JS

npm

Express JS

Introduction to node JS®

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What we’ll do learn today

- The 3-tier architecture
  - Presentation layer
  - Application layer
  - Data layer
- What is the Node.js ?
- What can I do with Node.js ?
- Javascript everywhere !
- Getting started with Node
  - Node REPL

The 3-tier architecture

Related to the process of building a piece of software, an application or a system.

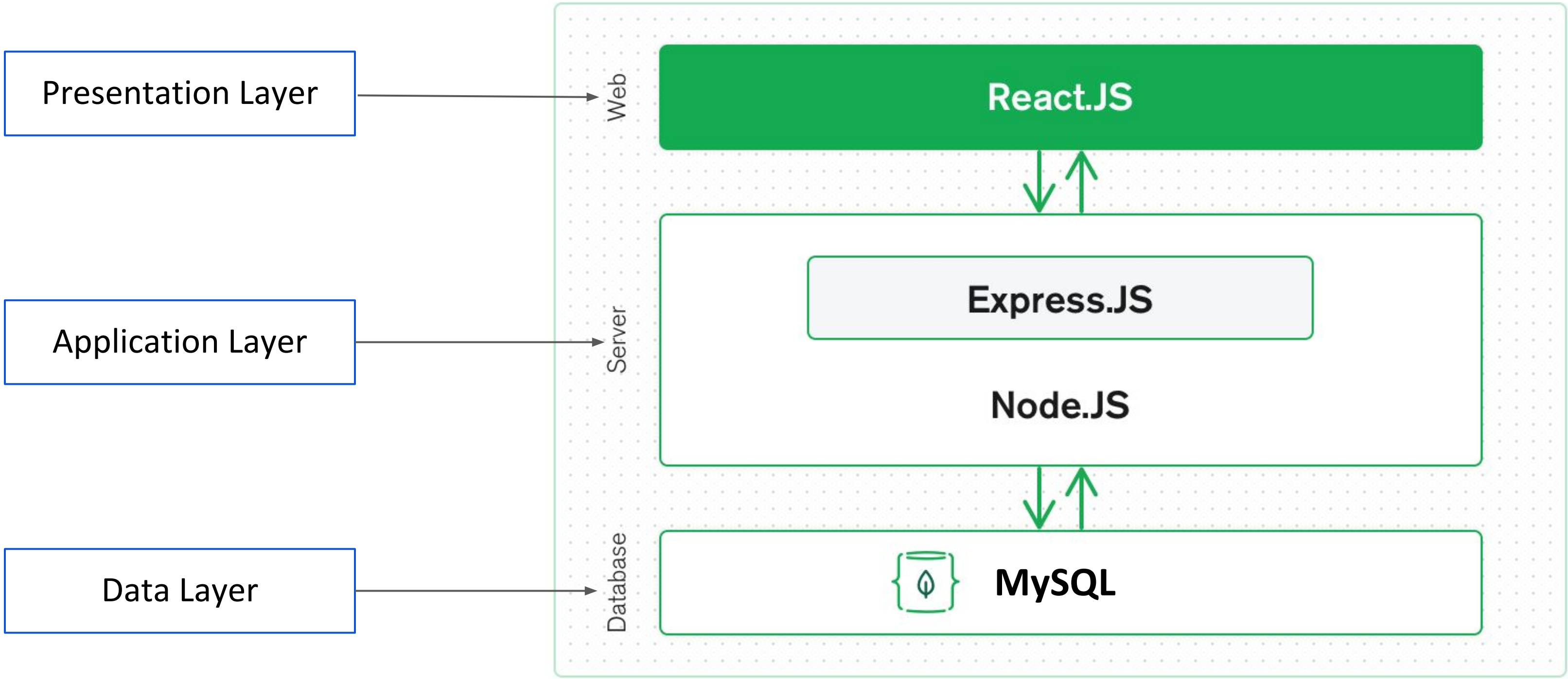
3 tier/layer architecture is a specific type of *client-server system*.

It divides the architecture into three tiers:

1. Presentation layer [front-end]
2. Application layer [middleware]
3. Data layer [back-end]

All 3 of these architectural layers work together to produce the entire system/ piece of software.

Allows updating a particular part of the software/app independently of the other parts.



