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CLOUD COMPUTING TECHNOLOGIES

An Overview and Recommendations Based on Specified Case
Study

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Introduction:

Cloud computing technology is one of the most important and emerging technologies in the present situation. The cloud computing technology provides on-demand services for computing. By using the cloud computing solutions different types of resources can be provided to the users for computing purposes and these resources include processing power, storage resources, and applications (Marinescu 2017). Due to these characteristics of a cloud computing solution, many of the large organizations are interested in or using cloud computing solutions within their organization. These organizations are mainly interested in this type of solution as the cloud computing solution will provide different types of advantages to the organization while the operational cost of the organization will also be decreased.

In this aspect, the London Bikes Ltd is a small and medium-sized organization, which is located in the heart of London City. Their main business is selling high to low-end bicycles which can be used for city riding. They also prepare a custom cycle as per the requirement of the customer. Currently, they use some specific type of IT capabilities within their organization for the purpose of the sale. Like other big organizations, London Bikes Ltd is also looking to implement cloud computing solutions to achieve the benefits of this platform. One of their main aims is implementing the Software as a Service platform for improving their overall business performance. For the employment of the cloud computing solutions, London Bikes Ltd is wanting to start with the cloud data backup solution and the main aim, in this case, is securing all types of confidential data of the organization. Through this report, a basic overview of cloud computing will be conveyed to London Bikes Ltd and the benefits of implementing the cloud computing solution will be explained to them.

Background and Terminology of Cloud Computing:

For the staff at London Bikes Ltd, it is important to know the background of cloud computing before cloud computing is actually launched within the organization. For the staff who are not very much familiar with the cloud computing solutions, for them, the cloud computing solution is a particular style for computing, through which the organizations can achieve a flexible and a scalable IT functionality and these services are delivered as a facility to the organizations through the internet services. Currently, cloud computing is not something which is a revolutionary idea, rather it is an evolutionary concept which is the integration of various types of technologies so that a better IT provisioning tool can be offered to the users (Hurwitz and Kirsch 2020). The applications which run within the cloud computing environment are considered as the cloud application and these applications are capable of extending their accessibility through the internet services and for that the cloud computing environment uses high power servers and huge data centers which are responsible for hosting purpose of the web services and the applications. There are five very crucial attributes of cloud computing solutions. The first attribute is service-based. The second attribute is that this solution is elastic and scalable in nature. The third attribute is the shared attribute of cloud computing. The fourth attribute is that cloud computing solutions can be metered by utilization (Botta *et al.* 2016). The last attribute of the cloud computing solution is that it utilizes internet technology for all of its operations.

There are several benefits that will be also achieved by London Bikes Ltd if they implement this solution within the organization. The first benefit which will be achieved in this case is the flexibility (Rittinghouse and Ransome 2016). The cloud computing solutions are capable of increasing or decreasing the computing power as per the requirement of the

user. This makes them extremely flexible in their area of usage. The scalability is another important area of advantage, which can be attained by the employment of cloud computing solutions. Scalability means that London Bikes Ltd will be able to scale its resource requirement at any moment of the time. Also, a high amount of automation will be achieved within the organization by the application of the cloud computing solution. For this reason, cloud computing can play an important role in London Bikes Ltd.

For cloud computing solutions, there are several key terminologies associated in this case. These terminologies are discussed in the below section.

