Scope of adapting Cloud Computing Technology in healthcare industry

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Abstract

This paper targets on the productivity of cloud computing technology in healthcare industry. Even though Information Technology entered healthcare sector with telemedicine in 1940s, we do not see much new technology adaption trend in healthcare. Healthcare sector is one of the largest service sectors in the world. Healthcare industry depends mainly on Information Technology to provide best service and accuracy of information to their patients. This paper deals with using cloud technology to create network between patients, doctors, and healthcare institutions by providing applications, services and also by keeping the data in the cloud.This paper encompasses the impact of cloud computing which simplifies data availability anywhere and accessible to the patient in need of healthcare info in patient care and service especially in India. With the pros and cons of cloud computing this paper also highlights the learning and sharing opportunities from the class room to workspace.

Keywords - Cloud Computing; Hospital; Hospitality in hospitals

Information Technology in healthcare

Information Technology entered healthcare industry with telemedicine in 1940s and transmission of radiological images in 1948. Growth of the internet in 1990 accelerated the role of IT in healthcare

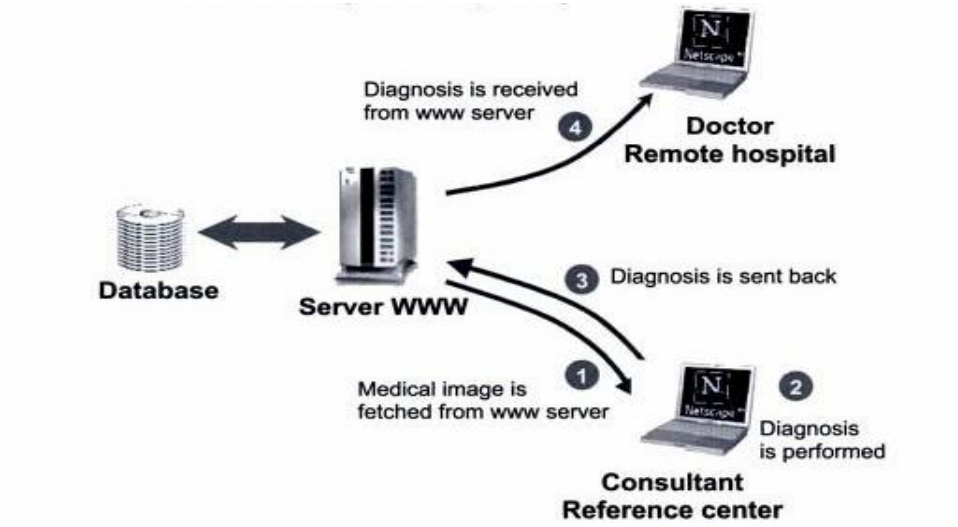


Figure 1: Web-cenric teleradiology

Only in the last 10 years have hospitals invested heavily in IT. At present every common man is influenced by technology. Therefore, patients' expectations in IT in healthcare are generally high.

Inviting Cloud Computing in health services may include Electronic Health Records (EHRs), Electronic Medical Records (EMRs), Personal Health Records (PHRs), Payer-based Health Records (PBHRs), Electronic Prescribing (E-prescribing) and also Financial/Billing/Administrative System etc.,

Hospitality in hospitals

I would like to cite the following old, but well known quotes used in Indian scriptures "*Vaidhyo Narayano Harihi*" – The physician is regarded as God and "*Athithi Devo Bhavah*" – Treat the guest as God. ("Front Office Management" S K Bhatnagar, Page number 64)

In the context of a hospital, patient should be treated like a guest. So, by keeping both the above quotations in mind, Information Technology has a major role in giving justice to both patient and doctor. Yes, in this sentence hospital is used as a synonym to the word doctor.

According to Pizam (2007, p. 500), "the difference between hospitals and hospitality is 'ity', but that 'ity' can make a significant difference in the fast recovery and well being of patients receiving services in that hospital."

According to Brotherton (1999), hospitality can be classified by four characteristics including: an exchange offered to a guest by a host, an interaction involving and coming together of a provider and a receiver, a blend of tangible and intangible factors whereby the host provides for the security and the psychological and physiological comfort of the guest.

Starting from concierge to food service to patient treatment to billing, at every point there are plenty of opportunities to please the guest. Therefore, Electronic Customer Relationship Management (CRM) plays a major role in a hospital's hospitality.

It is very important to note that one customer may bring 0 or N number of customers and if they are dissatisfied with the service, he may block N number of customers.

Advancement in technology always requires giving vast information to every healthcare professional so that they in turn will give the best quality of the patient care and hospital management to the guest.

