

A Web Base Information System Using Cloud Computing

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Abstract: Cloud Computing is the new field that was invented and developed during a period not so long ago. It has a lot of benefit such as decreasing the cost that the user needs, process the operation faster and keep the information secure. The security of cloud is the most important issue for several sensitive occupations, for web base information using this kind of computing does not need more than a computer and high speed internet to use application which is developed by cloud computing. This paper presents a model of web based information system at Amazon Web Services using visual studio to build a website with cloud data service which takes data from the instance in EC2 on Amazon Web Services (AWS), then lets AWS host data services from the cloud. The environment used, is EC2 (Elastic Cloud Computing) on AWS (Amazon Web Services) as host for an application which has several services to allow each user use the application separately and securely. AWS configuration and the way of using virtual server which it's given by EC2 will be pointed out in this paper.

Index Terms: Cloud computing, Elastic Cloud Computing (EC2), Amazon Web Service (AWS), Software as a Service (SaaS), Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Public cloud, Private cloud

1 INTRODUCTION

Cloud computing is one of the biggest dream for computing in IT industry. By this kind of computing the applications software become as a web service based on demand. These services process the operation faster, secure, and high performance, therefore the large companies can obtain the result of their processes quickly as their program can extend [1]. By universal use of cloud computing all of the desktops become clean from data and applications, users do not need to update or configure their applications; also installation for any program that related with application is not required. By using cloud computing user can access to any of hardware, software, and data resource [2]. National Institute of Standards and Technology's (NIST) definition of cloud computing describes three service models and four deployment models. Service types are: Infrastructure as a service (IaaS), Platform as a service (PaaS), and Software as a service (SaaS). Private model, public model, community model, and hybrid model are cloud computing models. All of services are available for public users by infrastructure when the model of cloud is public; unlike private which its infrastructures customize for particular user (organization) and services are controlled by cloud owner, then the user can access to these services locally. On the other hand infrastructures on community are not monopolized for one organization; hence services can manage from one of these organizations. Finally hybrid cloud refers combining two kind of cloud together [3]. This paper illustrates the way of using EC2 as a server to host web based application on it.

The rest of this paper is organized as follows: Section 2 includes Overview of cloud computing. while section 3 illustrate several server providers in cloud. On section 4 point out some Comparison between those providers. Then the configurations of using EC2 to host the web application are explained in section 5. At the end section 5 concludes the paper. There are a lot of applications which migrated to cloud services such as; using Cloud in e-health which it offer rapidly retrieve the data for patient, find some information about patients like history medical, allergy medicine, and diseases to allow doctor treat patient quickly. Additional patients need privacy for their medical information which is available on Cloud Computing [4]. Another example of using cloud is library system. Library can be as either PaaS which supply platform for application; despite of that organization can serve the application but cannot control the server, or IaaS which the server can be controlled by organization [5]. Library has been done as SaaS since 2000. However immigrate software applications such as library into IaaS is offered by Amazon Web Services. Those services allow organization to specify each of server size, operating system (Linux or windows), and save limitless data by using S3. As result by using Infrastructure as a service the library application can be brought without any extra service to sport this version, additional insert new application become easy with IaaS [5]. In paper [6] the steps of transfer any application into cloud was shown. These steps are: learning about cloud, find out organization need, choose prototype of cloud that is suitable with needed, cloud assessment, initialize the strategy of cloud, and finally continue improvement step. Migrate telecom system ECE (Ericsson Composition Engine) into cloud is one of another example about cloud which was case study of reference. Cloud computing in IT world is widely vice versa of cloud in telecom system which is limited. Because the cloud computing has virtualization for memory, storage, and etc. then reduce the cost needed; it can be very good opportunity for telecom system to migrate to cloud [7]. The most important issue for telecom system is security of data, thereby using private cloud computing is solution of them. There are some example of telecom system that they are using cloud on their system such as France Telecom, Shanghai Telecom, and SK Telecom [7]. Cloud services are supplied into IT and Communications Technology by Huawei, Cisco system and Google. Huawei created software, integration practices, some

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applications (SMS, MMS) to migrate telecom system into cloud. Companies of telecom system have some concerns for using cloud computing; for instance: application security, latency, and trust the vendor [7]. In this paper using web application in cloud will be described and point out the characteristics of cloud in this kind of applications. The provider used in here is EC2 which is available in AWS.

