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Voice based Cloud computing as a next generation Architecture

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Abstract— Cloud computing is the latest effort in delivering computing resources as a service. It represents a shift away from computing as a product that is purchased, to computing as a service that is delivered to consumers over the internet from large-scale data centers or "clouds". Cloud computing is gaining growing popularity in the IT industry, academia appeared to be lagging behind the rapid developments in this field. This paper presents the detail of cloud computing architecture and characteristics of cloud computing. This gives the detail of IaaS, PaaS, SaaS and essential characteristics in this field. The aim of this paper is to explain the characteristics of next generation computer and why IT sector is switching to cloud computing. This paper presents an architecture for future generation system which is based on voice/speech recognition. In last era speech recognition technology grows tremendously. There are a large number of companies who are working in this area and developing software for the people who are not able to control the system through keyboard or mouse such as physically impaired and senior citizens.

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1. Cloud Computing Architecture

Cloud computing architecture, just like any other system, is categorized into two main sections: Front End and Back End. Front End can be end user or client or any application (i.e. Web browser, etc.) which is using cloud services. Back End is the network of servers with any computer program and data storage system. It is usually assumed that the cloud contains infinite storage capacity for any software available in the market. Cloud has different applications that are hosted on their own dedicated server farms.

Cloud has centralized server administration system. Centralized server administers the system, balances client supply, adjusts demands, monitors traffic and avoids congestion. This server follows protocols, commonly known as middleware. Middleware controls the communication of cloud network among them.

Cloud Architecture runs on a very important assumption, which is mostly true. The assumption is that the demand for resources is not always consistent from client to cloud. Because of this reason the servers of cloud are unable to run at their full capacity. To avoid this scenario, server virtualization technique is applied. In sever virtualization, all physical servers are virtualized and they run multiple servers with either same or different application. As one physical server acts as multiple physical servers, it curtails the need for more physical machines.

As a matter of fact, data is the most important part of cloud computing; thus, data security is the top most priority in all the data operations of cloud. Here, all the data are backed up at multiple locations. This astoundingly increases the data storage to multiple times in cloud compared with a regular system. Redundancy of data is crucial, which is a must-have attribute of cloud computing.

2. Voice based Cloud as a next generation Architecture

The computer architecture of a computing system defines its attributes as seen by the programs that are executed on that system, that is, the conceptual structure and functional behavior of the machine hardware. Then, the computer architect defines the functions to be executed on the hardware and the protocol to be used by the software in order to exploit such functions. Note that the architecture has nothing to do with the organization of the data flow, the logical design, the physical design, and the performance of any particular implementation of the hardware.

Hence, By Architecture we mean the order in which certain hardware processes are carried out by the OS and has nothing to do with the logical software flow of the computer. An Operating System is the layer between the hardware and software as shown in figure 1.

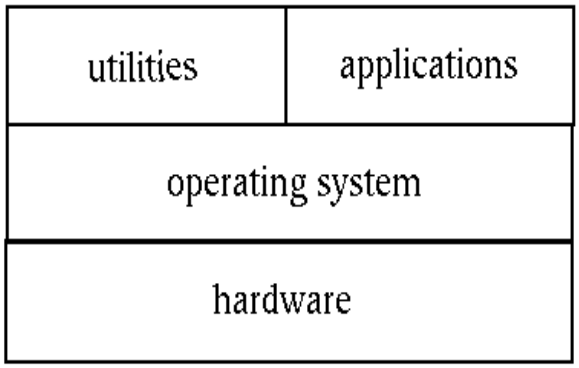


Figure 1: Operating system as interface between hardware and software.

An Operating System is responsible for the following functions

- Device management using device drivers
- Process management using processes and threads
- Inter-process communication
- Memory management
- File systems

In addition, all operating systems come with a set of standard utilities. The utilities allow common tasks to be performed such as

- Being able to start and stop processes
- Being able to organize the set of available applications
- Organize files into sets such as directories
- View files and sets of files
- Edit files
- Rename, copy, delete files
- Communicate between processes

Cloud architecture, the systems architecture of the software systems involved in the delivery of cloud computing, typically involves multiple cloud components communicating with each other over a loose coupling mechanism such as a messaging queue. Elastic provision implies intelligence in the use of tight or loose coupling as applied to mechanisms like these and others. Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (Internet). The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure as shown in figure 4. Cloud computing entrusts remote services with a user's data, software and computation.

