Chapter III
Literature Review

3.1. Django

Django is a web framework based on Python language that was created on 2003. Django main focus is to rapid development. Django handles many things in web development and web deployment. This framework can seamlessly migrate database. It is also support many types of database like MySQL , PostgreSQL , MongoDB or SQLite with its ORM. Django is using MVT as its design architecture. This framework is loosely coupled so developer, data engineer, designer, or even business side can use similar interface to develop and deploy website. The main idea for this loosely coupled framework is every component in website can be manage independently.

3.1.1. Python

Python is a high-level, general-purpose programming language created by Guido van Rossum. Python general idea is to make programming readable, simple and reusable but still powerful as a programming language. Python already become popular in engineering fields, especially computer engineering. This programming language is used in artificial intelligence, data scientist, website application, desktop application, networking, and embedded system. Python is a community based programming language. Python have PIP as its package manager.

3.1.2. uWSGI Django

UWSGI is a interface that connect application with web server. In this case, the application is written in python with Django framework. WSGI task is to make python application could be run by web server service like NGINX.

Normally, web service can not run python application so uWSGI will load the application to the interface and run it as a web server.

3.1.3. MVT(Model-View-Template)

MVT is development patter or design pattern for Django framework. This development concept using model for interfacing with database , template for HTML , CSS , JS design, and view to combine data from model and HTML design from template. View contain logic and data computation. Its data will be rendered to template. Model can contain logic or computation that prepare or manipulate the data. This model will become the object that contain data.

3.1.4. REST Framework & REST Framework JWT

REST framework and REST framework JWT is a package that extend django for RESTful API. REST framework JWT give additional JWT authentication. This package already contain class and object that can be use to automatically make a API. Its main feature is API View, Serializers, and authentication. Using API View we can define allowed method and permission. It is also can define every action or logic for each method. Serializers is a class that define data field for received JSON. This serializers will automatically translate json string to object. Inside the serializers already include data validation and can be interfaced with model.

3.1.5. ORM (Object-Relational Mapping)

ORM is a mechanism to automatically transfer data from database to a object. ORM make data manipulation easier and faster because programmer no need to use SQL language to manipulate the data but the programmer just need to manipulate the object. ORM can efficiently do a transaction to database because it will not run SQL command for each request but Scollect all of the related request to one transaction. Django ORM make django can automatically migrate model

to the database. It makes database manipulation become seamless. Every database transaction can be manipulate in model object.

3.1.6. PIP

PIP is python package manager. Python code is reusable but it makes python code sometimes need a lot of dependencies. PIP make the programmer easily find the dependencies and reuse others code. For example, one of the repository for the package is PyPi. PyPi contain package that is develop by many python developer. This make python code become more powerful when the community is increasing.

3.1.7. Python Virtual Environment

Python virtual environment is a feature that python give to enclose development environment. All package that is being installed is saved in each used virtual environment. It will make the package does not interfere will other development environment. It is also does not change package in main system.

3.2. NodeJs

NodeJs is a javascript run-time environment. This run-time environment lets javascript being executed by server. Main idea from nodejs is server-side and client-side can be written using the same language in this case written using javascript. NodeJs is built on chrome's V8 engine. Nodejs is using event driven mechanism and non blocking I/O. Nodejs have event loop to keep track the event. If there is a task or event, it will give it to the filesystem and continue to the next task. This means it will not wait for that task and block the I/O. NodeJs mainly use asynchronous for its function.

3.2.1. NPM

NPM is a package manager for NodeJs. When using NodeJs, all package is installed using NPM and will be stored at node modules. For each project, there

8

will be package.json file that store information about project and its dependencies. NPM can add that dependencies if needed or install the dependencies that is needed for the project base on package.json. This feature help developer to collect all dependencies needed and makes NodeJs scallable. Basically, NodeJs can be run on almost all system because its run-time machine. NPM help NodeJs to make sure the application in every machine have the same configuration and meets its requirements.

3.3. VueJs

VueJs is a javascript framework for building user application and single page application. VueJs can put rendered data to HTML template. When the data declared and bound to the template, both of them will be reactive. VueJs have directive for html tag attribute. It lets programmer to put logic in the HTML. VueJs using single state tree. Every state stored into a single tree. This state can be use in every Vue component. To change the state, VueJs use mutation. Mutation is a synchronous function. For asynchronous action will be put in action.

3.3.1. Vuex

Vuex is a state management pattern and library for VueJs. It is ensure the state, mutation, and action is called in expected and predictable way. This pattern is usefully for large-scale application or project. Vuex have clear architecture because Vuex use one-way data flow so programmer can manage Vue state easily. Vuex also integrate with Vue devtools for debugging.

3.3.2. Instance

VueJs instace is a declaration of a Vue component or object. It is contain data, function, state and template. Each instance will be registered as a component in Vue. Instance have lifecycle. This lifecycle is a conditon/state of the component. The lifecycles event are before create, created, before mount,

mounted, before update, updated, before destroy, destroyed. Before create is when the instance finish initiate its event and lifecycle. Created happen when the instance initiate its reactivity. Before mount happen when the instance already rendered the template. Mounted is a event happen when the instance load to the page. Before update happen when a new data appear. Updated happen when the HTML already re-rendered with the new data. Before destroy event happen when destroy function is called. Destroyed happen when the instance already teardown its event listener and child component.