Cloud computing approach gives accurate and quick access on request which can replace the usual trend in hospital's hospitality. In a group of hospitals having cloud computing infrastructure encourages and promotes the advantages available to the user.

Cloud computing

Cloud computing is a new general purpose internet based technology through which information is stored on servers and provided as a service on demand to clients. Applications provided by the data centers are referred to as 'Software as a Service' (SaaS) and the hardware system software provided by the data center is referred to as 'Cloud'.

SaaS, PaaS and IaaS: Infrastructure as a service provides computing resources such as servers, storage, and other forms of low level network and hardware resources offered in a virtual, on demand fashion over the Internet.

Platform as a service focuses on enabling SaaS applications, which based on the idea for renting software from a service provider rather than buy it. The software is hosted on central network servers to make service available over the intranet.

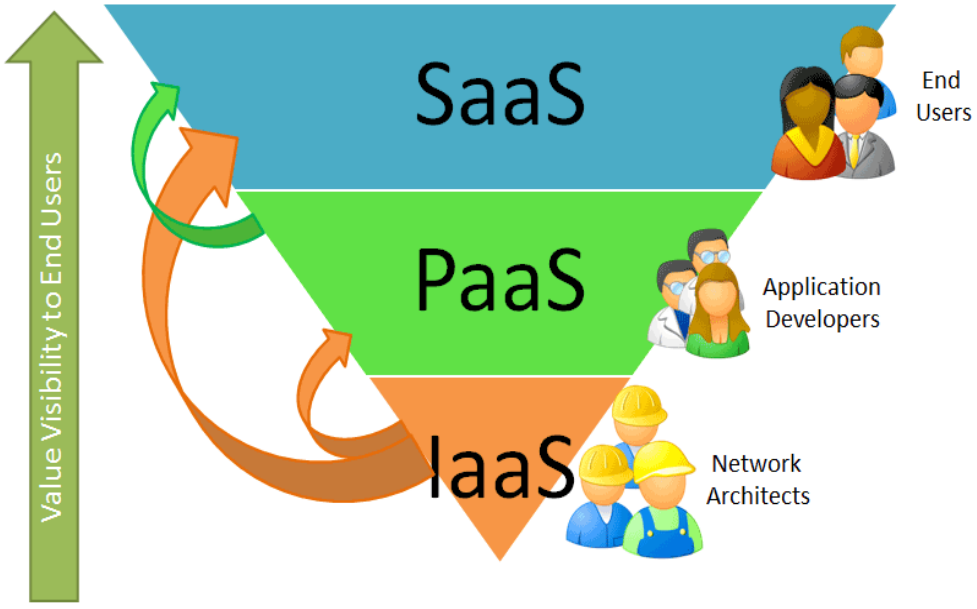


Figure 2: SaaS, PaaS, Iaas

Whether the cloud is available in a pay-as-you-go manner to the general public or for internal processes of an organisation, it is referred to as a public cloud or private cloud.

In Cloud Computing, Virtual Machines (VM) will be running different software in parallel instead of having to run only one application.

This technology drives down costs and increases resource utilisation by delivering resources for a period of requirement only and hence deduces the ICT (Information and Communication Technology) capital budget reservation.

Because of its scalability, pay on demand, easy implementation and also according to Rozmic case study; cloud is best for lower capital outlay.

