



# CAPSTONE PROJECT 1

CMU-SE-450 / CMU-IS-450 / CMU-CS-450

## TECHNOLOGIES STACK DOCUMENT

Version 1.2

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## SMART DASHBOARD APPLICATION

### Submitted by

Vo Van Hoa  
Pham Van Tin  
Ky Huu Dong  
Tran Thanh Kieu

### Approved by

#### Capstone Project 1 - Mentor:

Name

Signature

Date

Binh, Thanh Nguyen \_\_\_\_\_

A handwritten signature in blue ink, appearing to be 'Nguyen Binh Thanh', written over a horizontal line.

\_\_\_\_\_ 14 - Dec- 2020

Name

Signature

Date

Huy, Truong Dinh \_\_\_\_\_

PROJECT INFORMATION			
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<b>Project Mentor</b>	PhD Binh, Nguyen Thanh; MSc Huy, Truong Dinh		
<b>Scrum Master</b>	Hoa, Vo	hoavo.dng@gmail.com	0935.193.182
<b>Team Members</b>	Tin, Pham Van	tinphamvan123@gmail.com	0932.535.175
	Dong, Ky Huu	kyhuudong@gmail.com	0898.246.980
	Kieu, Tran Thanh	thanhkieutran391@gmail.com	0358.583.251

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## REVISION HISTORY

Version	Person(s)	Date	Description	Approval
Draft	Tin, Pham	06 - Nov - 2020	Initiate document	x
1.0	All members	06 - Nov - 2020	Finish content of document	x
1.1	Tin, Pham	14 - Nov - 2020	Update content of Frontend	x
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## 1. INTRODUCTION

### 1.1. PURPOSE OF DOCUMENT

The purpose of the Technology Stack Document is to provide a brief, yet clear information about all the technologies that make the project.

### 1.2. DOCUMENT OBJECTIVES

The Technology Stack has the following objectives:

- To describe the technologies that we are using to build the project.

### 1.3. INTENDED AUDIENCE

This document is intended for the following audiences.

### 1.4. ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Meaning
<b>SDA</b>	<b>S</b> mart <b>D</b> ashboard <b>A</b> pplication

## 2. MAIN DECISIONS TO CHOOSE TECHNOLOGIES

We have some key decisions to choose our technologies stack:

- Open source technologies: We would like to choose all the frameworks, tech stacks that are licensed under MIT license so that we can have more support from the community
- New but proven technologies: We use React, Redux as well as NodeJS for our project because they are new, so that we can really learn new things by building our project. Also, they've been used in production in many projects by the community so that we know that they are safe.
- Document rich: We want to have a framework with a good and well organised document so that we save our time reading the docs.

## 3. PROGRAMING LANGUAGE

### 3.1. JAVASCRIPT

JavaScript often abbreviated as JS, is a high-level, dynamic, weakly typed, prototype-based, multi-paradigm, and interpreted programming language. It's the most popular language nowadays and can be used everywhere. Javascript is so popular that we can easily find a solution for our problem on Google and Stackoverflow.

### 3.2. PYTHON

Python is an elegant, versatile language with an ecosystem of powerful modules and code libraries. There are over a hundred tools that act as a framework, libraries, or software for ETL. These tools become your go-to source once you start dealing with complex schemas and massive amounts of data. Therefore, we use Python to make the ETL process become easier to program and more effective.

### 3.3. HTML/CSS

HTML (the Hypertext Markup Language) and CSS (Cascading Style Sheets) are two of the core technologies for building Web pages. HTML provides the structure of the page, CSS the (visual and aural) layout, for a variety of devices. Along with graphics and scripting, HTML and CSS are the basis of building Web pages and Web Applications.

### 3.4. SQL


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## 4. TECHNOLOGIES OF WEB APPLICATIONS

### 4.1. REACT

Home page: <https://reactjs.org/>

React is the current industry standard that offers a lot of out of the box benefits. It is fast, efficient, and scalable. Due to the large community, finding solutions to potential problems



and reference material is much easier, even for a potential dev without a lot of experience who would like to contribute to the Main Course.