3.3.3. Watcher and Emitter

Watcher is a feature in VueJs to watch or monitored data that being pass to another component. If there is a change or update to that data, The watcher will be execute its defined function. Emitter is a feature that send a signal to upper level component. If emitter function is called it will send a signal to notify the upper level component that this function being executed. To use this feature, upper level component also need to apply listener to this event.

3.4. Git

Git is a distributed version control system. It is used for collaboration between programmers. Git also can be used for file tracking. Git support a lot of feature like branching and merging. It enables user to do experiment or make a base workflow.

3.4.1. BitBucket

BitBucket is a web-base version control system using Git. BitBucket owned and maintained by atlassian. BitBucket integrate with other products of atlassian so it not only can be useful for programmer but can be used for project management. Atlassian already give a full support for project management. Each product of atlassian can be integrate. It helps for documentation and project

tracking. BitBucket usually used commercially for its support but it also provide free account.

3.4.2. GitLab

GitLab is web-base DevOps tools that provide git repository. GitLab owned and managed by Gitlab inc. GitLab provide full lifecycle of devops from development, testing until deployment. GitLab have CI/CD feature to automatically deploy and test application. It makes software delivery become easy and fast. This feature also make the application scalable.

3.4.3. SmartGit

SmartGit is a tool for git management. SmartGit support many git repository like GitLab, BitBucket and GitHub. It helps user to manage multiple repository and handle conflict in repository. SmartGit also support single authentication for all repository. With its UI, it helps execute git command and it handle the error.

3.5. CSS/SCSS/SASS

CSS (Cascade Style Sheet) is a language to define how a website being represented. CSS define style for each element in HTML document. SCSS is an extention of CSS. SCSS give CSS additional feature like variables. Every valid CSS syntax is a valid syntax of SCSS. SASS is a pre-processor of CSS but SASS is not extent CSS itself. SASS use indentation for represent nested selector. Every SASS can be compiled into a CSS file.

3.6. JavaScript

JavaScript is a programming language that mostly used for web application. JavaScript make static HTML can have interactivity. Initially

JavaScript only can be used for client-side but today, JavaScript can be used in server-side using NodeJs. JavaScript control interactivity and data in client-side. JavaScript support several programming paradigm like object-oriented, procedural or functional.

3.6.1. Jquery

Jquery is a library for JavaScript. Jquery simplify usage of vanilla-JavaScript. Main feature in Jquery is its selector. Jquery selector lets user select a HTML element using DOM. Jquery also provide library for AJAX request with simpler usage and implementation. Jquery can be implement using CDN or self-managed static file. Jquery API provide function to make dynamic interactivity in website.

3.6.2. TypeScript

TypeScript is a programming language that is strictly syntactical superset JavaScript. Normally JavaScript will juggle its data type so when variable declared, JavaScript does not explicitly define its data type. JavaScript will assign that variable data type when a value is assign to that variable. JavaScript also does not have a strict rule for its syntax. Sometimes it gives problem to maintain the data. TypeScript want to resolve this problem. With TypeScript, programmer can define the data type and it has a strict rule of syntax. With this programmer can ensure the integrity of data.

3.7. PostgreSQL

PostgreSQL is a relational database management based on SQL language. PostgreSQL provide feature to safely store and scale most data workload. PostgreSQL can be run on all major operating systems. With its architecture, PostgreSQL can reliably do a data transaction and protect its integrity. It can be done because its robustness. This feature make PostgreSQL can manage data no matter big or small with the same manner.

3.7.1. PgAdmin

PgAdmin is a tool for administrate and develop PostgreSQL database. PgAdmin provide graphical interface to simplify database management. Every feature in PostgreSQL can be used in PgAdmin. PgAdmin provide database monitoring to let administrator troubleshoot the database. For its utility, PgAdmin can do automate unit testing. This help administrator to regularly maintain its database. Other than that, it is also have a feature to backup and restore the database.

3.8. JSON Web Token

JSON Web Token or JWT for short is a JSON-based open standard for granting an access to user. This access can be in a form of claims. For example, when the user have a token then it means the user has logged in. JWT widely used for API especially for access control and user authentication. JWT usually represent as a token string that represent user identity. JWT generation can be variative depends on system requirements. JWT mainly used for sessionless server. JWT will replace user session token with JWT for session verification. In this case, JWT is used to differentiate each user in a single thread system. This feature make JWT popular for scaling a system.

3.8.1. Authentication / Verification

After a generation of token using secret key, system will give that token to the user. If there is a request to the server. Server will check its header. If there is a token exist, the server will verify it by decrypt it with secret key in server and check its credential. If the token is match with user credential in server, the request will be handled but if there is no token match, the request will be drop.

3.8.2. NGINX

NGINX is a web server service that can be use for HTTP server or mail server. NGINX use event-driven architecture to handle request. This characteristic make NGINX have high performance and small memory footprint rather than conventional thread based architecture. This feature also make NGINX scalable. NGINX support feature like reverse proxy with caching, websocket, and load balancing.