Cloud Computing Challenges and Opportunities in Iran

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Abstract

The success and growth of the Internet is affected in all aspects of our lives, including interactions, learning, and business. Many companies and organizations offer their services through the Internet. Traditionally, access to public services is difficult because it requires a lot during the formal proceedings. Hence, governments around the world have offered their services through the Internet. This approach is known as electronic government. E-government delivers information and communication technology to citizens and business organizations in order to exchange information and service. With e-government, states can provide easier and faster communication with its citizens. The establishment of e-government should be affordable in terms of cost and reliability, in addition, it will also be easier to maintain. Unfortunately, current technologies are not sufficient to meet the needs of e-government. Cloud computing is a new way for acceptance of service on the Internet. This technology provides a platform for the implementation of efficient e-government systems. This approach will lead to cost savings. Because the cloud computing offers hardware, software and processing power in the network as a service, so the technology offers a better solution. Cloud-based e-government noted various benefits of to establish a state such that it can reduce costs, distributed data storage, resource availability, low cost, security management, accountability and variability.

Keywords: Cloud computing, Challenges, SaaS, IaaS, PaaS.

Introduction

The Cloud computing is not a new technology, but a new approach for computing resources using and a model for service delivery through the network. In fact, cloud computing can provides and increase capacity utilization and conservation of resources, so that the processing power and scalable becomes accessible tool. Cloud computing is a new approach in the field of IT. It includes a set of resources and services offered via the Internet. Hence, “cloud computing” is also called “Internet computing.” The word “cloud” is a metaphor for describing the Web as a space where computing has been preinstalled and exists as a service. Operating systems, applications, storage, data, and processing capacity all exist on the Web, ready to be shared among users. Figure 1 shows a conceptual diagram of cloud computing. (Sadiku et al,2014) (Rimal et al, 2011)

According to the International Institute for Technological Research, cloud computing and ubiquitous network model that provides enables easy access to shared resources such as network configuration and, providers locations Storage applications how to enable network inclusive , accessible and on applications By accessing the network. Cloud computing is a computing model, IT service capabilities, scalability and resilience offers via the Internet as a service to the customers.

Parallel and Distributed Systems cloud as a set of computers that are bonded together to form a dynamic virtualization capabilities that are provided in one or more integrated computing resource based on the Service Level Agreement is offered between users and provider set of cloud.

Cloud computing uses the idea of providing personal and business productivity through centralized servers. Cloud includes a variety of services which can be provided on multiple layers. Cloud layers as follows:

![Cloud Computing Architecture](image-url)

Figure 1. Cloud Computing Architecture
I. Service Models

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. These services are broadly divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flowcharts and diagrams. A cloud service has three distinct characteristics that differentiate it from traditional hosting. It is sold on demand, typically by the minute or the hour; it is elastic -- which means that a user can have as much or as little of a service as they want at any given time; and the service is fully managed by the provider. Significant innovations in virtualization and distributed computing, as well as improved access to high-speed Internet and a weak economy, have accelerated interest in cloud computing. This article has been tried to explain cloud computing structure and benefit. (Armbrust et al, 2010) The following service models have different strengths and are suitable for different customers and business objectives. In general, interoperability and portability of customer workloads are more achievable in the Infrastructure as a Service (IaaS) service model because the building blocks of this service are relatively well defined. (Armbrust et al,2010) (Foster et al, 2008)

* Cloud Software as a Service (SaaS). The subscriber uses the provider’s applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a Web browser. The consumer does not manage or control the underlying cloud Infrastructure, including network, servers, operating systems, storage, or individual application capabilities. It might be possible for the subscriber to specify application configuration settings. (Figure 2)

* Cloud Platform as a Service (PaaS). This service allows the subscriber to deploy onto the cloud infrastructure applications that the subscriber created or acquired using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud Infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations.

* Cloud Infrastructure as a Service (IaaS). This service enables the subscriber to use processing, storage, networks, and other fundamental computing resources, and to deploy and run other software, including operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components, such as host firewalls.

![Cloud Clients Diagram](http://www.ijcsns.com)

**Figure 2. Service Models**

E-government on Clouds

Cloud-based e-government systems can in the form of e-government applications and services are distributed within the framework of state standards and offer to customers without any limitation of time and place. Building blocks of cloud computing, the hardware and software architecture and innovative tools expand infrastructure and network virtualization, they find their form. Fast and secure cloud architecture to allocate resources based on the needs of the customer. Another benefit of this infrastructure is reliability, cost reduction through operational efficiency, rapid development of new businesses and also reduce the execution time and response time. (Zhang et al, 2010)
These dimensions are facilitating IT processes in government data centers, automating business processes and implementation public e-government projects. These three areas require extensive computing resources, network and IT infrastructure. In addition to the services mentioned in relation to government customers, several other categories of services include:

- Shared Services
- Information Services
- Interactive Services
- Transaction services
- Services integrated

Reliability and activities time must be considered when presenting the formal specification of cloud infrastructure and must be configured for fault tolerance and redundancy.

The cloud layer was introduced in the previous section, here's how the three layers in the e-government development is described.

1. Infrastructure as a Service (IaaS)

Applications of e-government require very large amounts of data. Cloud computing is the ultimate source of CPU, storage and bandwidth necessary to provide e-government. The application designer should just focus on the features and usability of the application.