- **Private Cloud:** The private cloud is one of the key terminologies in this case. The private cloud is a particular cloud computing solution that is dedicatedly used for a single organization, where all the functionality remains the same (Griebler *et al.* 2018).
- **Public Cloud:** The public cloud is another important terminology, which is the opposite of the private cloud. The public cloud can be used publicly without any type of restrictions where all the features of cloud computing remain the same. One example of the public cloud is the internet.
- **Hybrid Cloud:** Hybrid cloud is another specific cloud computing solution. The hybrid cloud is nothing but another cloud computing platform that includes both the public cloud solution and the private cloud solution (Yangui *et al.* 2016).
- **PaaS and SaaS:** Both PaaS and SaaS are other vital terminologies for cloud computing solutions. PaaS defines the platform as a service that is a category for cloud computing services. In this platform, both the businesses and the developers are provided with a platform where they develop applications using internet services. In

this way, the organizations can save the cost of infrastructure required for building the solutions (Verba *et al.* 2017). The SaaS on the other hand stands for the software as a service that actually provides on-demand software services for the organizations. Here, the users get access to the database system and the application software for organizational purposes.

- **Elastic Computing:** *Elastic* computing is another important terminology in this case. Elastic computing is a precise concept in cloud computing where the resources for the computing can be simply scaled down or up according to the user's or organization's requirement. The elastic nature of cloud computing resources is the main definition of elastic computing.
- **Vendor Lock-In:** This is another important terminology in this case. It defines that the organization cannot switch to different cloud service vendors due to different types of data structures, protocols, and models.
- **Cloud Provider:** Cloud provider terminology defines the provider of different types of cloud services. This can be an organization or a company. This type of organization receives payment from their client and as per their requirement, cloud-based services are provided to their clients.
- **Cloud Sourcing:** Cloud sourcing is another important terminology in this aspect. The cloud sourcing can be considered as the outsourced IT assets delivery through a cloud computing environment (Baun and Kunze 2019). In this aspect, rather than investing in a full-fledged solution for IT support, the organizations just only outsource all the requirements through the cloud environment. This is known as cloud sourcing.

Essential Characteristics and Benefits:

There are several important characteristics, which can be expected from cloud computing solutions if it is implemented for any potential solution. In this aspect, there are five very important essential characteristics which can be achieved through the potential solution. These five characteristics of the cloud computing solution are discussed in the below section.

- ***On-Demand Self Service:*** The cloud computing technology is capable of providing the required resources without any type of human intervention from the actual service provider (Gai *et al.* 2016). It means any type of increased resources required will be handled by the system itself and it will be provided on an immediate basis.
- ***Broad Access of Network:*** Here, it defines that the accessibility, if this network is very much broad as the cloud computing solution, can be accessed from any type of connection, including the LAN for private networks to the internet for accessing the public cloud networks.
- ***Resource Pooling and Multi-Tenancy:*** The resource pooling defines that the multiple of user demand can be satisfied by using the same physical resource. In this aspect, if the resource pool of the cloud service provider is large in size, then resource pooling can be easily achieved for the implemented cloud computing solution (Li *et al.* 2018). The multi-tenancy is another important aspect of the cloud computing solution. Through the multi-tenancy model of cloud computing, multiple users are able to enjoy a similar IT infrastructure where all the aspects of security and privacy will be retained.

- ***Rapid Scalability:*** Scalability is an important aspect of any type of service where cloud computing solutions are capable of providing rapid scalability by responding to the requirement of the users. Through rapid scalability, the users can achieve their required resources in quick succession which will ensure the normal flow of all the important processes.
- ***Measured Service:*** The measured service defines that the users only need to pay the service amount, which is used by them in the cloud service environment. In this aspect, the users do not need to pay anything extra for cloud computing services. This defines the measured service, which is an important characteristic of the cloud computing service.

There are several important benefits that can be also expected if London Bikes Ltd implements any type of potential cloud computing solution. These are elaborated in the following section.

- ***Reduced IT Costs:*** Reduction in the overall IT costs for the organization is one important benefit, which will be achieved in this case. The cloud computing solution will eliminate any type of IT infrastructure cost for business purposes (Deng *et al.* 2016). In this way, the reduced amount of IT-related costs can be attained by the use of cloud computing solutions.
- ***Business Continuity:*** By the implementation of the cloud computing solution, the business continuity of the organization can be also maintained. The cloud computing solution will provide protection for business-related data, which is an important part of business continuity. London Bikes Ltd can access this data anytime when required, which will play a crucial role in business continuity.

- ***Improved Collaboration:*** Improved collaboration is another important benefit, which can be achieved by London Bikes Ltd by using this system. Cloud computing solutions will make the process for collaboration very much easier (Li *et al.* 2018). For this reason, improved collaboration is another important benefit that can be accomplished by the utilization of cloud computing solutions.

Service Models and Available Real-World Services:

Now considering the service model offered by the cloud computing solution, it has been assessed that a total of three types of service models are available. These service models of cloud computing are the Software as a Service, Platform as a Service, and the Infrastructure as a Service.

- ***Software as a Service:*** This SaaS or the Software as a Service is a specific type of cloud service model where the applications are controlled using web service and the London Bikes Ltd not required to manage those applications but the application will be managed by the cloud service provider itself (Guo and Ma 2018). This will release London Bikes Ltd from the pressure of software maintenance.
- ***Platform as a Service:*** The Platform as a Service or the PaaS is also a service model available for the cloud computing solution. The PaaS will provide a cloud-based atmosphere and this environment can be used for building and delivering the application for the London Bikes Ltd without implementing the full infrastructure (Costache *et al.* 2017). An important feature can be also customized in this cloud computing environment.
- ***Infrastructure as a Service:*** The Infrastructure as a Service or the IaaS is another crucial service model for the cloud computing solution. This service model is actually

a standardized aspect for acquiring the capabilities for computing on the basis of the demand of the users (Ibrahim and Hemayed 2019). This demand is requested by the user over the web. For the IaaS the main resources which will be provided to the London Bikes Ltd are the networks, storage, virtual servers, and processing power. In this case, also, the London Bikes Ltd will be required to pay only for the required resources.

There are several real-world services available which work by using the cloud computing solution.

- ***Dropbox:*** The Dropbox is one important real-world service that works on the cloud computing model. This is mainly used for online storage-related purposes. By using this service, the users can easily store the information in the cloud environment and can be accessed through a web portal.
- ***Amazon Web Services:*** The amazon web service is another real-world service example that provides the cloud computing solution to the users. This provides different types of solutions, including business hosting to storage-related service.
- ***Public Services:*** Many governments from different countries also uses the cloud computing solution to provide important services to their citizens. The US government is one example of that.

Deployments Models for Cloud Computing:

Regarding cloud computing solutions, there are a total of three diverse types of models, which can be used for cloud deployment. These are the public cloud, private cloud, and hybrid cloud deployment model.

- **Public Cloud:** The public cloud is a particular model for cloud deployment where the cloud computing solution is deployed publicly. In the public cloud, all the data are stored within some third-party servers which can be accessed by anyone (Wang, Wang, and Domingo-Ferrer 2018). Due to this reason, in this type of deployment, the security of the cloud solution is very much low. Other than all the other amenities of the cloud computing service are remains the same.
- **Private Cloud:** The private cloud deployment is similar to the public cloud but the only difference is that the cloud solution is deployed on a private server rather than a public server which is accessible by all (Sridhar and Smys 2016). For this reason, high security can be achieved by following the deployment model of the private cloud.
- **Hybrid Cloud:** Hybrid cloud is another important cloud deployment process in this case. The hybrid cloud deployment is actually a mixture of both the private cloud and the public cloud (Aktas 2018). The best features of both the private cloud model and the public cloud model are included in this cloud computing deployment model.

Recommended Cloud Deployment Model: Considering all the cloud deployment models which have been discussed in the above section the private cloud deployment is recommended here. The private cloud deployment might be costly, compared with the other two cloud deployment model, but for the London Bikes Ltd, it is very much important to safeguard the security and the privacy of their business operation. The private cloud deployment is highly capable of providing the required amount of security of London Bikes Ltd. For this reason, the private cloud deployment model is recommended for London Bikes Ltd.

Virtualization and Its Relation with Cloud Computing:

In this aspect, virtualization refers to creating virtual servers, devices, infrastructure, and computing resources. In the other aspect, virtualization can be also considered as a specific type of technology that allows the development of useful IT services, which are traditionally bound to the hardware resources. In this process, a virtual instance of a computer system is abstracted from the main hardware (Karl *et al.* 2016). The most common example of virtualization is running several OS on the same computer resources in a simultaneous way. While any applications are executed on the virtualized machine, for the applications it appears that they are running on their own dedicated machine. There are several reasons, due to which the virtualization is used. This is mainly used for simultaneous operations between two different operating systems.

The virtualization is actually closely related to cloud computing. Virtualization is capable of changing the software and the hardware relations and it is actually one core important element for cloud computing. Virtualization is very much helpful for utilizing cloud computing capabilities to its full potential. It is an essential technology for powering cloud computing. In the cloud computing setting, the virtualization is mainly used for server consolidation (Win 2016). In this way, full utilization of the resources can be done which is important for cloud computing. By using the virtualization, the cloud service provider does not need multiple servers for different types of functions, instead, the cloud service provider just split the resources of any single server, and then it can be used for different purposes. In this way, cloud computing and virtualization are associated with each other.

Migration Strategies of Cloud Computing:

For the migration towards the cloud computing environment, there are a total of six common migration strategies. In the following section, these are discussed.

- **Rehosting:** The rehosting is an important strategy regarding cloud computing migration which is actually the lift and shift process (Opara-Martins, Sahandi and Tian 2016). In this cloud migration process redeployment of the cloud, the application is done and, in this case, the main changes are done in the host configuration of the application. This type of migration is actually very much quick.
- **Re-Platforming:** In this case, the migration is done for the applications and for their components without changing anything to the core application architecture of the application. In this type of migration process backward compatibility is also added to the application.
- **Re-Architecting:** The re-architecting is another solution for cloud migration. As per the name, in this cloud migration model re-architecting is done for the existing application so that the application can run smoothly on the cloud platform including all of the services and features provided by the cloud service provider (Osanaiye *et al.* 2017).
- **Re-Purchasing:** In this cloud deployment model old application model is discarded while a new purchase is done for upgrading to the newer version. In this way, migration to the cloud platform is done.
- **Retiring:** Retiring is another process for migrating towards the cloud platform where an assessment is done for each of the applications that are targeted to move to the cloud environment (Rodrigues *et al.* 2016). From the assessment, if the organization

understood that some of these applications do not worth moving to the cloud platform then the application is downed and it is not moved to the cloud platform.

- **Retaining:** This is another process for migrating to the cloud-based platform. In this cloud migration process, some specific applications are not migrated to the cloud platform which can take a huge amount of time for the re-architecting purposes so that the applications become ready to run on the cloud environment. This is also done for the application which is not ready for the migration for that specific moment. Here, retaining the application is done as per the decision of the organization.

Concerns of Security:

Though the cloud computing solution does provide various advantages for the business, there are several security concerns associated with cloud computing. These are discussed in the below section.

Information Breach:

Information Breaches result from an assault or worker carelessness and blunder. This is an essential driver for worry in cloud stages. Vulnerabilities in the application or ineffectual security practices can likewise cause information breaks (Elzamly *et al.* 2017). Representatives may sign into cloud frameworks from their telephones or individual PCs along these lines presenting the framework to focused assaults.

CSA characterizes information penetration including any sort of data that was not planned for open discharge, including individual wellbeing data, budgetary data, by and by recognizable data, exchange insider facts, and protected innovation.

From an examination, it has been assessed that the odds of information penetrate happening were multiple times higher for organizations utilizing the cloud. Information Breach isn't new, however, distributed computing has a specific arrangement of traits that make it increasingly defenseless.

Record Hijacking:

With the expansion in the appropriation of cloud administrations, associations have detailed an expanded event of record capturing. Such assaults include utilizing worker's login data to get to delicate data (Iqbal *et al.* 2016). Assailants can likewise alter, embed bogus data, and control the information present in the cloud. They additionally use scripting bugs or reused passwords to take qualifications without being identified.

Record seizing could have an impending impact at the venture level, sabotaging the company's respectability and notoriety. This could likewise have legitimate ramifications in businesses, for example, human services where the patient's very own clinical records are undermined.

Uncertain APIs and Interfaces:

Clients can tailor their distributed computing experience as indicated by their necessities by utilizing Application Programming Interface or APIs.

These are utilized to extricate, oversee, and collaborate with data on the cloud. Be that as it may, the one of a kind quality of API invites dangers (Singh and Chatterjee 2017). Subsequently, the security of APIs influences the security and accessibility of cloud administrations and stages.

APIs encourage correspondence between applications, in this lies the weakness. Firms need to concentrate on structuring APIs with satisfactory validation, different access control strategies, and encryption innovation.

The latest case of an uncertain API was at Salesforce, where an API bug in its Marketing Cloud administration uncovered client information. This made information be composed starting with one client account then onto the next.

Insider Threat:

An Insider danger is the abuse of data through threatening aim, malware, and even mishaps. Insider dangers start from representatives or framework chairmen, who can get to classified data (Basu *et al.* 2018). They can likewise get to considerably progressively basic frameworks and in the long run information.

At the point when the connection between the business and framework director goes bad, they may turn to release favored data.

There can be a few occurrences of insider danger, for example, a Salesperson who escapes or a maverick administrator. In situations where the cloud specialist organization is liable for the security, the hazard from insider danger is regularly more noteworthy.

Insider dangers can be dodged through business associations, controlled access, and organizing activities.

Implementation Process of SaaS for London Bikes:

For London Bikes to implement the Software as a Service or the SaaS within the organization, there are several steps that need to be followed. In this aspect, there are a total of 11 steps that must be followed for the implementation of SaaS which is discussed below.

- For the implementation of the SaaS within London Bikes first business requirements of them should be understood.
- Then a team must be prepared which will be responsible for implementing the SaaS.
- Following that a scalable infrastructure should be also designed for implementing the SaaS within London Bikes (Mori *et al.* 2016).
- In the next section, a hostile facility and the bandwidth requirement should be finalized.
- Following that the infrastructure components should be procured.
- Next, the SaaS delivery infrastructure should be deployed.
- In the next section disaster recovery and continuity should be planned (Li, Liu and Yan 2017).
- Following that, a monitoring solution should be integrated.
- In the next section, London Bikes should prepare a support center for its customers.
- Next, the service level agreement should be prepared for the SaaS in London Bikes (Abtahi and Abdi 2018).
- Lastly, appropriate documentation will be prepared for the SaaS implementation within the London Bikes.

Conclusion:

The above discussion regarding the cloud computing solution concludes that it is one of the significant aspects for the businesses as it provides several important benefits. In this aspect, cloud computing has been discussed for the London Bikes organization which is a small and medium-size organization in London. Different aspects of cloud computing solutions have been evaluated in this report. In the first section, background and the

terminology for the cloud computing solution have been discussed so that staff at the London Bikes can gain an understanding of the cloud computing solution. Following that important characteristic of the cloud computing solution has been discussed within this report. The service models, which are associated with cloud computing, have been also discussed in this report. Total three service models have been identified in this context. Following the cloud computing service model, deployment models for cloud computing have been discussed and the appropriate model for the London Bikes has been recommended. Also, the virtualization factor of cloud computing has been elaborated in this report. There are several migration strategies, which are applicable for the cloud computing solution and these migration strategies have been discussed for the London Bikes. Also, the main security concern related to cloud computing has been discussed. In the further section of this report implementation process of SaaS for London, Bikes has been discussed.

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