NODEJS

SERVER SIDE SCRIPTING

TRAINING AGENDA

- NodeJS Overview
- Modules
- Buffers & Streams
- Event System
- Express
- Data Persistance

NODEJS : INTRODUCTION

Not a programming language

V8 engine used in chrome browser as well

"Node.js is a *platform* built on *Chrome's JavaScript runtime* for easily building fast and scalable *network applications*. Node.js uses an *event-driven, non-blocking I/O model* that makes it lightweight and efficient, perfect for *data-intensive real-time applications* that run across *distributed devices*."

Node works on event model same as JavaScript

Can create app which can work over web

Working with Async code makes node app faster

Great for creating apps which require huge amount of data transfer In real time

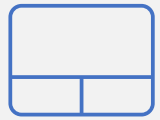
Node Runtime Environment runs JavaScript on Server

NODEJS : FEATURES

EXTREMELY FAST	I/O IS ASYNCHRONOUS	EVENT DRIVEN
SINGLE THREADED	HIGHLY SCALABLE	OPEN SOURCE

NodeJS Process Model

Node.js runs in a single process and the application code runs in a single thread.



All the user requests to web application will be handled by a single thread and all the I/O work or long running job is performed asynchronously for a request.

An event loop is constantly watching for the events to be raised for an asynchronous job and executing callback function when the job completes.

Internally, Node.js uses libuv for the event loop which in turn uses internal C++ thread pool to provide asynchronous I/O.

NODE.JS FRAMEWORKS AND TOOLS

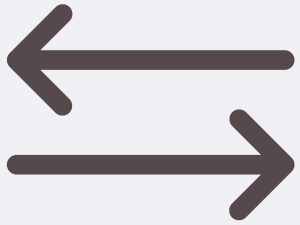
Node.js is a low-level platform. In order to make things easy and exciting for developers, thousands of libraries were built upon Node.js by the community

Framework / Tools	Description
Express	One of the most simple yet powerful ways to create a web server
Gatsby	A React-based, GraphQL powered, static site generator with a very rich ecosystem of plugins and starters
Loopback.io	Makes it easy to build modern applications that require complex integrations
Meteor	Integrates with frontend libs React, Vue, and Angular. Can be used to create mobile apps as well
Micro	It provides a very lightweight server to create asynchronous HTTP microservices
Nx	A toolkit for full-stack monorepo development using NestJS, Express, React, Angular, and more
Socket.io	A real-time communication engine to build network applications

DIFFERENCES BETWEEN NODE.JS AND THE BROWSER

BROWSER – CLIENT SIDE SCRIPT	NODEJS – SERVER SIDE SCRIPT
Most of the time we interact with the DOM or other Web Platform APIs like Cookies	Do not exist in Node.js. You don't have the document, window and all the other objects that are provided by the browser
NodeJS modules does not exist on browser	Node.js provides nice APIs through its modules, like the filesystem access functionality
Need to use Babel to transform your code to be ES5-compatible before shipping it to the browser	You can write all the modern ES6-7-8-9 JavaScript that your Node.js version supports
Latest browsers starting implementation of ES6 modules standard	Node.js supports both the CommonJS and ES module systems (since Node.js v12)

NODEJS : MODULE SYSTEM



Use of imports/exports for importing and exporting the modules in application.

Following are a few salient points of the module system:

Each file is its own module.

Each file has access to the current module definition using the module variable.

The export of the current module is determined by the module.exports variable.

To import a module, use the globally available require function.

NODEJS : REQUIRE FUNCTION

The Node.js require function is the main way of importing a module.

The require function blocks further code execution until the module has been loaded.

Call require() based on some condition and therefore load the module on-demand

After the first time a require call is made to a particular file, the module.exports is cached.

Module allows you to share in-memory objects between modules.

Treats module as an object factory

NODEJS : BUILT-IN GLOBAL VARIABLES

Console

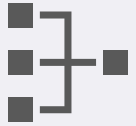
The console plays an important part in quickly showing what is happening in your application when you need to debug it.