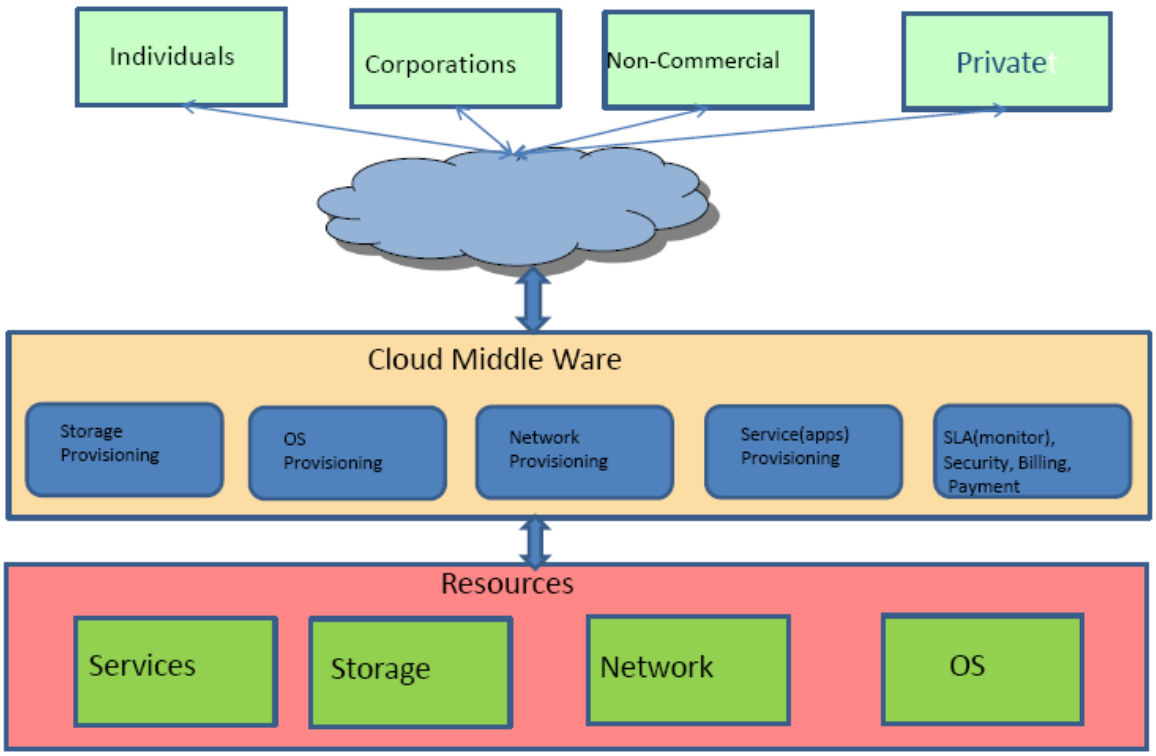


Figure: Cloud Components

Makes job simple

It is time to assume a service that works from home because it changes the way we do our job. It gives advantages in outsourcing and reaching goals while letting other experts take care of what they do best.

New types of communications allow us to work closely with partners, remote employees, and customers around the world as if they were right there in our office.

In health services

Based on the requirement, services can be made public, private, hybrid or community oriented. These can be made available between patients, doctors, and organisation by working out proper access rights among them and can be made legal.

Microsoft's HealthVault and Google Health have already taken their initiative in giving health services.

Hospitality in hospitals

Now hospitals are working in the direction of providing the best service to the patients. Providing IT support to know the patients preferences, requirements which may help in making the patient feel comfortable wherever the patient needs it.

Cloud implementation improves handling e-Health data and hence improves patient care by providing complete, accurate, and searchable health information. This also reduces the waiting time.

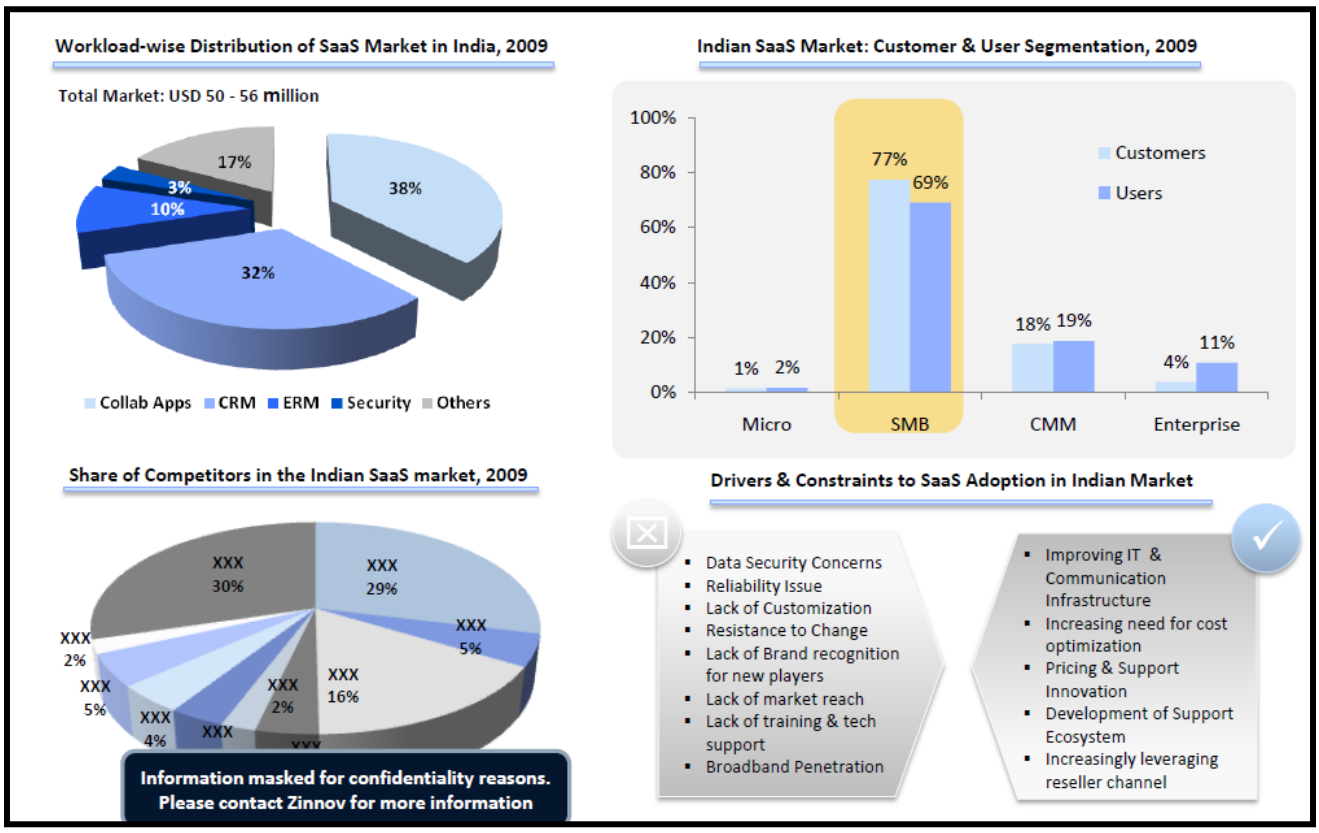
Why in India?

