Should we move data and computation to the cloud, and when?

Ayush Sinha

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Abstract: Data is regarded as the core component of any computing system, no matter how big or small the business. As more and more companies modernize their daily operations globally, massive amounts of data are generated on a regular basis and if they are not moved to the cloud, can become very complex and challenging to handle. When it comes to managing different types of data, cloud computing may prove to be the most practical and effective solution, which also increases the usability of the software. This study will analyze the potential benefits of data in the cloud, as well as why and when data migration should occur.

1. Introduction

Cloud computing has been at the center of attention in computing in both the academic and industrial fields recently [1] [2]. Many organizations including startups view cloud computing as the preferred business strategy to remain competitive and also to meet business demands [1] [2] [3] [4]. Larger enterprises are trying to exploit the advantages of this platform by carefully taking all the business strategies into account [1] [5]. This increasing popularity of leveraging cloud services also means that the existing applications need to adapt to this environment [4]. For this adaptation to take place the data should be migrated to the cloud using specific strategies [6] which is also the need of the hour as one cannot rely on the conventional ways of storing data in this age of ever evolving and expanding data. Thus, this study is structured as follows: Sect. 2 will discuss the reasons to move data to the cloud with it's possible advantages. In Sect. 3, different data migration techniques will be discussed and in Sect. 4,

the question of when to move the data to the cloud will be discussed. Sect. 5 will finally conclude the article, with the summary of entire research paper.

2. Reason for moving Data to Cloud

The advent of Cloud computing has resulted in a paradigm shift in the business processes. One of the most important essence of cloud computing is data processing i.e, cloud computing can understand and apply large data, activate data assets, and serve the relevant departments and enterprises [7].Moreover Cloud computing consists of software, platform and infrastructure to provide data services in a secured manner [8]. One of the foremost reasons to move data to the cloud could be because an organization produces data frequently and overtime it could amount to a humongous data which is usually characterized by their large volumes also called “Big Data” [7] [9]. Additionally, whenever there is a risk to the data security, the company should move their data and computation to the cloud before something irreparable loss happens to the organization. This in turn helps to ensure dynamic data verification and system monitoring in terms of access and also helps to identify data errors and provide dynamic fix to those errors [10]. Cloud computing also possesses features like scalability, reliability and highly accessible model [7]. Due to this the additional costs on equipment programming, support, depreciation can be reduced significantly as compared to on premises infrastructure [7]. Cloud providers also tend to ensure that the entire cloud infrastructure is safe and secure by enabling regular security checks through high end encryption systems [7].

3. Migration techniques

One of the most important aspects of migrating data to the cloud are the techniques involved in carrying out the data transfers. Through a thorough analysis and comparison, we could categorize the migration techniques into three categories: (i) Migration to IaaS, (ii) Migration to PaaS and (iii) Migration to SaaS [6] [11]. The primary technique is to migrate by transferring the whole application to cloud by using IaaS

so that the clients can take full advantage of virtual machines (VM) [6]. The other technique provides platform as a service (PaaS) to the developers over the internet [6] [11] and migration dependent on PaaS is needed to make the system viable with prerequisite of the PaaS vendor [6]. In short PaaS provides a complete "IT" stack which makes it possible for building viable cloud applications [6]. The migration to SaaS can help users to reengineer the existing framework by virtue of the cloud. [6].

4. When to move data to the cloud

Although the cloud infrastructure could come as a lucrative option for the enterprise to move their data, the decision to move the data to the cloud should be made after considering all the positive and negative aspects of the cloud infrastructure. As discussed earlier in Sect. 2, when the data becomes enormous and intricate to handle, one should consider moving data to the cloud [7] [9]. Also, the data migration to the cloud could help reduce the upfront costs that could be incurred in the on-premises infrastructure thus also improving the efficiency [9]. When an organization requires flexibility and agility with their data, then moving the data to the cloud could act as the most preferred solution.

5. Conclusion

The aim of this research was to describe the reasons behind moving the data to the cloud and when should the organizations/enterprises consider moving their data to the cloud. The article first established the core concept of cloud infrastructure and how one could leverage it's capability in storing the data. The paper then discussed about the various migration techniques for moving data to the cloud with the advantages of each of the mentioned migration techniques. The final section of the article addressed the question of "When to move data to the cloud?" by citing various scenarios for an organization along with the potential steps that they could take to smoothly facilitate the data transfer to the cloud. This research paper could be used to further identify the potential research areas for the secure transfer of the data to cloud and to also rectify the research gaps in terms of the trustworthiness of cloud infrastructure.

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