## Pros of React

### The community

Like with most online developer communities, the React one is growing and offers a great network of experienced developers.

### Faster development

Speed is often the name of the game where development is concerned. Anything that can speed up the development of an application is much appreciated!

With React, the development time is considerably shorter.

## 4.2. REDUX

Home page: <https://redux.js.org/>

Redux is a predictable state container for JavaScript apps.

It helps you write applications that behave consistently, run in different environments (client, server, and native), and are easy to test. On top of that, it provides a great developer experience, such as live code editing combined with a time traveling debugger.

You can use Redux together with React, or with any other view library.

## 4.3. RESTful API

RESTful API is an architectural style for an application program interface (API) that uses HTTP requests to access and use data. We build APIs based on RESTful principles for easy data accessing and interacting between different levels of the system.

## 4.4. ExpressJS

A prebuilt NodeJS framework that makes creating server side applications simple, fast, and flexible. NodeJS is powered by Google's V8 Engine which means it's powerful and can handle a large number of requests without lapsing in dependability. Also, this means that this is a highly scalable choice when you consider the Event Loop which manages all asynchronous operations allowing the program to continue to run as expected without stops.



## 5. Database / Data Cubes

### 5.1. PostgreSQL

PostgreSQL is one of the most well developed and mature relational database management systems, with its development, ongoing for more than 20 years now, from supporting small websites on single machines to data warehouses and large scale concurrent setups.

### 5.2. PgAdmin 4

pgAdmin is the most popular and feature rich Open Source administration and development platform for PostgreSQL, the most advanced Open Source database in the world.

### 5.3. OpenRefine/RDF Extension

RDF extension of OpenRefine is a reconciliation service for registered SPARQL endpoints, a graphical user interface(GUI) for exporting data of Google Refine projects in RDF format. The export is based on mapping the data to a template graph using the GUI.

### 5.4. GraphDB

Enterprise RDF and graph database with efficient reasoning, cluster and external index synchronization support.

## 6. DEVELOPMENT STACK

### 6.1. VISUAL STUDIO CODE

Home page: <http://code.visualstudio.com/>

Visual Studio Code (Vscode) is a great open source code editor developed by Microsoft, it provides a rich and easy to use user interface as well as thousands of extensions that we can install to suit our needs.

## 6.2. ESLINT

Eslint is a must have tool to lint our project, so that we can provide a consistent code style to work in our team.

## 6.3. PRETTIER

Prettier, used with Eslint, helps us to auto format our code on save.

## 6.4. REACT DEVTOOLS AND REDUX DEVTOOLS

React and Redux are being used heavily in our project. That's why the devtools will help us debug our code easier.

# 7. VERSION CONTROL

## 7.1. GITHUB

Home page: <https://github.com>

GitHub is a repository hosting service. Think of it as the "cloud" for code.

GitHub will host your source code projects in a variety of different programming languages and keep track of the various changes made to every iteration. It is able to do this by using git, a revision control system that runs in the command line interface.

Using GitHub has numerous benefits including easier collaboration with colleagues and peers, ability to look back on previous versions, and tons of easy integration options.

# 8. DEPLOYMENT

## 8.1. FIREBASE

Home page: <http://firebase.google.com/>

We use Firebase to deploy hosting

Firebase, offered by Google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search and YouTube. Alongside a set of management tools, it provides a series of modular cloud services including computing, data storage, data analytics and machine learning.

Firebase provides a rich set of tools, configs and tutorials that can help us quickly deploy our application in just a matter of minutes.

## 8.2. Virtual Machine

Linux VPS is a cost methodology in which there is a physical server, although several completely independent virtual servers run from each other. We use Linux VPS to configure server configurations in the cloud, as well as a cloud environment for deploying and launching APIs, thereby making it easier for users to interact with the system and database.