2 OVERVIEW ON CLOUD COMPUTING

In this section some theoretical information about cloud computing will be described; 1. Definition of cloud computing, 2. Essential characteristics, 3. Service model. 4. Deployment models, 5. Providers, 6. Advantage of cloud computing, and 7. Challenges of Using Cloud Computing.

2.1 Definition of Cloud Computing

Cloud computing refers to any application, data, and etc. which is hosted by the internet. The name of cloud is coming from a symbol that is used for internet in the graph. The cloud can be public or private, users can have any services if the cloud is public otherwise server allows limiting of users to access to that service when it is private.

2.2 Essential Characteristics

Essential Characteristics: Cloud computing has five essential characteristics as shown in Figure1.

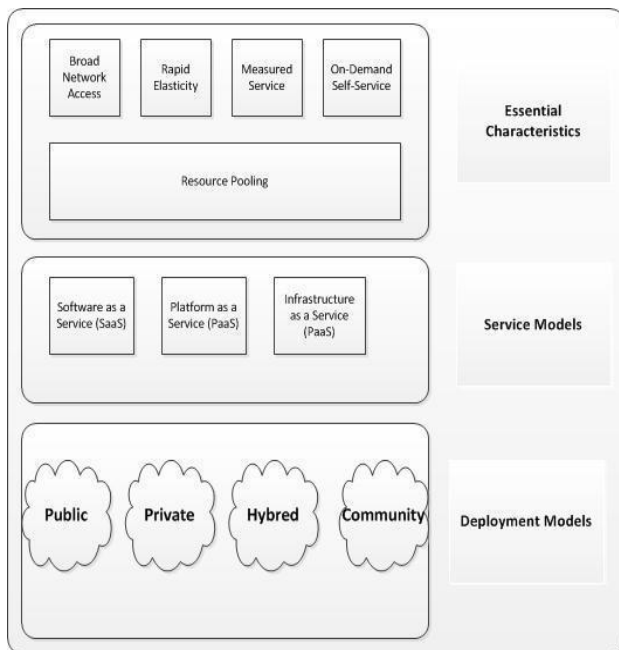


Figure 1. Cloud Computing Overview Model [8]

- On-demand self-service: User can insert any resource require (network, storage, server, etc.) as soon as s/he wants automatically without needed for human effort.
- Broad network access: Here the resources are saved on the server which the customer can use them by heterogeneous (laptop, mobile phone, etc.).
- Resource pooling: The resources are gathering together then serve several customers. These customers don't know about the saving location for the resource on cloud. The benefits for using this characteristic are

“economies of scale and specialization” [9].

- Rapid elasticity: Computing resource price is flexible; that means customers can raise or lower the price immediately, for instance increase the price for web site when it has more load otherwise decrease it.
- Measured service: In spite of the recourses are pooling together to serve several customers, it can measure usage resources separately for each customer.

2.3 Service Model

There are several models for represent cloud computing as shown in Figure1.

- Software as a Service (SaaS): Refer to software associate with data that is hosted in a cloud. Users can use these applications by thin layer interface like web browser which is connected with cloud. Google Mail, Salesforce.com are some examples about SaaS [9].
- Platform as a Service (PaaS): The provider kept application and all of its tools, configuration management on server. Hence the cloud infrastructure completely manages automatically.
- Infrastructure as a Service (IaaS): In here IT infrastructure will be used by customer directly. On the other word the provider will supply the servers, equipments, storage, and backup [3]. In IaaS the user can rent resources that s/he needs from provider due to distributed the resources as a services. Amazon's EC2 is one example of IaaS. The user can use this type of cloud with flexible because it provides highest amount of customization and flexibility to the users [4]

2.4 Deployment Models

As shown in figure1 there are four models:

