

Medical Applications of Cloud Computing

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At the:
**PERCCOM Seminar on Clouds, Grid and
Cluster systems**
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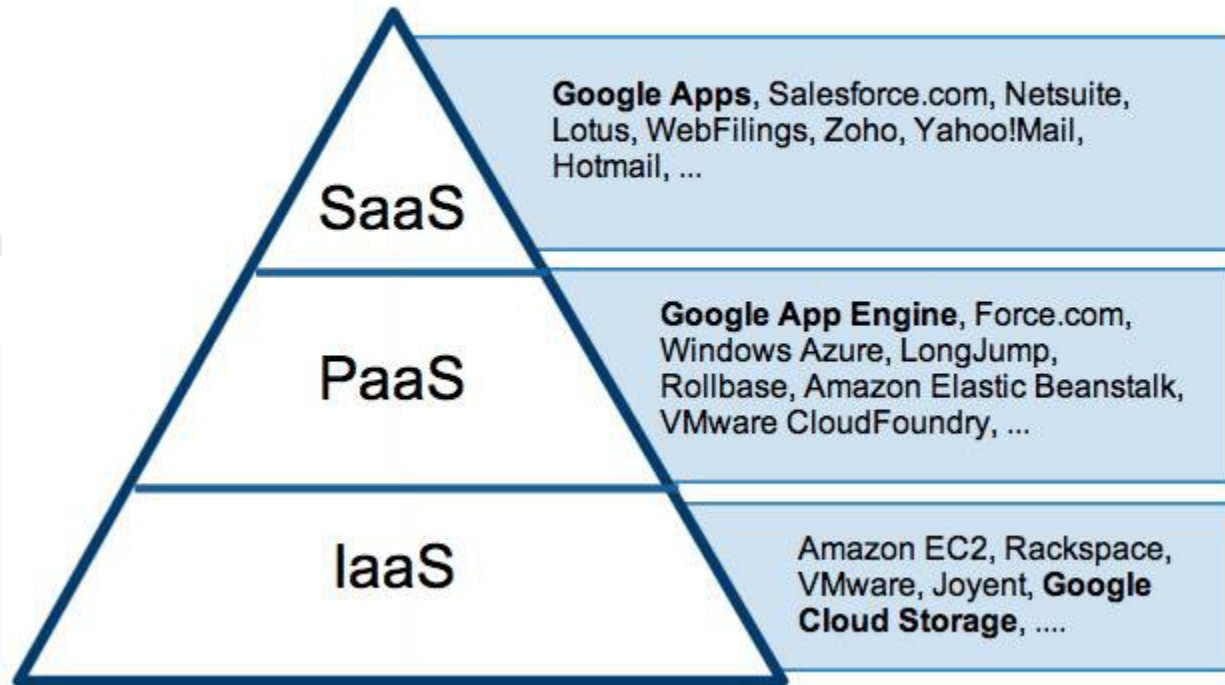
4th June, 2014

Introduction

- What is Cloud Computing?
 - Storing, managing and processing data on Internet hosted networks of remote servers rather than on local servers or personal Computers.
- Types of Cloud
 - Public cloud: Services are delivered from a service provider to different customers
 - Private cloud: Limited usage inside an institution (on premise)
 - Hybrid cloud: Services are built on hybrid infrastructure; private storage of data and public access interface

Cloud Computing Models

Cloud Computing as Gartner Sees It



Source: Gartner AADI Summit Dec 2009

Motivation

- Healthcare providers are constantly challenged to improve the productivity and overall quality of patient care, while at the same time reducing the cost structure.
- Saving even a few seconds per patient could potentially result in saving significant amounts of time and hence improve the quality of patient care.
- According the CDC, in the United States alone there are 129.8 million emergency department visits yearly.

Applications

- Cloud computing has made it possible to solve many complex problems very fast at a lower cost and in less time.
- Healthcare professionals can now keep their information about critical diseases, critical cases and sophisticated problems within convenient reach.
- Information retrieval (Medical Image retrieval, Clinical Data Retrieval)
- Data processing (bioinformatics applications, data mining, etc.)
- Patient monitoring