2. Platform as a Service (PaaS)

Cloud computing provides a standardized platform for developers of e-government services. Some of these platforms are offering OS, Queuing services, database services, middleware services and workflow services.

3. Software as Service (SaaS)

Government agencies may be reluctant to buy expensive applications in order to promote e-government services. When integrating software and using the latest version of software is one of the government problems, then the government can request applications in the cloud. Many of these applications can be provided as a standard service. Some of them include:

- Resolving complaints system
- Employee Management System
- Recruitment System
- Police electronics, electronic court
- Maintenance of municipal
- Bill Payment Services

But using the cloud computing has own advantages and difficulties that according to that governments use or not that.

- Data extensively: e-government applications encountered large amounts of data in many years. The database must be extended. At the lowest level, relational databases guarantee data integrity, while databases in the cloud can be at any level extend and used for e-government applications.

Audit and event logging: e-government services must be supervised and tracked any changes in the content of information. Accountability must be done to control corruption in the government. Security audits and audit processes should be carried out periodically to ensure system security. Cloud computing helps to analyze large amounts of data in order to detect breaches. (Dillon et al, 2010)

- Publishing and distribution new versions and migration of existing Version: Typically applications uses in e-government departments, provinces and municipalities and therefore time, more effort and funding seek to publish their software. Cloud architecture to create an instance of the application has excellent features to set up a new agency or municipality. Cloud computing can reduce the time required to implement new versions of applications.

- Repair failures, natural disasters such as floods, earthquakes, wars and internal injuries can affect the application of e-government as that they lose not only their data but also services are unavailable. Cloud computing offers tools and technologies to repair failures which simplify things. Clouds are dynamically helps to increase the number of resources to maintain quality services even when load is high.
Extensively and performance system: architecture and the technology used to implement e-government should extensively, and is among common delivery channels. Satisfying needs of users is essential. By Cloud architecture extensively built in, E-government applications can connection to a powerful machine that more present memory, storage, and processor, can be deployed. A simpler solution is clustering applications and horizontal expansion with the addition of resources. (Garrison et al, 2012)

Management policies: for dealing with citizens must abide by government policies and the use in e-government applications. Along infrastructure and data centers, policies should be applied in everyday operations. Cloud architecture helps to implement policies in the data center. Security-related policies, programs and implementation can be formalized and applied in data centers. Using the cloud, e-government apps can manage policies by presenting security and compatibility. (Chen et al, 2010)

Integration of systems, applications and services that provide in an organization must move to cloud and integrate with previously cloud applications. IT helps to create relationships between data in different applications and transition messages between systems to provide faster services to end users. Because cloud computing is built on the principles of service oriented architecture offer a good solution to integrate various applications.

Migration to new technologies, migration technology is always the biggest challenge. The move to different versions of software, using latest versions of applications and security patches in e-government is the key factor in maintaining a data center. Cloud architecture to meet efficiently these requirements through a combination of new software versions and editions at the same time. When new applications tested can be used easily at the operational level.

Reduce investment and operating cost: investment costs means the organization does not need to build and provide infrastructure, will pay. From an operational view because providers do computing, organizations can store operational and maintenance budget.

Increased agility: the goal of cloud computing is to achieve business requirements with high speed. In a private cloud using virtualization can reduce the supply.

Remote management: establishment of a cloud computing infrastructure that makes it possible for the government to be managed elsewhere.

E-government challenges are the challenges of technical, economic, security, etc., as follows:

Cloud Security: Security is a combination of confidentiality, integrity and availability and it is considered one of the main obstacles. Security in cloud computing is divided to providing mechanisms for monitoring cloud servers, providing privacy for sensitive data, preventing unauthorized access cloud provider staffs, prevention data theft and phishing and fraud. (Shaikh et al, 2011)

Dependence on network: access cloud computing services, it depends on network connectivity and Internet, in other words, although the cloud act unmatched processing power, when transmission data is needed in large amount, cloud computing will not be the best model.

Interactions between clouds: one of the challenges which Cisco has forecast, interoperability between clouds. In the classic scenario, cloud, organizations need to ensure the removal or migration between multiple clouds. This scenario needs cooperation between the clouds, users should make sure that traveling from one data center to another data center, their data completely and correctly transmits.

Cost: The cost of the initialization, implementation and maintenance of infrastructure virtualization and high availability for all of the economic challenges is facing e-Government for using cloud computing.

Conclusions

Cloud computing is a model for providing various services to the service is through the internet. E-Government with cloud computing can do Integration management to solve the problem automatically; and manage security like end-to-end and based on the actual amount of data help to funding. On a national level, cloud-based architecture can reduce the duplication of efforts and maximize the effectiveness of resources contributed.

In this paper, we describe the characteristics of cloud computing and its reasons mentioned for using the development of e-government with the introduction of different models of cloud computing application in e-government, the benefits of cloud in
this solutions. E-government will be pervasive throughout the world in future. Cloud computing enables the government to rapidly expand its facilities and cost saving and create programs, services and develop. Cloud computing as an approach is in contrast to traditional data centers, but also there are the challenges of interoperability and interaction between clouds, mobility and security for virtual machines, so standards are needed to cover such challenges


