



# Survey: SOA Architecture in Cloud Computing

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## To cite this article:

Priyanka Pandey, Prasant Kumar Pattnaik, Raghvendra Kumar. Survey: SOA Architecture in Cloud Computing. *International Journal on Data Science and Technology*. Vol. 2, No. 1, 2016, pp. 1-4. doi: 10.11648/j.ijdst.20160201.11

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**Abstract:** Design of software solution for delivery as a shared service over Cloud requires specific considerations. In this chapter we describe an approach for design of infrastructure resource management as a service for use by group of institution based on Service Oriented Architecture, Software-as-a-Service, and Cloud Computing paradigms. Our goal in this paper is to propose a architecture mechanism that allows the hiding of a large quantity of data as possible in a database to provide them to other institutions without resulting much difference between the original institution having the data and the other institute accessing them significantly. A fusion of implementation, analysis and evaluation has to be done for hiding information.

**Keywords:** Cloud Computing, SAAS, IAAS, SOA

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## 1. Introduction

In surge of demand of present generation, Cloud computing provides the facility to access shared resources and common infrastructure, offering services on demand over the network to perform operations that meet changing business needs. The location of physical resources and devices being accessed are May not known to the end user. Besides that, it facilitates the users to develop, deploy and manage their applications 'on the cloud.

As history is witness for computing, when mainframes were predicted to be the future of computing. Indeed mainframes and large scale machines were built and used, and in some scenario that has been used today. The trend, however, turned from bigger and more expensive, to smaller and more affordable, PCs and servers due to ministration of electronic technology.

## 2. Overview of Cloud Computing

Cloud Computing, popularly means "Internet Computing." The Internet is commonly visualized as clouds; hence the term "cloud computing" for computation done through the Internet. With Cloud Computing users can access database resources via the Internet from anywhere, for as long as they need, without worrying about any maintenance or management of actual resources. Besides, databases in cloud are very dynamic and scalable.

As the perception of the lay man what and about cloud computing is that ability to rent a server or a thousand servers and run a geophysical modeling application on the most powerful systems available anywhere. It also have the ability to rent a server, install require software on it, turn it on and off as and when he desires to be, or clone it Ten times to meet a sudden workload demand. It can be storing and securing immense amounts of data that is accessible only by authorized applications and users. It can be supported by a cloud provider that sets up a platform that includes the OS, Database, Web software's with the ability to scale automatically in response to changing workloads. Cloud computing can be the ability to use applications on the Internet that store and protect data while providing a service — anything including email, sales force automation and tax preparation. It can be using a storage cloud to hold application, business, and personal data. And it can be the ability to use a handful of Web services to integrate photos, maps, and GPS information to create a mash up in customer Web browsers [4, 5].

Cloud computing is gaining popularity as means for saving cost of IT ownership and accelerating time to market due to ready-to-use property, dynamically scalable computing infrastructure and software services offered on Cloud on pay-per-use basis. Design of software solution for delivery as a shared service over Cloud requires specific considerations. In this paper we describe an approach for design of software reservations solution for use by group of institution based on

Service Oriented Architecture, Software-as-a-Service, and Cloud Computing paradigms. Where we can avoid the institution to use pirated software as well as cost saving.

Most of our data is stored on local networks with servers that may be clustered and sharing storage. This approach has had time to be developed into stable architecture, and provide decent redundancy when deployed right. Considering an example, Google Apps where any application can be accessed using a browser and it can be deployed on thousands of computer through the Internet. The other analogy of examples discussed below [9]:

- Amazon's Elastic Computing Cloud (EC2) offering computational services that enable.
- people to use CPU cycles without buying more computers.
- Storage services that provided by Amazon's Simple Storage Service (S3), the company say Nirvanix availing the facility to store data and documents without adding a single on-site server
- SaaS based companies say salesforce.com, delivering CRM services, to their Clients in order to manage customer information without installing specialized software.

*Pros and Cons of Cloud Architecture:* One of the main advantages of cloud computing is, "that the computational work is moved from the users' terminal to data centers where the cloud applications are deployed. This in turn lessens the restrictions on the hardware requirements needed at the users' end, allows them to obtain superb performance to some of their CPU-intensive and memory intensive workloads without necessitating huge capital investments in their local machine" (Youse *et al.*, 2009). Pros 1. Client side installation expenses is not required 2. Generally based on Pay per use and plug and play mechanics 3. Not bounded with operating system, any machine connected with internet can be used as an access point. 4. If executable be run locally, the risk of viral infection can be reduced 5. Application can be continuously updated by a application provider without shipping and issuing installation disk Cons

1. Performance may be affected since all data; user files, input, etc have to be sent to servers and back. Delay and round trip consume time and can be serious problem
2. Security is compromised because all confidential data (i. e. passwords, credit card information etc) have to travel across over insecure networks.
3. Complete dependence on underlying network to access the application, when the network is down the user has no option the access the application. Integration Need SMEs believe that the two greatest challenges that they have experienced in managing their profitability are threat from competitors and cost of managing changing demands of the business i. e agility. As the market demand changes there will a change in enterprise solution, This evolution converted the single tier application to distributed cloud application. To understand the SOA and Cloud together, we can take an analogy of library. SOA related requirements are to

provide improved governance and management of services within the cloud environment where they may not be under direct control. Governance is a word that monitors prominence within the SOA environment; it is applicable at two phases of SOA development i. e. design time and run time. Design time governance relates to defining policies for services and run time governance monitors actually applying those design time policies to real time traffic.