It may also help industry in not choosing piracy to save money, as software and hardware (cloud) will be made available whenever required on a demand basis.

In India there is an estimate of USD 4 bn OS piracy. Unsuccessful attempts in open source having a grip on USD 12 bn, other applications pirated, infringed, locally developed USD 16 bn. So compelling Cloud on pay per use or flexible usage gives remote OS and desktop applications, customised ERP & CRM for SME and retail chains from cloud with flavour of private cloud, Clustered virtualised DB services without load of licensing and on hosted model, Education content digitised and on affordable scale, Foot on street with resellers on commission basis.

Dr. Sunil Shroff, President, Medical Computer Society of India says "As India has best computer Technocrats, we are having very skilled medical fraternity, private healthcare emerging as a key-player in the country. Indian healthcare spending likely to increase to 200,000 crores by 2012 from present 86,0000 crores as per www.medindia.net/articles/article1print.htm Potentially, India a very suitable location and resources pumped in this sector now are likely to be of great benefit"

Following figures four and five show how demand in India is growing towards the SaaS. Figure four also shows and highlights the importance of customer relationship management compared to the rest of the entities.



Costs/Economic Metrics	Status Quo: 1,000 Server (Non-Virtualized) Environment	Scenario 1: Public Cloud	Scenario 2: Hybrid Cloud	Scenario 3: Private Cloud
Investment Phase Costs FY10–12 (BY09 M$)	$0	$3.0	$6.1	$7.0
O&S Phase Costs FY10–22 (BY09 M$)	$77.3	$22.5	$28.9	$31.1
Total LCCs (BY09 M$)	$77.3	$25.5	$35.0	$38.1
Economic Metrics:				
NPV (BY09 M$)	N/A	$41.8	$33.7	$31.1
BCR	N/A	15.4	6.8	5.7
DPP (Years)	N/A	2.7	3.5	3.7

Figure 4 & 5: The Economics of Cloud Computing: Addressing the benefits of infrastructure in the Cloud. Posted 6 October, 2009