Presentation Layer

Application Layer

Data Layer

Web

React.JS

Server

Express.JS

Node.JS

Database

MySQL

The Presentation tier (UI) *aka* ***front-end***

- Top level of the application/system, represents the front-end layer, often built on HTML5, JS, or CSS. Concerned with delivering the information to the user.
  - Also includes native mobile interfaces, kiosks, and other visual display systems.
- Popular web development frameworks, such as Angular, React, Vue etc could be used here.
- All the elements of the software that are **visible and is directly interactable** by the end user.
  - A combination of two different elements:
    - the graphic design (the look)
    - the user interface (the feel).

The Application tier *aka* ***middlewares***

- Sometimes called the ***Logic layer***, is everything the user doesn’t see (except the back-end layer).
  - Stores functional business logic which drives an application’s core capabilities.
  - Access to multiple databases, extra layers for security.
  - Concerned more about the data access, validation, content processing, and generating the content to be delivered to the user
- Links the front and back end of the system together acting as a **bridge between the front and back end**.
  - Responds to requests made by the user by sending/recieving information from the back end and sending it to the front end to be displayed.
  - Ensure that the user is served with the correct information as quickly as possible.

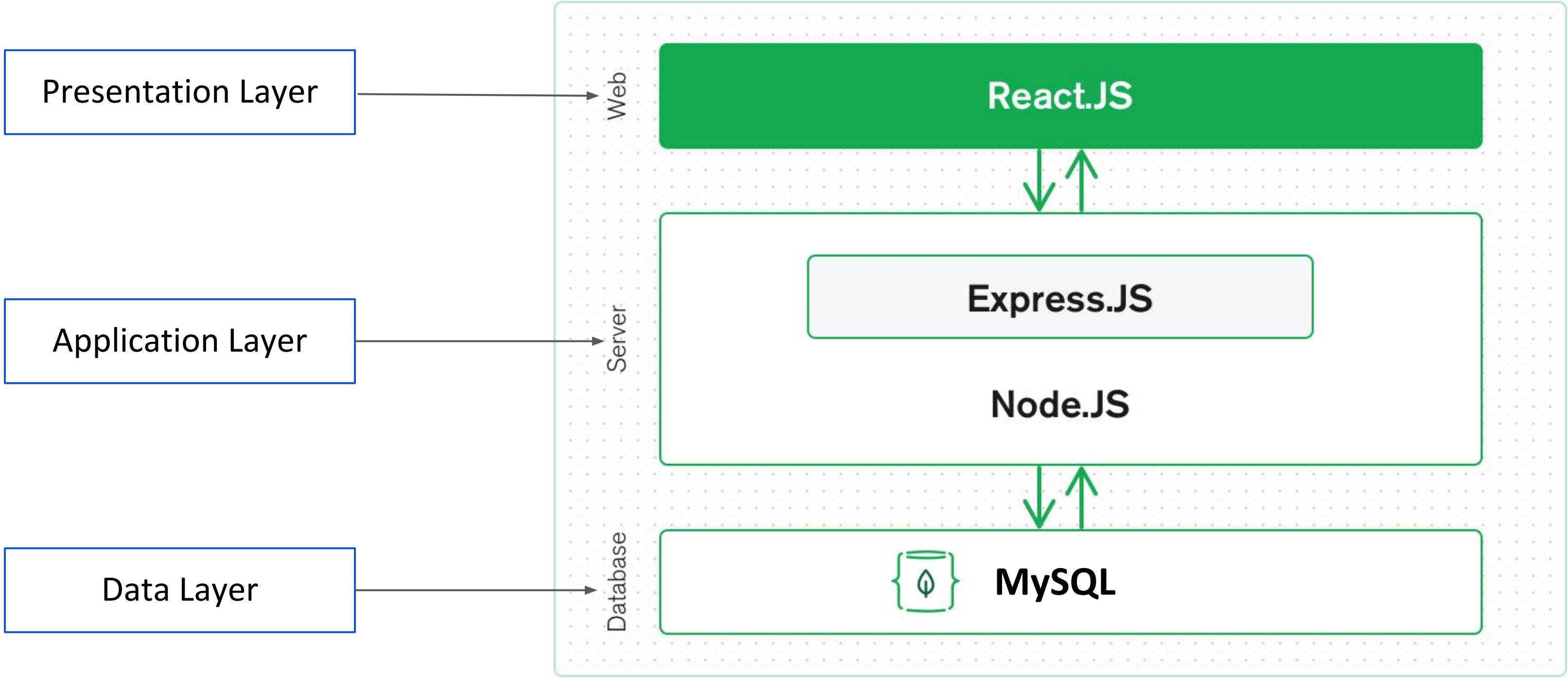
The Data tier *aka* ***persistance layer..***

- Comprises of both ***data sets*** and the ***database management system software*** that manages and provides access to the data.

- The part of a computer system or application that is ***not directly accessed*** by the user, typically responsible for **storing and manipulating data**.
  - Data is accessed by the application layer via API calls.

- In simple terms, a way to ***SAVE*** and ***RETRIEVE*** items that your application uses.
  - Persistence layers allows you to perform CRUD (Create, Read, Update, Delete) operations.

- Example for DBMS - ***MySQL***, MongoDB, Oracle PL/SQL, MariaDB, etc



Presentation Layer

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Presentation tier

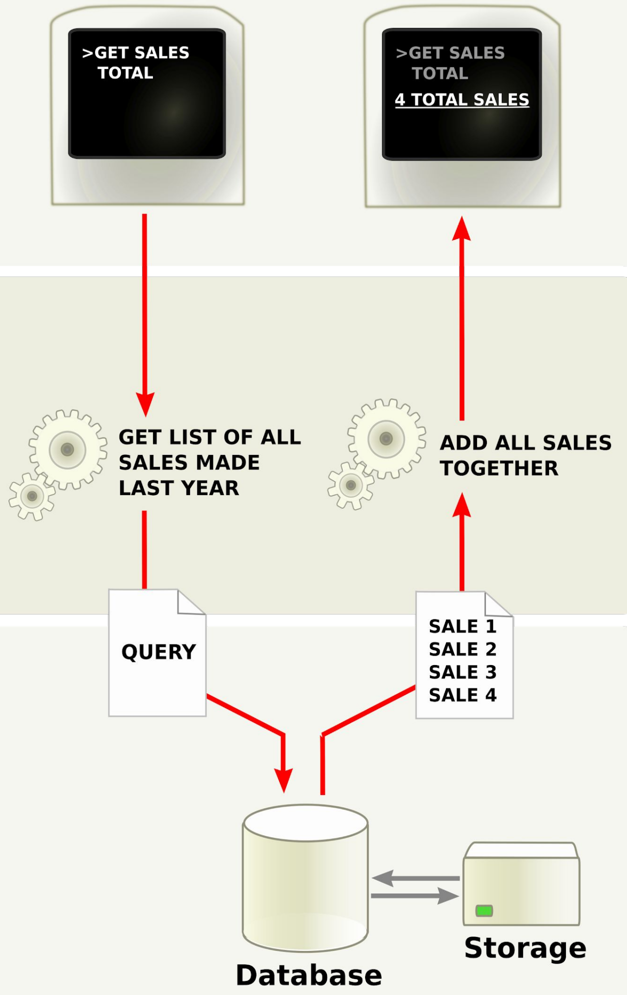
The top-most level of the application is the user interface. The main function of the interface is to translate tasks and results to something the user can understand.

Logic tier

This layer coordinates the application, processes commands, makes logical decisions and evaluations, and performs calculations. It also moves and processes data between the two surrounding layers.

Data tier

Here information is stored and retrieved from a database or file system. The information is then passed back to the logic tier for processing, and then eventually back to the user.