The systems architecture of voice based virtual machine monitor has different voice activated tools and application and supporting libraries which is used to integrate the system with cloud computing. End users access services and applications through a "Voice based Virtual Machine" and data is stored on servers at a remote location as shown in models in figure 4. Application Programming Interface (API) is the accessibility to software that enables machines to interact with cloud software in the same way the user interface facilitates interaction between humans and computers. VBVMM Cloud computing systems typically use APIs which supports voice.

The three layer architecture of VBVMM cloud computing consists hardware, kernel which consists voice based virtual machine monitor and all the tool, application and supporting library and RAAS (Request as a service) is a layer which treats all the services on the same level and makes them available to the user when a request raised as shown in figure 2.

Voice based Cloud computing is the use of computing resources on voice requesting that are delivered as a service over an Internet. The name comes from the use of all services a request which are stored in the cloud shaped symbol as an abstraction for the complex infrastructure, it contains in system diagrams. Voice based Cloud computing entrusts remote services with a user's data, software and computation.

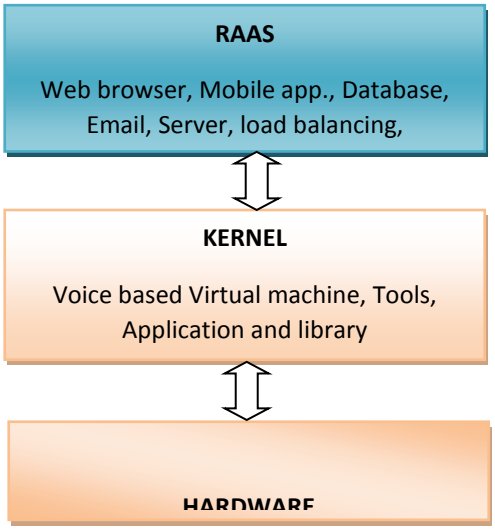


Figure 2: Layer Architecture for Voice based Cloud Computing

There is only one type of cloud computing RAAS (request as a service). End users access cloud-based applications through a voice operated web browser or a light-weighted desktop or mobile app which is operate by voice while the business software and user's data are stored on servers at a remote location. This type of cloud computing delivers a single application through the browser to thousands of customers using a multi-tenant architecture. On the customer side, it means no upfront investment in servers or software licensing; on the provider side, with just one app to maintain, costs are low compared to conventional hosting. RaaS is also common for all apps, software, platform and infrastructure as shown in figure 3. A big cloud represents the all the application, platform and infrastructure under one cloud. These are managed by different IT companies which provide such services. Users do not bother about the file system, Load balancing, recourses, security, availability and database, they all are manage and maintain by service providers.

3. World Wide IT Spending On Cloud Computing 2013

According to a latest study conducted by Savvis, a global cloud infrastructure and hosted IT solution provider for enterprises, about three out of five companies consider that operating and maintaining IT infrastructure in-house increase cost and waste resources. Savvis, arm of CentuaryLinkCompany, which is the largest telecommunication company in the US, provides IT and cloud.

Recently there was a report by the research firm Gartner estimating global spending on IT outsourcing to reach $251 billion in 2012 which is up by 2.1% when compared to previous years. Further the report states that cloud computing segment will be the fastest growing segment under IT outsourcing, which is expected to reach $5. Spending on IT outsourcing (ITO) services worldwide is likely to surpass $ 251 billion in 2012, according to the new research report by Gartner. Gartner, a leading information technology research and advisory company, in their research report titled “”Forecast Analysis: IT Outsourcing, Worldwide, 2010-2016, 2Q12 Update” claimed that spending on IT outsourcing services will grow.

The largest component of the overall cloud services market is cloud-based advertising. This component represented 60% of the market in 2008 with revenue of $28 billion and is forecast to reach $33 billion in 2009. This reflects the success of Google in creating a new business and delivery model for IT-based services, which is being emulated by Yahoo!, Microsoft and others, says Gartner. Gartner believes the overall market for cloud services will surge to $150.1 billion in 2013 as shown in figure 4.[21]

The latest report on cloud computing forecasts released by Cisco, Deloitte, IDC, Forrester, Gartner, The 451 Group and others show how rapidly cloud computing’s adoption in enterprises is happening as shown in figure5.

