DOMAIN

All the time, learning is a importance part in human social. Human learning for knowlead, skills… Arcording Unesco Human have to learning because “***learning to know, learning to do, learning to live together and learning to be***”. Because learning is really improtance, thus human have to learning by many way. Human learning at school, university, reading book, reading news… and nowaday human learning on the internet.

Since 1990, distance learning is not on the internet because in that time, personal coputer is too expensive and internet is not development. Almost distance learning in that time via letter. In 1989, a British scientist named "Tim Berners-Lee invented" the World Wide Web (WWW). The development of the personal computer, internet and www make the world closer together. In addtion internet and www make academic insititution in overthe world shared information, documentation, knowled. The World Wide Web was born to help academic institutions in countries around the world share information. But due to its applicability, people gradually apply it to develop distance learning more accessible. In 1994: the first school was applied online learning to their curriculum. In US, distance learning via internet and personal computer has been allowed for student from 9 to 12. In 2002 "OpenCourseWare" was published by MIT. OpenCourseWare provied for many documentation and courses.

Nowaday, technology 4.0 made the world borderless. Distance is not the problem for learning. The advent of high performance personal computer, smart phone, tablet and internet bandwidth has created conditions for many E-learning applications to be born. Learning on the internet vie E-learning application is very convenient for student. They can learning any time and any where with a smart phone or laptop.

Because the needs of people are growing, more and more applications to support distance learning are born. There are many E-learning, class management applications, software,solutions such as Google Classroom, Kahoot, Udemy, FreeCodeCamp, Hackerrank, CodeLearn. Most of them are focused on class management, not following the subject and knowledge of students. Moreover, the data on scores, time when taking quizzes have not been compiled and analyzed thoroughly. Our E-learning system was born to solve the problem. This project of mine is about e-learning. This is a business project aimed at serving customers who are teachers, lecture at primary schools, secondary schools, universities who want a tool to manage students, class, create tests, evaluate knowledge for their students. This project will produce a website for teachers and students. Students can use the website to do testing of class or subject. The teacher can manage their class, subject, test, and take the analysis of the test.

In the future, AR and VR will be treding for everyone and E-learning is not a exception. Which application is not following the trending will be out of the E-learning market share. Moreover AI, deep learning is a feature, this is best tecnology ever for anaysys the data in a E-learning system. Any great E-learning system will have to take the trending of AI and deeplearning.

TECHNOLOGY

In the project E-learning, we have to facing with many problem about technologies and solutions to implement the application.

Nowaday, There is many programing languages and framework base on them for back-end development also front end development. Which programing languages and framework will have advantages and disadvantages, thus to make the decision for technology, programing language and framework for back-end also front-end, we have to list a bunch of problem that we are going to deal with them, in addition we will list what we wanted in a technology, programing languages and framework.

Firstly, let’s write about what I want in a technology, programing languages and framework. The application e-learning have to develop as a website platform, thus for the back-end technology also front-end technology, there are should be web framework, about this conditional, there are some name can be mention as Python with framework Diango, Laravel framework base on Php programing language and ExpressJS is a freamwork from NodeJS platform. they are 3 fabulous name for back-end framework have been used for million developer in over the world. Let’s in detail for each freamwork to find which is the best for E-learning website application.

Diango a framwork base on python programing languages. It is high performance framework with so many benefits for web developer. There are some advantages can mention: Django have many packages to fast develop a lot of popular features as create, read, update, delete, permission, role, authenticate… Moreover Django have private web server, Django base on MVT(model – view – template). Because Django base on Python programming language so it will also have unique advantages for machine learning. Django have a lot of benefit, but it still has some of disadvantages can be mentioned such as: Django is suitable for big system, but it is not suitable for medium system or small system. Moreover it has a huge disadvantage is routing is quite difficult and it is not easy and fast to develop routing and API.

In the E-learning system, I aim the application will be a SPA(single page appplication), thus the application have to implement so many API, but Django is not easy and fast to implement API like RestfulAPI or GraphQL API, thus Django is not suitable to develop our E-learning system. Next, I will explain about Express JS freamwork. This is a framwork from NodeJS platform and base on Javascript programing language. The original purpose of javascript is front-end programing languages but day by day, javascript is increasingly proving that it can become a back-end programming language with a lot of advantages, and that's why NodeJS and the Express framework were born. NodeJS have so many advantages such as: NodeJS has fast processing speed asynchronous processing mechanism (non-blocking). Developer can easily handle thousands of connections in the shortest amount of time. Moreover by asynchronous processing, nodeJS can easy to build real-time application with popular technology is socket.io, nowaday real-time application is more popular. Moreover nodejs has a lot of package to easy implement popular features same as Django: CRUD(create, read, update, delete), permision, authenticate, middleware… In additon nodeJS with ExpressJS can routing is really fast and easy, thus with nodeJS I can easy to implement so many API. NodeJS has a lot of benefits for developer but in other hand Nodejs will bring a lot of disadvantages for developer, there are some disadvantages can be mentioned. The first is a double-edged sword called ' asynchronous processing mechanism', Asynchronous processing sometimes brings some trouble for programmers. When facing " asynchronous " in NodeJS, programmers must often use "promise", "async - await" and callbacks. Programers are easy to fall into the problem named "callback hell". Callback hell will lead to our code being extremely complicated, extremely difficult to read and understand. Moreover unit test is not a part of NodeJS. In NodeJS when programer want to write the unit test for their application, they have to choose a lot of package of unit test such as “jest”, “ava”… that will take many time of programers.