>GET SALES TOTAL

>GET SALES TOTAL

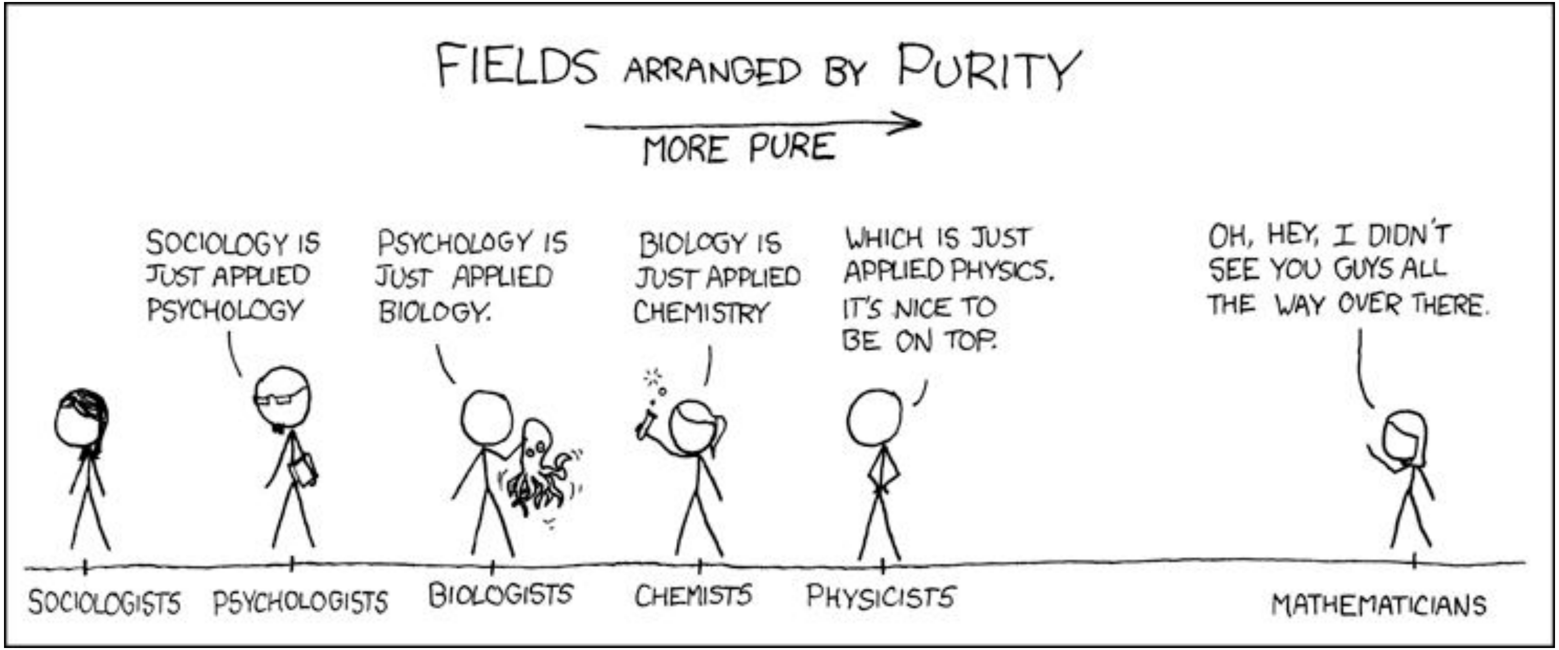
4 TOTAL SALES

GET LIST OF ALL SALES MADE LAST YEAR

ADD ALL SALES TOGETHER

QUERY

SALE 1
SALE 2
SALE 3
SALE 4


FIELDS ARRANGED BY PURITY
MORE PURE
SOCIOLOGY IS JUST APPLIED PSYCHOLOGY
PSYCHOLOGY IS JUST APPLIED BIOLOGY.
BIOLOGY IS JUST APPLIED CHEMISTRY
WHICH IS JUST APPLIED PHYSICS. IT'S NICE TO BE ON TOP.
OH, HEY, I DIDN'T SEE YOU GUYS ALL THE WAY OVER THERE.
SOCIOLOGISTS
PSYCHOLOGISTS
BIOLOGISTS
CHEMISTS
PHYSICISTS
MATHEMATICIANS

xkcd.com/435

So for us, the

presentation layer → **React.js**

application layer → **Node.js**

data layer → **MySQL**

Questions ?

What is Node.js?

- Node.js is a javascript runtime built in Chrome’s V8 engine.
  - Chrome's V8 JavaScript engine ***compiles JavaScript directly to native machine code*** before executing it. V8 is written in C++ — so it’s fast.
  - Created by Ryan Dahl in 2009 - *https://youtu.be/EeYvFl7li9E*
- It is a ***cross-platform*** JavaScript runtime environment
  - Node allows you to execute ***Javascript code outside of the browser***, in a computing environment rather then a browser environment.
- It’s ***NOT a programming language*** used almost exclusively for developing back-end web applications, like PHP or Ruby.
- It’s ***NOT a package manager***, though there are several node package managers.

Things we could do with Node.js

- Build **cross-platform desktop apps** using NW.js and Electron
    - *https://www.electronjs.org/*
- Node **Games**, browser-based HTML5 games
    - Realtime and turn-based games
- Responsive **Real-time applications**
    - Node applications that can push data to clients in realtime.
    - Streaming binary data such as audio (Spotify streaming server) or video (Netflix) directly to browsers
    - Instant messenger applications like WhatsUp
- Lightweight **servers for IoT** devices
- Package management, build tools, command line tools
    - create-react-app