Timers

setTimeout only executes the callback function once after the specified duration. But setInterval calls the callback repeatedly after every passing of the specified duration.

__filename and __dirname

These variables are available in each file and give you the full path to the file and directory for the current module.



Process

Use the process object to access the command line arguments. Used to put the callback into the next cycle of the Node.js event loop.

PACKAGE.JSON FILE

The package.json file is kind of a manifest for your project

Central repository of configuration for tools

Manages the dependencies of your project

Properties in package.json file

version indicates the current version

name sets the application/package name

description is a brief description of the app/package

main sets the entry point for the application

private if set to true prevents the app/package to be accidentally published on npm

scripts defines a set of node scripts you can run

dependencies sets a list of npm packages installed as dependencies

devDependencies sets a list of npm packages installed as development dependencies

NODE PACKAGE MANAGER

NPM is the eco-system to manage the project dependencies

Commands	Description
npm install	Install the packages/ dependencies
npm uninstall	Uninstall the packages/dependencies
npm config get/set	Get /set the npm eco-system
npm update	Update the project dependencies
npm ls	List down the dependencies
npm search	Search the listed package on npm registry
npm init	Generates package.json file in local project directory
npm outdated	List down the outdated package

Task – Notes App

- **Notes App should provide following features -**
  - User should be able to run command from command prompt to create, read, delete and list the notes.
  - Should use local file storage
  - Should use terminal colors

- **Commands to run -**

```
> node index.js add --title="New Title" --body="New Title Body"
> node index.js read --title="Some Title"
> node index.js remove --title="Some Title"
> node index.js list
```

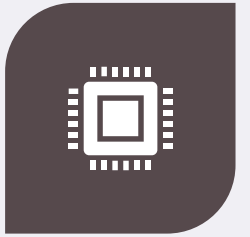
Express
(Fast, unopinionated, minimalist web framework)

Web application framework for node apps.

Express can accept middleware using the ‘use’ function which can be registered with http.Createserver.

Express request / response objects are derived from standard Nodejs HTTP request / response

Request object can handle URL : route parameter & querystrings



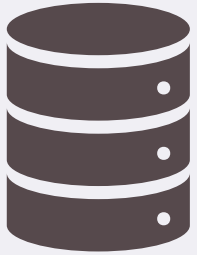
Express router is used to mount middlewares and access all REST APIs

Data Persistence

Why NoSQL ?

– Scalability

– Ease of Development



NoSQL servers can be placed into four broad categories:

- Document databases (e.g. MongoDB)
- Key-value databases (e.g. Redis)
- Column-family databases (e.g. Cassandra)
- Graph databases (e.g. Neo4J)

MongoDB

A MongoDB deployment consists of multiple databases.

Each database can contain multiple collections.

A collection is simply a name that you give to a collection of documents. Each collection can contain multiple documents.

A document is effectively a JSON document

Mongoose

Mongoose provides a straight-forward, schema-based solution to model your application data.

It includes built-in type casting, validation, query building, business logic hooks and more, out of the box.

```
npm install mongoose
```

Task – REST API : Todo App

Todo App should provide following API

METHOD	API	DESCRIPTION
GET	/todos	Get all todo items
POST	/todos	Create todo item
GET	/todos/{id}	Get single todo item
PATCH	/todos/{id}	Update single todo item
DELETE	/todos/{id}	Delete single to item

REFERENCES

READING MATERIAL

- https://nodejs.org/en/docs
- https://nodejs.dev

VIDEO LINKS

- https://www.youtube.com/watch?v=zb3Qk8SG5Ms&list=PL4cUxeGkcC9jsz4LDYc6kv3ymONOKxwBU
- https://www.youtube.com/watch?v=Oe421EPjeBE&t=4708s
- https://www.youtube.com/watch?v=MpGLUVbqoYQ&t=4s