- Private cloud: Each organization has special cloud that it can control it. Using private cloud has many benefits. Firstly, increased utilization of resources which are existing in organization, secondly, more security for private data, thirdly, the amount of money which one should spend to transfer data from infrastructure in local to public cloud will be saved, finally, create a private cloud for specific utility like education [9].
- Public cloud: Public cloud is available for all the kinds of consumers. The provider has whole of proprietorship of public cloud. Example of this cloud is Amazon EC2, Amazon S3, Google App Engine, and Force.com [9].
- Community cloud: Pool several organizations and share with one infrastructure cloud. Hence the control of this cloud will be with another party for instance seller or with one of these organizations [9].
- Hybrid cloud: The cloud is integration for two clouds or more, hence their entities become unique. This kind of cloud is used when some organizations want to combine their business functions together for improving [9].
- Virtual Private Cloud (VPC): This kind is a special kind which is innovated by the Amazon Web Service and it is not illustrated in the figure 1. Its blend between private and public cloud because it use resources for Amazon for all of consumers and on the other hand the connection between application and cloud is secure.

2.5 Advantages of Cloud Computing

Cloud computing has many advantages at the technical level, user level, company level, and environment level. On this part these advantages will be explained.

- **Technical Advantages:** Cloud computing has many advantages on technical side. These advantages are Power Management, Scalability, Data Storage, Efficiency and reliability.
 - I. **Power management:** using virtual server can manage easily compare with normal physical server [4].
 - II. **Scalability:** Cloud computing processes all of operation easily and rapidly during traffic times without extra infrastructure. This action happens without disturb the user works [4].
 - III. **Data storage:** Cloud computing allows organizations to choose their datacenter easy and use unlimited of data storage on it.
 - IV. **Efficiency and reliability:** Cloud computing has security enough to save all of important data for organization such as financial data which it saved on an external [4].
- **User advantages:** There are some advantages for user as follow[12]. The most important advantage that it does not need special infrastructure for using cloud, therefore any device can access to internet can use for cloud application, hence save capacities on user's computer. Other advantage is, the user doesn't worry about updating his/her program or worry about capacity for data because all of these action will be done by cloud provider itself.
- **Companies advantages:** Cloud computing is useful for small and medium organizations to improve them by spend not much more money for resources [12]. When the company transfers to the cloud, the cost needed for serve its data will be decreased [4].
- **Environment advantages:** Cloud computing is used to share data for several center which it good for save electric power for run each server separated or maintain datacenter[4].

2.6 Challenges of Using Cloud Computing

When the organizations move to cloud computing they face many challenges. These challenges are [13]:

Security: In cloud computing either provider will be responsible for control the resources or there is no control at all. Hence the security will be less.

Lock-In: The data, procedures, tools are not surely to be portable, so it's difficult for user to move from one provider to another.

Isolation failures: Resources on cloud computing are shared with multi costumers, thus it's hard to separate them.

Data protection: The customer has problem for checking if the data is processed or not on cloud and if it is processed in legal way. This kind of problem is faced when the data transfer several times.

Insecure or incomplete data deletion: There is no guarantee when request for delete is given, the data is deleted correctly

due to one of two reasons; first several copy from same data are stored but not enable, second this data are used by another user.

Malicious insider: This is the most dangerous risk for cloud computing which is damaged by malicious insider.

3 SERVER PROVIDERS IN CLOUD

3.1 Microsoft (Windows Azure):

Windows Azure is one of the providers for cloud computing which is built by Microsoft. It is designed for easy use web applications via internet. Cloud services model for Windows Azure is either PaaS or IaaS. Windows Azure is type of both public cloud and private cloud. SQL Azure is one of the services which are available in Windows Azure. This service has Azure database, SQL Azure data Sync, SQL Azure reporting, and Appliance [3]. Microsoft data centers maintain the web application on cloud. Windows Azure can sport Microsoft program languages and even not Microsoft program languages, and also sport XML (Extensible Markup Language), SOAP (Simple Object Access Protocol), and REST (representational state transfer) protocols [3].

