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1.0 Introduction

In the development of science and technology today, the Fourth Industrial Revolution (4th IR) plays an important role in the daily tasks of humans. 4th IR technologies such as artificial intelligence and machine learning, Internet of Things (IoT), Big Data Analytics, cloud computing and others play an important role in ensuring that every job can be done in a limited time. One of the 4th IR technologies such as cloud computing plays a very important role in managing an organization and businesses in order to meet the needs of customers. There is no denying that all these 4th IR technologies solve many problems faced by organizations whether in the education, business or tourism sectors in providing a great experience in their respective sectors. There are many cloud computing service providers that have been established which offer a lot of specifications. There are a lot of options for service providers that have different qualities and capabilities. The main objective of this paper is to create a solution for problems faced by bioinformatics course students. This paper contains 3 sections. The first section outline is the content of cloud computing. Section 3.0 describes the architecture planning and design. In section 4.0, we conclude our research and provide arguments about it.

2.0 Content

Bioinformatics deals with the collection and efficient analysis of biological data, particularly genomic information from DNA sequencers. This course is characterized by a high degree of fragmentation in which literally hundreds of different software packages are regularly used for scientific analyses with an incompatible variety of dependencies and a broad range of resource requirements.

Therefore, the client aims for one specific software tool that can complete all the requirements needed by students and lecturers of a bioinformatics course from the simple command line tools, to more complex graphical programs and standalone web services. This includes a range of software packages such as BioJava, Biopython, NET Bio, SOAP Suite, LabKey Server and many others which help the learning, research, predicting, solving and programming for Bioinformatics course.

As a solution, we will summarize all on-demand tools for Bioinformatics course students such as popular software such as NetSurfP, NetTurnP, MODELLER, AutoDock, Gromacs and OrfPredictor in one software. The software platform is designed to teach bioinformatics concepts and methods including Rosalind and online courses offered through the Swiss Bioinformatics Institute, videos and slides from the Canadian Bioinformatics Workshop and other related bioinformatics courses that have been combined under one software platform to provide more interactive and easy-to-use tools that will simplify the process and students can create their own workflows accurately. These solutions include the use of AI technology to further simplify the task of identifying writing errors or student answers. This will make it easier for lecturers to mark student assignments and assignments can also be returned in a short time. In addition, there are also meeting applications combined with other student applications. The meeting app also uses AI technology that helps keep track of student and lecturer meetings, keep track of attendance records and keep track of the amount of time they have spent in meetings in the past few weeks. After the meeting, AI can help summarize key topics, present a schedule or work plan and more. It is easier for them to know at what time the meeting took place.

3.0 Architecture Planning and Design

We named this software platform 'AlphaBI'. The word alpha means to have the highest position in the hierarchy of mastery while BI is taken from the word bioinformatics itself. Therefore, this software is mainly focused on bioinformatics students and lecturers because many applications in this software are about learning and teaching subjects related to computer science bioinformatics.

The cloud computing we use is Amazon Web Services (AWS) because AWS has more services and more features in the service than any other cloud provider such as infrastructure technologies like computing, storage and databases. There are also emerging technologies like machine learning, artificial intelligence, data and analytics and the Internet of Things (IoT) in AWS. This makes it faster, easier and more cost-effective for us to move from the existing apps to the cloud and build almost anything we want to build.

In terms of the network of our software platform, we use Virtual Private Cloud (VPC) as VPC will establishes a separate virtual network environment for our AWS account to provide cloud services, other AWS resources and services run inside VPC networks to surely provide us with the software we need to create this platform without the need of high end computer. A VPC is similar to a typical TCP/IP network in that it may be grown and expanded as needed without the hassle of running a physical data center. VPC allows us to quickly create a virtual network architecture into which AWS instances can be deployed in which each of VPC specifies the requirements for our AWS that are IP address, subnets, routing, security and networking functionality. Multiple VPCs can be hosted by a single Amazon account. Because VPCs are self-contained, we can duplicate private subnets between them in the same manner that we could use the same subnet in two distinct physical data centers. We can also specify public IP addresses that can be used to connect to VPC-launched instances through the internet. Because of this feature, it allows us to create the program much faster and at the same time prevent the project data from being leaked or stolen.

For the storage, Amazon S3 was chosen as Amazon S3's administration tools can be used to optimize, organize, and configure data access to meet our specific business, organizational, and compliance needs. The S3 offers industry-leading scalability, data availability, security, and performance that meet our demand to create the software platform. For a variety of use scenarios, including data lakes, websites, mobile applications, backup and restore, archive, business applications, IoT devices, and big data analytics, Amazon S3 can store and preserve any quantity of data and make sure the software platform can run smoothly even if any problem occurs. The main reason why we choose Amazon S3 was because of the abundance of feature that are storage classes, storage management, access management, data processing, storage logging and monitoring, analytics and insights, and strong consistency. This feature

allows us as developers to create the software with more ease and neatly maintain the platform software from having crashes or bugs.

In the database system of our software platform, we use Amazon DynamoDB. It is a fully managed NoSQL database service that provides fast and predictable performance with seamless scalability. DynamoDB allows us to unload the administrative load to operate and scale a distributed database so that we no longer have to worry about hardware allocation, setup and configuration, replication, software patching or batch scaling. DynamoDB also offers encryption at rest, which eliminates the operational burden and complexity involved in protecting sensitive data. DynamoDB can improve performance and scalability as it gives us the ability to auto-scale by tracking our usage distance to the upper boundary. This can allow our system to adjust according to the amount of data traffic, helping us avoid problems with performance while reducing costs. As mentioned earlier, DynamoDB is a NoSQL database, where items in the same table can have different attributes. This gives us the flexibility to add attributes as our application grows and we also can store newer format items next to older format items in the same table without having to perform a schema migration.

4.0 Conclusion

To summarize, the target for our software AlphaBI is basically to solve the problem that has been faced by the students and teachers while in the learning process. The structure of our system contains one-management with multiple facilities of programs in education; to make a connection with teachers, available notes or past year questions, access to assignment and for teacher's marking purpose. This program generally makes learning easy and more accessible. This AlphaBI software will definitely help in enhancing educational learning especially for bioinformatics students. The suitable cloud storage (Amazon S3) has been chosen for user use to store all the things they want. This will make their practicality faster and more cost effective than data centers and it allows users to create specific work requirements through our software. We also provide an optional database (Amazon DynamoDB) to organize the collection of structured data in computer systems and also to simplify user workflows. We provide an ideal network (Amazon Virtual Private Cloud) so users can connect devices to enable data sharing, secure networking and maintain bandwidth. With the use of AWS in the development of this software such as Amazon Virtual Private Cloud (VPC), Amazon S3 and Amazon DynamoDB, it definitely helps in providing a better experience for students and lecturers in learning while using this software.