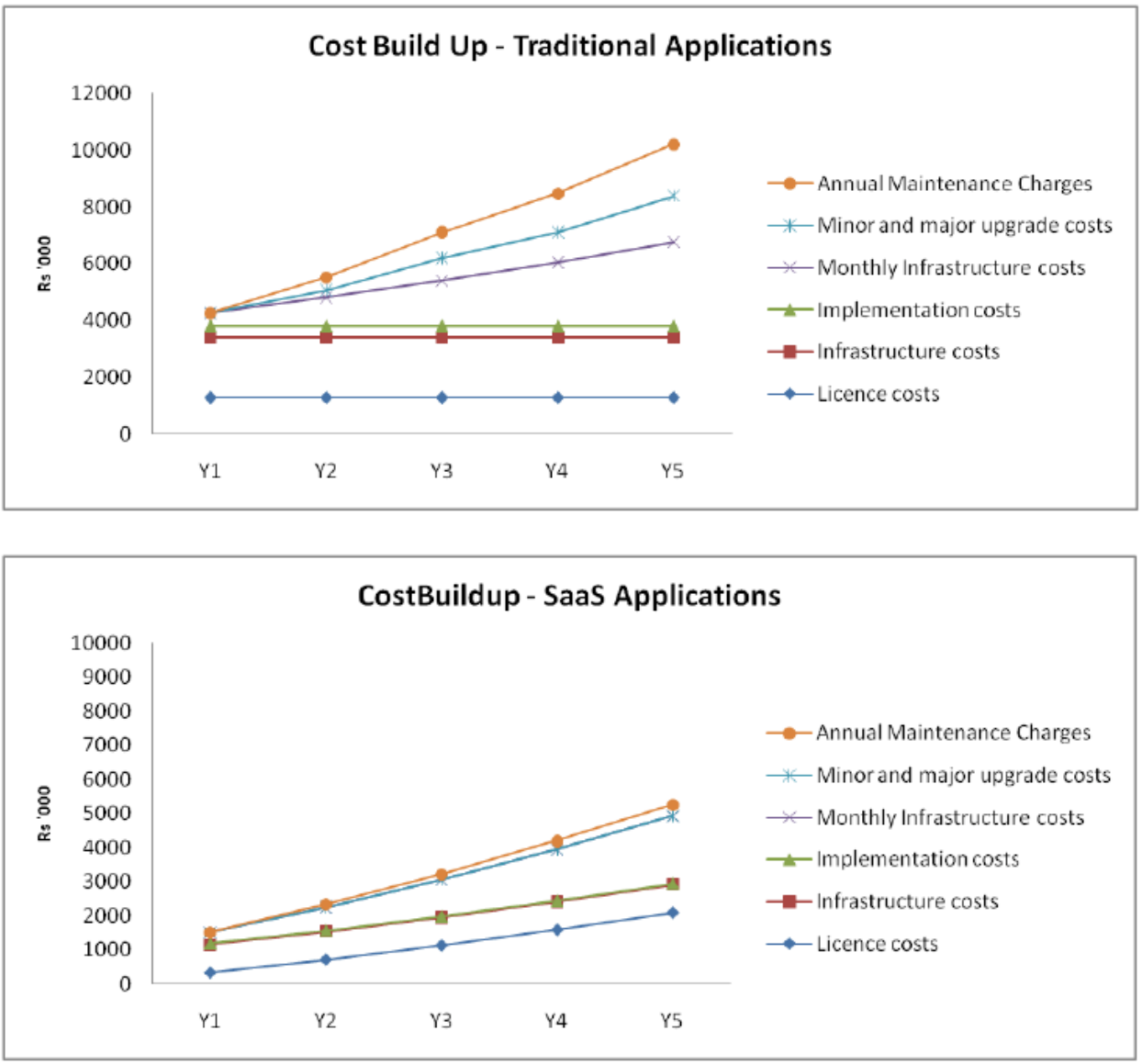


Figure 5: Comparison of costs and return on investments of IT investments

Survey

There is limited data regarding implementing cloud computing in EHRs.

International Business Times dated 27 August, 2010 and a study at the Harvard School of Public Health (HSPH) report that the number of all hospitals with EHRs only increased from 8.7% in 2008 to 11.9% in 2009. Even worse, only 2% met the federal government's "meaningful use" standard to qualify for government incentives.

IBM and Apollo Hospital Group have announced a joint go-to-market initiative to build a National Health Data Network called 'Health Hiway' to provide a diverse set of software

applications for the healthcare segment. Therefore, any pros and cons should be analysed after a reasonable time gap.

Switching to this advanced broad technology is slow in health care sector. Factors are discussed in the next paragraph.

Pros and Cons

Most sensitive issue is price, as you pay for only what you use, the price increases linearly with the requisite storage, network bandwidth, and compute power. For transactional workloads, a fault tolerant DBMS can recover from a failure without losing any data or updates from recently committed transactions and sensitive data may be encrypted before being uploaded to the cloud. In order to prevent unauthorised access to the sensitive data, any application running in the Cloud should not have the ability to directly decrypt the data before accessing it.

The advantages of cloud computing is elasticity on usage and the cost that is pay as per usage. Some of the factors like the kind of control over the data and performance of applications, monitoring and maintenance of tools on the Cloud are fear factors.

As entire functioning is depending on the internet, the internet connection may add to latency or limit bandwidth.

But these risk factors we face in internal servers as well. Human errors, system maintenance and crash etc., may also bring fear factors. Potential users need to evaluate security measures such as firewalls, and encryption techniques and make sure that they will have access to data and the software or source code if the service provider runs out of business.

Conclusion

There are tremendous opportunities and reasons to choose Cloud Technology in healthcare. It is time to join hands with clinicians and computer specialists to proceed in order to implement the broad technology which suits small practices to large hospitals.

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