3.2 Google (Google App Engine):

GAE is platform as a Service (PaaS) which hosts web based application; on Google managed data center. In GAE the application is processed by several servers in different locations which make the architecture of it very complicate [10]. GAE had been generated since 2008, it refer to public cloud. The services which available on this provider are: Memcache, URL Fetch, Mail, XMPP, Images, Google Accounts, Task Queues, and Blobstore. Some products were created by GAE, such as Gmail, Google Docs, Google Calendar, YouTube, and Google Videos [3].

3.3 Amazon Web Service (AWS):

AWS is one kind of provider which is used in this thesis. It refers to Infrastructure as a Service (IaaS) that use elastic for computing the services. By this provider, the user can use any kind of operation system like Windows, Linux also any kind of software, hence it is very flexible to use. AWS contains a group of services; those services allow database, network and etc. to store and use on it. There are several services are available on AWS such as:

Virtual Private Cloud(VPC):

This service used for creating private virtual network which include all of available services on AWS (it can include everything that it's been on normal network). VPC allow user to create range of acceptable IP address. [15].

S3: S3 is a storage for database which is available on internet. By this service, the users can retrieve or access to their data easy[16].

DynamoDB: DynamoDB is one of database service available on AWS. It is NoSQL database which manage huge of data with high performance by distribute the data into more other servers during the traffic [17].

Amazon Relational Database (RDS):

RDS is relation database which allow user to store his/her

database and manage it as same as other database environments like Mysql or Oracle. Hence the user doesn't need to change the application to be compatible with it. RDS keep back up for database automatically and make it available in any time that the user needs it[18].

Identity and Access Management (IAM):

IAM is one service which controls accessing on AWS; by using it, the users can access to their service securely [19].

EC 2:

Ec2 is a central part of Amazon.com's cloud computing platform; Amazon web services (AWS). Ec2 allows users to rent virtual computers on which to run their own computer applications. Ec2 allow scalable deployment of applications by providing a web service through which a user can boot on Amazon machine image to create a virtual machine, which Amazon calls as "instance" containing any software designed. A user can create, launch, and terminate server instances as needed, paying by the hour for active servers, hence the term "elastic". Ec2 provides users which control over the geographical location of instances that allows for latency optimization and high level of redundancy. This service is used in our thesis refers to Infrastructure as a Service (IaaS). By EC2 users can create virtual machine and choose any specifications for that machine such as memory, hard size, processor, and so on...[11]. There are multiple benefits for EC2. Infrastructure will be configured by a user; thus user can use any program language or tools. EC2 supply huge capacity for user; on the other word the user can store until terabyte from data. Create various machines on EC2 and use them on-demand, will not charge more than what you use [11]. From multiple places the expense of cases are arranged by user. List of IP addresses can either set up user's instances or change the users instance when it has error. Manage the resources during traffic by distribute them on several instances.

4 COMPARING SEVERAL PROVIDERS

In this section some comparison between three different providers (EC2, GAE, Windows Azure) These differences depend on a service model, applications that are available on each one, program languages that each provider support, capacity storage, and the way for control each of them. Table 1 and 2 will be illustrated the comparison between those providers.

TABLE I. COMPRESSION BETWEEN AMAZON EC2 AND GAE

	EC2	GAE
Service Model	IaaS	PaaS
Applications	Any kind of applications	Web based applications
Program language	Any language can be used	Java, Python
Data	NoSQL, SQL.	NoSQL
Storage	From 1GB to 1TB	Not more than 10 MB
Controlled	Controlled by user	Completely automatic

TABLE II. COMPRESSION BETWEEN WINDOWS AZURE AND AMAZON EC2

	Windows Azure	Amazon EC2
Server	Virtual server which can manage and access via web browser	Rent virtual computer to run the application on it
Application Support	Support only windows environment and windows server 2008.	Support any kind of environment (windows, Linux)
Scalability	Easy to scale up	It need some logic and manage from company to scale up
Pricing	Pay for capacity used	Pay for resource used