- According to IDC, by 2015, about 24% of all new business software purchases will be of service-enabled software with SaaS delivery being 13.1% of worldwide software spending. IDC further predicts that 14.4% of applications spending will be SaaS-based in the same time period. [13]

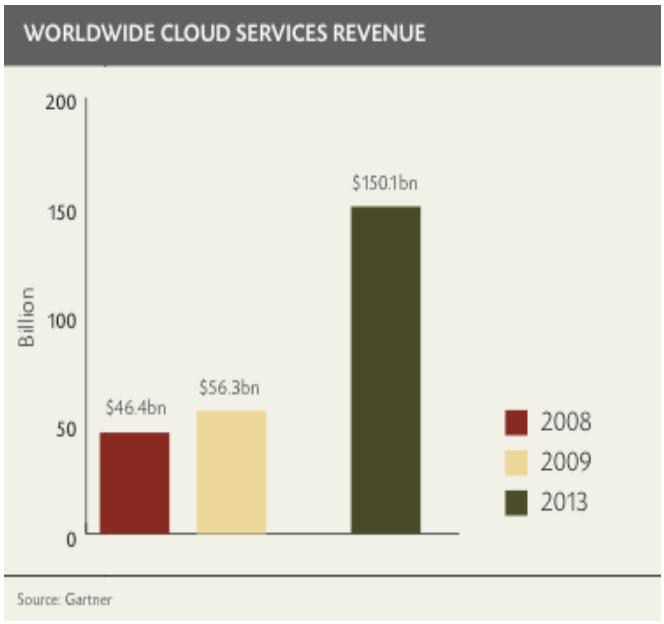


Figure 4: Worldwide Cloud Services revenue graph

- Mobile SaaS Market will reach $1.2 billion in 2011 and grow to $3.7 billion by 2016, with a five-year compound growth rate (CAGR) of 25.8 percent. The ability to integrate business applications on smartphones, tablets and other wireless devices is predicted to accelerate SaaS adoption in the corporate business environment.[14]
- The cloud computing marketplace will reach $16.7B in revenue by 2013, according to a new report from the 451 Market Monitor, a market-sizing and forecasting service from The 451 Group. Including the large and well-established software-as-a-service (SaaS) category, cloud computing will grow from

revenue of $8.7B 2010 to $16.7B in 2013, a compound annual growth rate (CAGR) of 24%.[15]

- The US cloud computing market for medical imagery was at $56.5M in 2010 and is forecast to grow at a Compounded Annual Growth Rate (CAGR) of 27% during 2010-2018. [16]
- The U.S. Federal Government cloud computing market enters into double-digit growth phase – at about 16% CAGR over the period 2013-2018, with annual federal cloud computing market to hit $10 billion landmark by 2018. [17]
- Forrester forecasts that the global market for cloud computing will grow from $40.7 billion in 2011 to more than $241 billion in 2020. The total size of the public cloud market will grow from $25.5 billion in 2011 to $159.3 billion in 2020.[18]
- Deloitte predicts cloud-based applications will replace 2.34% of enterprise IT spending in 2014 rising 14.49% in 2020.[18]

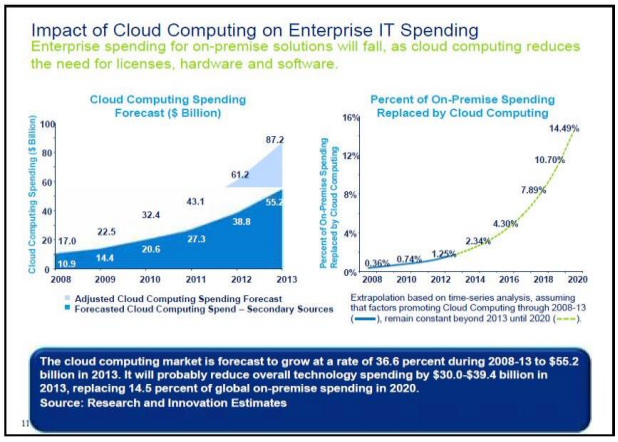


Figure 5. Impact of cloud computing on Enterprise IT Spending

- Cisco predicts that Global cloud IP traffic will increase twelvefold over the next 5 years, accounting for more than one-third (34 percent) of total data center traffic by 2015.[19]

