Graphical user interface, text, application

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  + To add a status code to our response, we modify the ‘statusCode’ property of the response object.
  + Continuing with the example from the previous section on routing, we can add status codes as shown below inside the switch statement:
  + Text

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  + Now, if we run our app.js file and go the <http://localhost:3000/store> for example, we get the following:
  + Table

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  + Notice that the status code is 200
  + Now, if we go to some random url like <http://localhost:3000/asd> for example, we get the following:
  + Calendar

    Description automatically generated
  + Notice that status code is 404.
* Redirect
  + Continuing from the example in the above section (status codes), suppose we want to create a new html called store2.html to be the new store. So if anyone goes to ‘/store2’, we respond with the store2.html file. However, we also want it so that when anyone goes to ‘/store’, we redirect them to the new store2 path.
  + To redirect, we want to modify the location header of the response to be the ‘/store’. Recall we modify response headers via setHeader.
  + Thus, the code would look like the following:
  + Text

    Description automatically generated
  + Now, when we run the app.js file and try to go to <http://localhost:3000/store>, we get redirect to <http://localhost:3000/store2>
  + Notice that we should change the status code to 301 which indicates the ‘/store’ page has been moved to ‘/store2’. Note that we didn’t modify the path variable inside the “/store” case. Also notice we had res.end() to end the current response.

**Npm**

* Npm allows us to use pre-built code from other people instead of having to build everything from scratch.
* Stands for node package manager and is the main package manager for node js
* A package contains code that someone created and uploaded to the npm online platform. (package, dependencies, modules are used interchangeably)
* Npm is an online platform and a command line interface (CLI).
* Graphical user interface, website

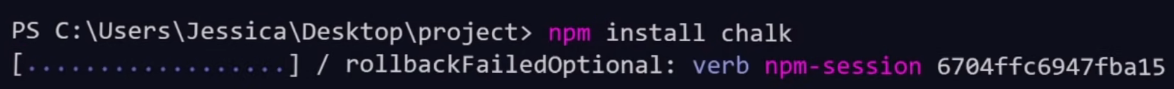
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* In the online platform, anyone can publish and share tools written in JS. These tools can be used in the browser, server, or command line.
* In the command line tool, it allows us to interact with the online platform. Via the command line tool, we can:
  + install/uninstall packages
  + use version management. Every package has a version which changes as the package changes. Npm allows us to be up to date with the version, or switch to a specific version.
  + Use dependency management. Many packages are built using other packages. Dependencies are packages that are need for another package. Npm allows us to install a package and all of its dependencies.

Installing npm

* We need to first install node js Graphical user interface, text, application, chat or text message, website

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* We can check the node and npm versions using ‘node -v’ and ‘npm -v’ respectively.
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* When we install npm packages, we can install them locally or globally.
* Graphical user interface

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* Local packages are installed only in the project folder we want to use them in. To install a package locally, we run in cmd: npm install packageName
* 
* Global packages can be used from any folder. To install a package globally, we run in cmd: npm install -g packageName
* 

Package.json

* If we are using multiple packages in our project, we can keep track of which projects we have installed via the package.json file
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* This file can also store information about the project such as its name. version, author, etc
* If we want to clone a project and it has a package.json file, we can run npm install and npm will read the package.json file and install all of the packages listed in the package.json file.
* We can create a package.json file by running in cmd: npm init
* When creating this file, npm will ask us some questions about the project.
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* If we don’t want to answer the questions, we can run in cmd: ‘npm init -y’ which sets all the fields to a default value.
* When we install a package, the package.json file gets updated to include the new package we installed as a dependency.
* Graphical user interface, text

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* As well, a new folder called node\_modules is created. This node\_modules folder is where the package files are installed. We will see not only the package we installed, but other packages as well since those are the packages that our package depends on. And each of those other packages depend on other packages which are also added to the node\_modules folder
* Text

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* We can run npm list in the project folder to display all the installed packages and what versions they are on.
* Text