Sharp Demo

week-1/sharp-demo

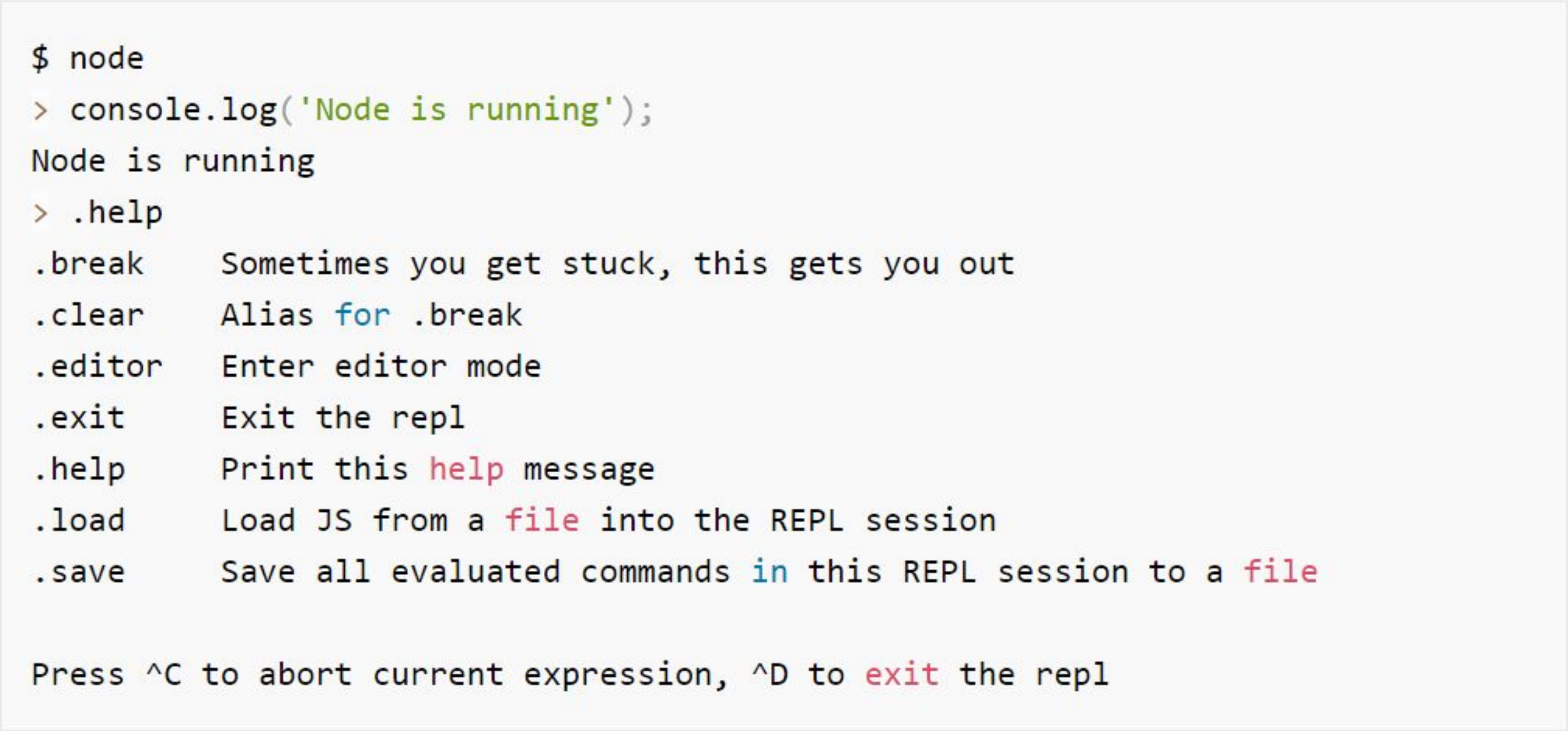
Run Javascript everywhere !

- For the eighth year in a row, JavaScript is the ***most commonly* used** programming language - https://insights.stackoverflow.com/survey/2020
- JavaScript is the only language that allows you to build web applications, APIs, mobile applications, and desktop apps
- Simple syntax, large ecosystem and, a great community.

Getting started

You probably already have everything !

Node REPL



```
$ node
> console.log('Node is running');
Node is running
> .help
.break    Sometimes you get stuck, this gets you out
.clear    Alias for .break
.editor   Enter editor mode
.exit     Exit the repl
.help     Print this help message
.load     Load JS from a file into the REPL session
.save     Save all evaluated commands in this REPL session to a file

Press ^C to abort current expression, ^D to exit the repl
```

Thank you