5 CONFIGURATION OF AWS AND USING EC2 AS A SERVER

- There are several steps for using AWS as provider to host the web site on it by using Ec2 these steps are follow:
- Create AWS Account: from Amazon Web Services (www.aws.amazon.com), AWS account can be created by developer to use all of available services on it.
- Create EC2 Instance: from "AWS Management Console" which is available inside of developer account, all of services that AWS support them will be shown; from those services, EC2 service is our choice Then Launch Instance from EC2. Then operating system and software required for application will be chosen. During the wizard it asks to create a select key, this key is required when the developer want to entrance to instance, it needs to create it just one time and save it.
- Create elastic IP address: because the server name is public DNS for connection and Public DNS is changing each time after connect and disconnect the instance, hence server name in database connection will be changed every time and it could be problem, but associate the instance with one IP address make the server name as that IP address which it is static.
- Connect To Instance: connect to instance, and then virtual server will be given by Amazon to use.
- Publish the Website: create database on server and remotely connecting to the data and Upload the website into that server then the website will be published.

6 CONCLUSIONS

Cloud computing become the most important field in IT nowadays. Most of organizations like migrate their data into cloud to reduce the cost needed for those data get rid of hardware infrastructure and using network instead. On this paper cloud computing was introduced as host web base information system also the provider for cloud computing was Amazon Web Service with using EC2 services to create a server for host the application on it. EC2 is a public cloud which is available for any kind of customer. The benefit of using cloud computing is creating one database for several users which they can use it separately, and also keeping memory space on users computer because they don't need to save their data on local, everything will be saved on cloud. On the other hand the users need very good network connection to easy use the system.

REFERENCES

- [1] M. Armbrust, A. Fox, R. Griffith, A. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica, M. Zaharia, "A View of Cloud Computing", Communications of the ACM, page number 50 - 58, April 2010.
- [2] L. Wang, M. Kunze " Cloud Computing: a Perspective Study", 2010.
- [3] A. Refai, S. Pandiri, " Cloud Computing - Trends and Performance Issues ", Master Thesis, School of

Computing, Blekinge Institute of Technology, Sweden, May 2011.

- [4] P. K. Bollineni, K. Neupane, " Implications for adopting cloud computing in e Health ", Thesis, School of Computing, Blekinge Institute of Technology, Sweden, September 2011.
- [5] E. Mitchell, " Using Cloud Services for Library IT Infrastructure ", March 2010.
- [6] A. Rastogi, " A Model based Approach to Implement Cloud Computing in E-Governance ", November 2010.
- [7] S. Sapkota, K. Shehzad, " Cloud Computing for Telecom Systems ", Master Thesis, School of Computing, Blekinge Institute of Technology, Sweden, September 2011.
- [8] https://wiki.cloudsecurityalliance.org/guidance/index.php/Cloud_Computing_Architectural_Framework. (Access on 16/10/2012).
- [9] T. Dillon, C. Wu, E. Chang, " Cloud Computing: Issues and Challenges ", IEEE International Conference on Advanced Information Networking and Applications, 2010.
- [10] K. Khan, A. Jan, " Evaluating Google App Engine for Enterprise Application Development ", Master Thesis, School of Computing, Blekinge Institute of Technology, Sweden, June 2011.
- [11] Diginotion, " Running a website on Amazon EC2 ", November 2010.
- [12] F. M. Aymerich, G. Fenu, S. Surcis, " An Approach to a Cloud Computing Network ", 2008.
- [13] Enisa, " Cloud Computing Benefits, risks and recommendations for information security ", 2009.
- [14] H. Löhr, A. R. Sadeghi, M. Winandy, " Securing the E-Health Cloud ", University Bochum Germany, 2010.
- [15] <http://aws.amazon.com/vpc/>, (Accessed on 1/11/2012).
- [16] <http://aws.amazon.com/s3/>, (Accessed on 1/11/2012).
- [17] <http://aws.amazon.com/dynamodb/>, (Accessed on 1/11/2012).
- [18] <http://aws.amazon.com/rds/>, (Accessed on 1/11/2012).
- [19] <http://aws.amazon.com/iam/>, (Accessed on 1/11/2012).