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Semantic Versioning

* Packages can get updated over time to add new features/fix bugs, but this can lead to conflicts between packages that the updated package depends on, or packages that depend on the updated package.
* If we type in cmd: ‘npm view packageName versions’, we get a list of all the versions of the package from the beginning
* Text

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* The versions are represented by 3 numbers, separated by a ‘.’
* The first, second, and third numbers are the major, minor, and patch versions of the package
* A picture containing text, clock, first-aid kit

  Description automatically generated
* Major updates are big and not backwards-compatible which means updating will probably break old code.
* Minor updates are backwards-compatible features and ideally won’t break old code
* Patch updates are small bug fixed that won’t break older builds
* When a new version is released, the numbers on the right reset back to 0. For example, if we are on version 1.9.15 and there is a major update, the new version becomes 2.0.0. If we are on version 1.9.15 and there is a minor update, the new version becomes 1.10.0.
* When we first locally install a package, npm will install the newest public release. When we upgrade, npm has safeguards that help prevent code from being broken.
* In the package.json file, the dependencies object will display the dependency and it’s version such as below: Graphical user interface, application, website

  Description automatically generated
* Notice the ‘^’ symbol which tells npm to update the package to the latest minor and patch version for the currently install major version. So, the above version of 4.1.1 might update to 4.2.1 for example even if version 5.0.0 exists
* We can run in cmd: ‘npm update’ to update all the packages listed to the latest minor and patch version for the currently installed major version (as shown in the bullet point above). Thus, if version 5.0.0 is released and are on version 4.1.1, we can run ‘npm’ install but nothing happens since it is a different major version.
* To override this safeguard and update to the newest version (potentially different major version), we can run in cmd: ‘npm install package\_name@latest’
* 
* To install an older/newer version of a package, we can run in cmd: ‘npm install package\_name@versionNumber’.
* 
* We can also limit updates to patches within the current minor version by running in cmd: ‘npm install [packageName@~major.minor](mailto:packageName@~major.minor)’ . So if we had version 2.2.0 installed and wanted to update to the latest patch within 2.2, we could run in cmd:
* 

Package-lock.json

* When using a package.json file from a different environment, compatibility issues can arise.
* For example, if we copy a github repo that has a package.json file and we run npm install, it is possible that a dependent package has been updated between the time the package.json file was created by the author and when we run npm install. Thus, we could be installing a different minor and patch version that was used in the original repo, which could lead to breaking of code.
* Package-lock.json solves this problem.
* If we run npm install and there is a package-lock.json file, npm will install the exact major and minor patches recorded in the package-lock.json file. This will ensure our package versions match those of the authors.

Devdependency

* A dev dependency is a dependency that the developer uses to make their lives easier when writing code but isn’t needed for the production version of their application. For example, testing packages could also be in dev dependency instead of normal dependency.
* To install packages as a dev dependency, we run ‘npm install packageName -D’.

Uninstall

* To uninstall a package, run ‘npm uninstall packageName’

**Nodemon**

* Nodemon is an npm package that will automatically restart the server when changes in our files are made.
* To use it, we can install it as a dev dependency since we don’t need nodemon in production. When we push our node server to Heroku or whatever, some more serious package will be used to restart the application.
* Thus, run ‘npm i -g nodemon -D’ in the terminal to globally install it. (make sure we already ran npm init)
* 
* To run nodemon, in the cmd run ‘nodemon fileName’.
* If that doesn’t work and we get the following error, go to this location File C:\Users\Dell\AppData\Roaming\npm and delete the nodemon.ps1 file and run the command.
* Text

  Description automatically generated
* The console should now log the following and restart upon changes:
* Text

  Description automatically generated

<https://blog.insiderattack.net/javascript-event-loop-vs-node-js-event-loop-aea2b1b85f5c>

learn event loop for both vanilla js (fix js event loop shit) and node

learn which methods are async like is readFile async or the callback function async, is .on async or its callback

finish from important topics intro to streams (inclusive)