The $383 billion customers will spend this year and $16.2 billion – or a mere 4% – will be consumed as cloud services. By 2012 – based on a conservative forecasting approach customer spending on IT cloud services will grow almost threefold, to $42 billion, accounting for 9% of customer spending as shown in figures 6 and 7.[21]

Worldwide IT Cloud Services Spending: 2008-2012
(for Business Applications, Application Development/Deployment, System Infrastructure Software, Storage and Servers)

	2008	2012	CAGR
All Spending ($M)	383,274	493,713	7%
Cloud Services Spending ($M)	16,235	42,270	27%
Cloud as % of Total	4%	9%	

Source: IDC, October 2008

Figure 6. Worldwide IT Cloud Service Spending according to IDC [21]

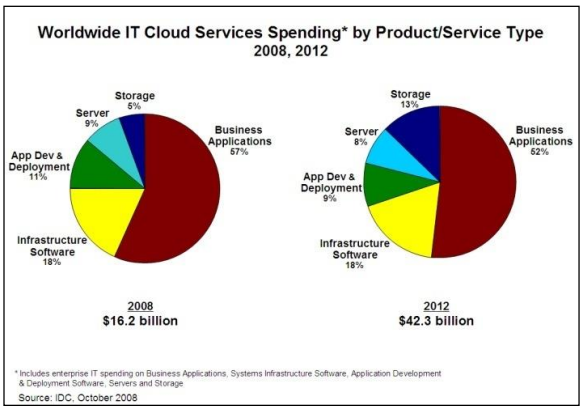


Figure 7. Pie chart representation of Worldwide IT Cloud Service Spending according to IDC

4. E-GOVERNANCE IN INDIA- THE NEW GATEWAY TO CLOUD SERVICES

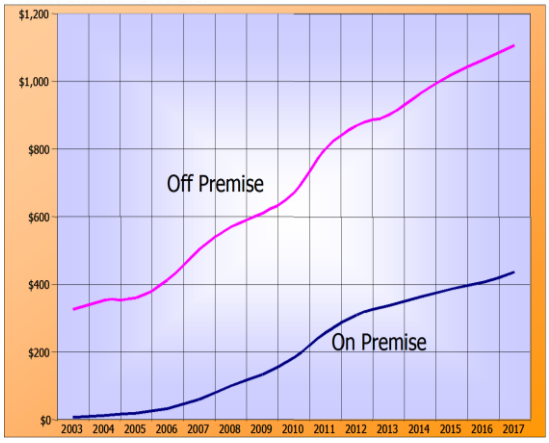
In India E-governance is the new gateway to cloud services. Cloud Computing is the new wave transforming Indian IT industry. Cloud technology has opened up new avenues of growth for all types of companies including start-ups in India. Cloud technology allows the companies to store data and access software over a network on the basis of pay-per use model. This service helps the companies to cut costs as they are not required to make investment in IT infrastructure and they work on a shared platform. The new report, Indian Cloud Revolution by the CII, KPMG and Marchland Magnolias & Shroff insist that the government can adopt cloud services to launch new e-governance initiatives at a considerable low

investment. The adoption of cloud services by the local government bodies and agencies will help government to provide better services to citizens with a trimmed down investment in IT infrastructure. [12]

According to the report, cloud services

- Can provide an ideal platform for the government to realize its vision to scale up services in the areas of education, healthcare, banking, e-governance and entrepreneurship.
- To enable the government to set up low cost IT infrastructure to drive the next revolution in the area of e-Governance.
- Will help to set up a universal healthcare record system which will benefit specific segments of the healthcare sector.

Cloud Computing involves users accessing applications remotely from data centers over which they themselves have no direct control (or indeed knowledge of). It is the prevalent form of computing for consumers, who use Web-based apps and applications typically paid for by unknown advertisers. It is a large sub-sector of the overall market growing at a faster rate as shown in figure 11.



[22]

Figure 11. Cloud Computing Revenue Forecast ($US Billion)- On and Off Premise Location-2003-17

5. CONCLUSIONS

Cloud Computing is an image of the coming era of computing in which systems will be fifth generation system, speech enabled system. In Cloud computing architecture services provide on demand and on payment basis. In this paper the voiced based cloud computing architecture is discussed which will support future generation systems. The Paper also discusses worldwide IT cloud Service spending, according to IDC.

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