Practical Example

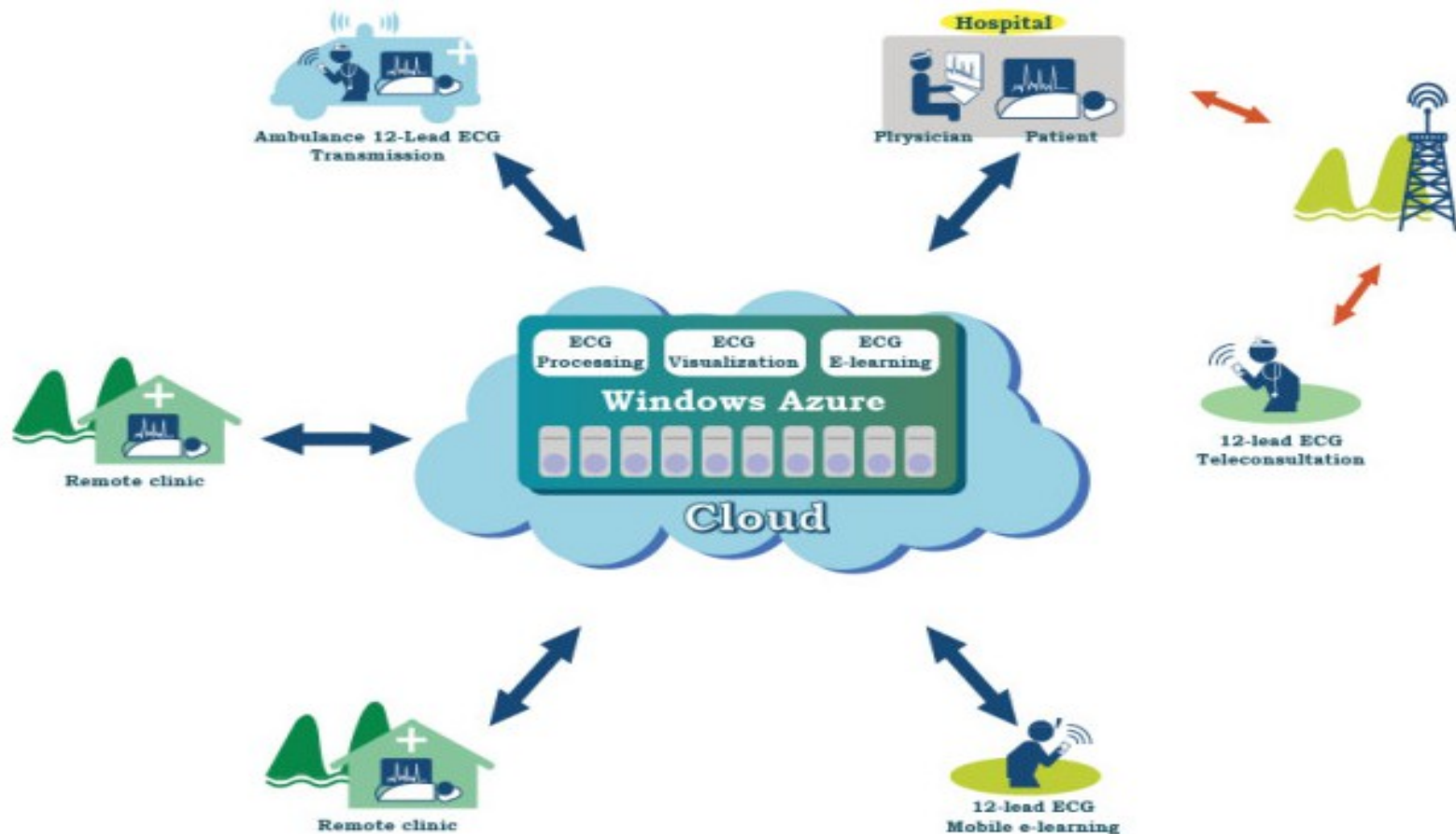


Figure 2

A 12-lead ECG telemedicine service based on the cloud computing. The heterogeneous 12-lead ECG files from urban hospitals, rural clinics, and ambulances can transmit and store 12-lead ECG files in the datacenter of Windows Azure with unified file structure via internet. The ECG interoperability among hospitals can be easily realized by sharing ECG records in the cloud. In addition, clinicians can use these 12-lead ECG records in the cloud for consultations or as e-learning materials of clinical ECG continuing education.

Conclusion

- The need for adequate resources to process, store, exchange, and use large quantities of medical data has made Cloud computing very necessary and useful.
- However, there has been some concern over some ethical issues because control over research/patient data is transferred to a third party, the service provider. The need to ensure the privacy and security of patient data is a major concern.
- Many measures exist to deal with these issues, such as the requirement that service providers must be able to quickly destroy data upon instructions of clients if a security breach occurs.

References

- American Journal of Computational Mathematics. 2012, 2, 240-243 . *Efficient Use of Cloud Computing in Medical Science* . [ONLINE] Available at: <http://dx.doi.org/10.4236/ajcm.2012.23032>. [Accessed 03 June 2014].
- Cisco Systems . 2014. *Cloud Computing for Healthcare - Industry Solutions*. [ONLINE] Available at: http://www.cisco.com/web/strategy/healthcare/cloud_healthcare.html. [Accessed 03 June 2014].
- Cloud computing in medical imaging. 2014. *Cloud computing in medical imaging*. [ONLINE] Available at: <http://scitation.aip.org/content/aapm/journal/medphys/40/7/10.1118/1.4811272> . [Accessed 03 June 2014].
- Pino C., Di Salvo R. 2013 2nd International Conference on Computer Science and Electronics Engineering (ICCSEE 2013). A Survey of Cloud Computing Architecture and Applications in Health.