In the our E-leaning system, I do not have many time to implement the application, thus I do not want to fall in the “callback hell” and spend many hours to choose the unit test package or deal with “callback hell”, thus NodeJS is really good but it is not suitable for my E-learning system.

Laravel is the last name of back-end framework in my framwork list. “*Laravel is a web application framework with expressive, elegant syntax. We’ve already laid the foundation — freeing you to create without sweating the small things.*”. This is the sort description on the laravel website. Same as Django and NodeJS, Laravel have also many package from composer to implememt popular features like CRUD, permission, role, authenticate, middleware. Moreover Laravel suitable for two kind of website are: SSR(server side rendering) and SPA(single page application). With SSR, laravel provided “blade” to implement front-end easy and fast, Blade is a simple yet powerful templating engine powered by Laravel. Unlike most other templating engines, Blade doesn't limit you to using simple PHP code in the View. In NodeJS it also have some of templating engine like blade such as: “hbs” or “ejs” and so many other, but most of them do not support too much use of javascript, must follow specific syntax for each template engine. Thus, Blade and laravel are a pair of similar articles for implement SSR websites. Moreover about SPA, laravel is very easy to route and build APIs without using any other packages. This is similar to Unit Test in laravel, When using laravel to develop web applications, programmers already have enough tools to perform unit testing such as mockery, faker, factory, sqlite... these tools exist as part of laravel without installing any other packages. In addition Laravel base on php programing language, it is not asynochourus, thus programers is can not be fall in to the callback hell like nodeJS. In other hand, laravel also have disadvantages can be mentioned: processing speed of laravel is much lower than nodeJS and django and the tool “composer” is really heavy.

**In conclusion** I really want to use the laravel for the back-end part because it suitalbe for all of my requirement about a back-end framwork: it is easy to install and implement. It is eoungh package to implement popular feature like: CRUD, permission and role, middleware, authenticate, json web token, CSRF token and too many. Moreover laravel base on php and it is not sync programing language and I can save almost time by avoid solving with sync. About E-learning system, it is not heavy system and it have no machine learning part insde, thus laravel is most enough for the back-end, Django is really suitable for big system like insgram, spotify.

In above part I has been gived almost about the 3 framwork and the reasone why I choice Laravel is back-end framwork for E-learning system. In the part I will discuss about importance thing. It is the database. In our E-learning system, we aim for the data for many student and lectures or teacher. Moreover we have to manage a lot of data about grade of student, testing, result of analysis. Therefor, we need a database is popular for many developer and system, moreover the database have to has a DB management tool to help the developer implement the application faster and easy. One more thing, the database have to working well with php programing languages and laravel framework. There are two database suitable for the requirement are mongodb and MySQL.

According the mongo website “***MongoDB is a document-oriented NoSQL database used for high volume data storage. Instead of using tables and rows as in the traditional relational databases, MongoDB makes use of collections and documents. Documents consist of key-value pairs which are the basic unit of data in MongoDB. Collections contain sets of documents and function which is the equivalent of relational database tables. MongoDB is a database which came into light around the mid-2000s***”. Mongodb have a lot of benefit for user, because mongo stored the data as json, it is NoSQL data base, thus it is really suitable for the system have to scalde up day by day. Moreover mongo DB have a tool to management the database, it is really friendly for user and named “atlas”. Mongo is really good but I have one more choice is more suitable for the php programing languages and Laravel framework. It is MySQL, acording mysql website “***MySQL is an open-source relational database management system. Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language***.” Same as Mongo DB mysql have a management tool with high performance. In addition mysql is SQL database, I can using the query to working with laravel framework, moreover laravel framework have a module named “Eloquent”, it supported almost for mysql, by eloquent I can write the query to working with database easy and faster. In conclusion MySQL and Php – Laravel framework is really suitable to working together.

METHODOLOGIES

To manage this project, we need to choose a project management model. I can come up with 2 models that I would consider using in my project. There are the waterfall model and the Scrum model.

Firstly I will explain about the waterfall model. Waterfall - is a cascading SDLC paradigm in which the development process resembles a flow, progressing through the phases of analysis, projecting, realization, testing, implementation, and support one step at a time. This SDLC model contains the whole execution of each stage. Every aspect of the software development life cycle model is meticulously documented and standardized, with characteristics expected at each stage.

Waterfall model has a lot of advantages, there are easy to understand and use for the project. With its rigidity comes simplicity in management: each phase has a clear outcome and process review, the waterfall model has stages progress sequentially. Moreover it perfect for the small or mid-sized projects where requirements are clear and not equivocal.

In addition, the waterfall model has some of disadvantages, there are the product is ready only after the last stage is over. Really hard to change the requirement has been designed, thus this is not inappropriate for the long-term projects.

About the scrum model, as opposed to the waterfall methodology, encourages iterative and incremental development. Each stage of the process culminates in a finished product that can be put to use right away.

There are some advantages of the scrum model. Firstly the product is ready for each stage in the life cycle of the software. In each stage will also have the mini step, that means the product can be changed some of the requirement has been designed if, in the development process, the production team discovered any requirement is not suitable.

In addition the scrum model also have some of disadvantages. Due to the lack of a clear end date, scrum frequently leads to scope creep. Moreover, if team members aren't fully committed or cooperative, the project is more likely to fail. Therefore The Scrum framework is difficult to implement in big groups. Only experienced team members can use the framework to its full potential.

In this project, my team has only 2 members, but we are all inexperienced in software development and project management. This is because I think the scrum model is not suitable for us to apply to the project. Besides, the project that we will develop is to build a product, the project does not go in the direction of outsourcing so we will design our project from the beginning and make sure that the features and ideas that We've designed right and will be deployed, so the waterfall model is a good choice.