Project Proposal

In the digital age, online education is in the demand and the fitness domain is surging. People are continuously looking for ways to improve their health and wellbeing, and with an increase in health consciousness, there is a need and a potential market for a platform where users can both learn and teach fitness course. As such the aim of this project to develop a scalable and reliable application that uses cloud computing technologies to provide a platform for enthusiast to learn new skills and share their knowledge. The overall objective of the project is to create a space where users can browse, purchase and engage with fitness courses. As such, the core features will include:

* Course favouriting
* Commenting on courses
* Shopping List Creation
* Wish List Generator
* Search for courses
* Listing and selling courses

Allowing users to engage with courses and other will lead to the formation of a tighter community and foster healthy competition. Traditional computing usually consists of a monolithic system that may suffer from scalability issues, especially during peak traffic times. Traditional systems might not have the flexibility needed to integrate multiple features seamlessly and that is where benefits of cloud computing becomes apparent. Utilising cloud computing will allow the web application to scale based on traffic and demand. Additionally the distributed nature of cloud computing ensures that availability is high and the modular approach allows for easier integration of new features. This project will be using Google Cloud Platform (GCP) which provides a myriad of built-in tools and services that can enhance the ease of implementation and security for a traditional system.

In terms of the technical solution, the front-end is implemented with Nginx web server that will handle incoming HTTP requests and relay them to the PHP application. The Php application server is where the source of code of project runs which is powered by Codeigniter 4 framework. MySQL is the chosen database sever and phpMyAdmin will be used as a web interface to the database.

As apart of Google Cloud Platform, Google Compute Engine (GCE) VM instances will be deployed to host the application. Docker is used to containerise the different functionalities of the site for separation of concern. This ensure that’s applications run consistently across devices and eliminates the “it works on my machine” problem. Furthermore it isolates the application from the host machine and can be transferred and run anywhere Docker is installed. Docker Swarm is a powerful tool that provides orchestration and native clustering capabilities for Docker. The tools can turn a group of Docker hosts into a single virtual host which means that it can be set up without a singling point of failure. Docker Swarm also has built in tools for load balancing traffic between containers and can easily allow for scaling the services. This project will utilising Docker Swarm with three instance nodes:

* one managing node and,
* two worker nodes

As a benefit of using Google Cloud Platform, the network infrastructure supporting the project provides high availability and built-in fault tolerances. GCP networking meshes well with other GCP services that the project will use like Compute Engine. Security is also priority and GCP ensures that the network is secure and gives the option to configure virtual private networks and firewalls. For a month cost estimation of all the cloud resources used in this project assuming that the project deployed to production and run 24/7, Google Cloud Platform charges for various aspects such as:

|  |  |
| --- | --- |
| Feature | Cost |
| Ingress and Egress Traffic, data leaving a GCP region or going to the internet has a costs and this would be a point of concern as courses may involve large transfer to data across the servers | $0.15 per GiB, assuming on the lower end only 200GB of storage is transferred per month is $35/month. |
| Static External IP address which is reserved | $0.014 per hour. Is roughly $10/month per IP address. Ideally there are 3 instances so total is $30/month. |
| Compute Engines. The VM instances used are N1-standard-2 (2 vCPU, 1 core, 7.5 GB memory) based in region Australia-southeast1-b. They run Ubuntu and have 50GB each of persistent disk. | These cost $75.63/month each. Ideally the project should have at least 3 nodes running to provide resilience and reliable application. So total cost $226.9/month. |

The estimated monthly total cost if the project was deployed and running 24/7 with scalability, reliance and resilience in mind would be approximately $291.9 per month. This is a significant amount of money but for a business, it is appropriate for all the benefit it provides over traditional computing. Note that these are estimations and actual costs can vary based on actual usage and changes in GCP pricing.

Diagram depicting the workflow of the project:

