Sarah Walker B4050530 TM352 EMA

Question 3

Before considering changes in technological direction it is important to assess a selection of potential solutions to enable an informed decision is made regarding which solutions to adopt.

With regards to mobile application development, there are a number of options to consider. Firstly, is the development of a native app, which is built for an individual mobile platform to be deployed to an app store and downloaded to a mobile device. An alternative approach would be to develop a web application designed to run on a mobile device, which would be run in the device’s web browser, but can be made to appear to the user as a native app. Lastly there are hybrid apps that are written in HTML and JavaScript code, but use tools such as Cordova to compile the code into native code. In the case of MegaMax my recommendation would be to adopt the web app approach. The development of native apps can be time consuming, as a different version of the app must be developed and supported for each mobile platform Megamax wish to support, and there are additional costs associated with developing native apps and deploying them to an app store for download (Dabit, 2016). Also, as the Megamax salesforce use their own smart devices when out in the field, this will ensure the company has a mobile solution that is usable for the majority of their users, instead of having to develop a native app for each potential operating system if adopting the native/hybrid approach

Using an IaaS offering from a cloud provider would enable Megamax to enjoy the benefits often associated with cloud hosting, such as auto-scaling and reduced costs. There are a number of popular cloud providers offering these products, two of which are Amazon Web Service(AWS) and OpenStack. Using OpenStack would allow Megamax to create their own private cloud infrastructure, hosted internally on a server owned and maintained by them. This would involve some staff training to implement which could have cost implications, but OpenStack is open-source, meaning that it can be used for free. Conversely, AWS hosted applications and data are stored on an external server owned by AWS. In this instance, I would recommend that Megamax consider hosting their applications on AWS. Although AWS comes with associated costs, I feel that based on the fact that MegaMax are at full workload capacity with their current IT staff, it would cost them less in the long run to pay for hosting than to employ any additional staff needed to maintain the infrastructure locally.

To enable Megamax’s web application and mobile application to share centrally stored data, it makes sense to use a web service based development approach. In this way code can be written once and reused, saving development time and preventing code repetition, which is generally considered good coding practise. One methodology for building services would be to use Simple Object Access Protocol(SOAP), which uses XML to send and receive messages. An alternative approach would be to implement REST services which utilise the HTTP protocol to send and receive requests and responses. For a number of reasons, my recommendation to Megamax would be to adopt a REST based service approach. Firstly, REST services are platform independent, and so can easily be used to communicate with a variety of clients using a number of response types including JSON which is more lightweight than XML, meaning they offer better flexibility. Secondly, REST services are easier to implement due to the fact that they utilise HTTP protocols, which should be well known to the current Megamax developers and easier to implement that SOAP services (Stakify, 2017).

**Dealing with legal issues and security risks**

By adopting a web service centred web and mobile solution, Megamax could be exposing themselves to new security risks. APIs will make endpoints available over to internet, which could allow access to Megamax data if not correctly implemented and protected. This could lead to a number of issues, including data breaches or security vulnerabilities. As Megamax store details of customer bank details and transaction records, it is imperative that security best practises are adhered to, to ensure Megamax’s customers can rely on them to keep their details safe.

Firstly, the API and client applications should send requests and responses over a secure protocol, such as HTTPS. This ensures that the data sent between the clients and the server are encrypted, and difficult to intercept in transit. This will give Megamax customers greater peace of mind if they are sending sensitive data to the Megamax servers, such as payment detail. HTTPS authenticates both the client and server using SSL certificates during a transaction, and uses encryption to send the data securely between them, meaning it is much more secure than simply using HTTP.

Megamax should also implement a login process on the applications to ensure that only authorised users are able to access them. This would reduce the risk of certain attacks such as injection and cross-site scripting by restricting the number of users that are able to submit data to the server to only those within Megamax or their clients. If unscrupulous users were able to gain access to the submission forms, and the values submitted into the forms were not properly sanitised, sensitive data could be exposed.

Data protection issues must be considered, especially in respect to the client contact details that are stored by Megamax. Personal data is subject to strict legislation, and if moving to an AWS hosting solution, this data will inevitably be leaving their possession, and moving to a server elsewhere. The cloud provider will be acting as a data processor on behalf of Megamax, but the responsibility still falls to Megamax with regards to adhering to the Data Protection Act, so they must make sure their cloud provider is offering adequate protection. A move to the cloud could in fact offer an improvement on Megamax’s current security offering, as reputable cloud providers have great experience in data security. AWS, for example, have over 1,800 security controls in place governing the services that it provides (Wall, 2016).

**Potential costs and savings of technology, staffing, training etc.**

Due to the underlying protocols and programming languages used to implement the technology recommendations that I have made for Megamax, I believe that the potential costs of implementing these solutions would be lower than if alternative solutions were chosen.

High potential costs could be avoided by developing a web app as opposed to developing native apps for the mobile solution. Web apps are predominately developed using HTML, CSS and JavaScript, which are programming skills that are commonly found in a developer’s skill set. As of last year JavaScript is, in fact, the most popular programming language among the development community (Ramel, 2017). JavaScript developers are cheaper to employ than Android and iOS developers (Dabit, 2016), and so cost savings could be made in this area. Also, the tools required to develop native applications would be more expensive for Megamax to acquire than a more generic and open-source IDE that could be used to write JavaScript. Even if Megamax were not to expand their workforce, the costs of the app development would still be lower when developing a web app, as the research and development and training aspects of this development would be less than when undertaking native app development, which would be a completely new endeavour.

There are cost implications that should be considered when contemplating a move to cloud hosting services. The costs of these services would depend on the resources that Megamax anticipate they will need to meet demand for their new application offerings. Costs will almost certainly be less to host on the cloud than to host on physical machines, due to the concepts of virtualisation that cloud providers implement. Cloud hosting costs do depend on the resources that are used, and Megamax must ensure that they do not over provision the virtual host machines that they acquire to ensure that they are not paying more for the hosting services than is necessary. This would involve carefully monitoring initial usage and adjusting as necessary so that unused resources aren’t being paid for.

If Megamax perceive the future usage of the applications to be variable, with periods where demand on the applications could be higher compared to others, then hosting could offer significant savings in this situation. In this sort of situation resources are scaled backed when they are not required, and Megamax will only pay for the resources currently being utilised. One consideration is that if the level of traffic to the Megamax applications is predicted to be fairly steady, with no huge increases or falls in demand predicted, then the benefits or auto-scaling and the costs associated with that will not be felt as greatly.

Cloud hosting could also offer Megamax savings due to the lack of requirement to buy, maintain and house their own hosting infrastructure. There are staffing costs associated with this, as staff are needed to maintain the servers as well as spending time carrying out deployment activities. Costs associated with housing the servers and the running costs, such as electricity and cooling, will be eliminated, as well as the costs of actually buying the servers themselves and any replacement parts that they may need.

The new technology options that Megamax adopt may involve training with regards to data protection requirements, particularly where the cloud hosting is concerned, and this may come at an additional cost to Megamax.

**Potential for and approaches to scaling and supporting greater reliability of the applications.**

Virtualisation is a concept that allows applications hosted on the cloud to be highly scalable and reliable. Virtualisation involves partitioning a physical server into multiple virtual servers, allowing multiple applications to be hosted on one physical server. Each host appears to be its own self-contained computer. In this way, AWS are able to scale-up the resources available at times when the number of requests being made to the virtual server is high and the response time starts to degrade. The allocated processors and memory to the virtual machine by the physical host are redefined to give more capacity, and the response times of the application will increase back to an acceptable level.

This approach enables greater reliability as opposed to traditional hosting setups as there are no physical machines for Megamax to maintain themselves. There is no need to keep a stock of replacement parts to be kept in case of outage as this maintenance responsibility no longer falls to the Megamax. It is in the interests of providers such as Amazon to maintain a high level of availability, as without this they will lose confidence from their customers, business and money.

AWS hosting solutions have a lot to offer in the way of increasing availability of applications, and this is particularly prominent in situations where demand for an application may exceed that which the available resources can handle. In a traditional hosting environment, if demand reaches a high level it can often lead to the application slowing or crashing completely. Physical resources will need to be added to the infrastructure to bring the application back to a usable state. The potential for this situation to occur is often the reason that physical servers are under-utilised the majority of the time.

The AWS infrastructure includes a load balancer that distributes requests that are made between a number of availability zones. This means that if there is an issue in one availability zone requests can be diverted to another that is still up and running. The load balancer can also determine when demand may be increasing or decreasing and additional virtual machines can be created should demand for resources require it.

**Word count: 1953**

References

(Dabit, 2016) ‘The Cost of Native Mobile App Development is Too Damn High!’ *Hackermoon* [Online] Available at <https://hackernoon.com/the-cost-of-native-mobile-app-development-is-too-damn-high-4d258025033a> (Accessed 01/06/2018)

(Stackify, 2017) ‘SOAP vs. REST: The Differences and Benefits Between the Two Widely-Used Web Service Communication Protocols’ *Stackify* [Online] Available at <https://stackify.com/soap-vs-rest/> (Accessed 01/06/2018)

(Wall, 2016) ‘Can we trust cloud providers to keep our data safe?’ *BBC* [Online] Available at <http://www.bbc.co.uk/news/business-36151754> (Accessed 01/06/2018)

(Ramel, 2017) ‘JavaScript Dominates 2017 Stack Overflow Developer Survey’ *ADTmag* [Online] Available at <https://adtmag.com/articles/2017/03/22/stack-overflow-survey.aspx> (Accessed 01/06/2018)