*Data Collection:* The study adopted a descriptive type of research in which data was collected from various sources and analyzed to come to conclusion. Primary data was collected by visiting industry person, communicating face to face, conducting telephonic interviews and by mailing metrics designed through GQM. Secondary data was collected through magazines, internet, journals, and research articles on the subject. For this research, we focused on companies with 10 to 150 employees in the NCR region. This includes a survey conducted through face to face interviews with Senior Management from sixty manufacturing companies The companies that we selected for the survey are from various sectors such as manufacturing of automotive components, polymer items, electrical and power equipments, industrial items, companies involved in turnkey projects, mineral mining and iron and foundry. The geographical regions that were covered in this study include SMEs located in the Delhi NCR region Sahibabad Industrial Area in Ghaziabad, Faridabad and Noida. A sample of questions formulated for an interview can be found on Appendix A. Question designed for interview encompassing a wide area covering general questions on enterprises followed by general view of Cloud Computing to effectiveness of a proposed integrated model.

*On-demand-self-service:* Consumer can provision or un-provision the services when needed, without the human interaction with the service provider. • Broad Network Access: It has capabilities over the network and accessed through standard mechanism. Resource pooling: The computing resources of the • provider are pooled to serve multiple consumers which are using a multi-tenant model, with various physical and virtual resources dynamically assigned, depending on consumer demand. • Rapid Elasticity: Services can be rapidly and elastically provisioned. Measured Service: Cloud Computing systems • automatically control and optimize resource usage by providing a metering capability to the type of services (e. g. storage, processing, bandwidth, or active user accounts).

### 3. Service Oriented Architecture

Service Oriented Architecture is a paradigm for organizing and utilizing distributed capabilities that may be under the control of different Services [8]. Service is a mechanism to enable access to one or more capabilities, where the access is provided using a prescribed interface and is exercised consistent with constraints and policies as specified by the service with description. In SOA approach to modeling

software, software is organized in terms of services each capturing reusable functionality that can be is covered at run time and accessed in location transparent manner through well-defined, open standards based interfaces. A single copy of software can be made available to consumers on demand as a shared service accessible over remote network location and charged on subscription or pay-per-use basis [2, 3, 4]. The term SaaS denotes application software provided in such a mode.

The concept of Service Oriented Architecture (SOA), as related to cloud computing is simple. It is necessary to understand that when we are dealing with clouds, we're dealing with services, and when we're dealing with services we should we dealing with SOA. In SOA world we talk of services and only services, where services are in form of software, live components and objects (technical things), but when it comes to realization in the real world it is outcome based. It is generally found people saying 'we are doing SOA so we are ready for the cloud', but the difference between SOA services and the cloud context is huge. Typically Cloud is focused only towards the outcome, not the technology. "In cloud the service terminology you are focusing on is a relationship between service provider and consumer not technology provider and consumer". The following graph shows estimates of migration to cloud-based IT infrastructure and applications which supports the evolving nature of business solutions. SOA based design involves defining sets of services that may exist physically within the data center, on a public cloud, or perhaps in both places (hybrid cloud), and we need to consider the quality of the services design, the granularity, or how well the services approach a "functional primitive," and thus providing more value.

The bottom line is without SOA, it's very difficult to get to cloud. An elevator-pitch definition of service oriented architecture would be: Loosely-coupled services with well-defined interfaces that provide business functionality and can be shared or reused across and beyond the enterprise. These services can be discovered through a registry/repository or other directory, and can be assembled and disassembled to meet current business process demands.

Deloitte, for one, recognizes the necessary link between service-oriented and cloud-ready. In a report from earlier this year, the consultancy urges a "services thinking" approach to business problems. And when applying cloud solutions to the mix, the implications extend beyond simply replacing or upgrading or reconfiguring technology. It means a reconfiguring of the business itself. As John Seely Brown, independent co-chairman of Deloitte Centre for the Edge, put it: "Beyond the IT stack there is a challenge on which many organizations haven't yet focused: what does it mean to rethink my business as a collection of services?"

Services thinking means defining operating models, business processes and technology components as services – within and beyond the enterprise. Service technology conference organizer Thomas Erl, author and CEO of Arcitura Education Inc., has been tracking the growing convergence between SOA and cloud, especially as the

former makes deeper inroads into business management thinking. "Companies who have gone ahead and adopted SOA, have gone through a number of project lifecycles, and are delivering services are using that experience and knowledge in cloud computing technology," he says.

Which one most closely meets a company's needs. Unless an organization deploys SOA, it will not be able to utilize these techniques, and it will be next-to impossible to find the service it needs.

**3 Extensibility** It is great to be able to find services in the cloud and be able to access them, but there will be many cases where an organization cannot find a service that exactly meets its needs. It may need to put multiple services together, and from time-to time it will certainly need to modify the operation of a service. How will that be possible? Cloud services can be modified and customized using SOA techniques; so organizations will want to utilize the same architecture in their in-house IT systems.

**4 Matching expectations** One of the most intricate parts of working with the cloud in any significant manner is ensuring that the service is provided in a way that matches the expectation of the user. Two common questions illustrate the point: When is the service available? What type of response time does the service deliver? It is critical that both sides understand and agree upon the answers to these and many more questions: What is the escalation procedure if there is an issue with the service? What is the change process? What is the enhancement request process? How frequently can the service be called? How much data can the service accept? Even, how much does the service cost? If there is a misunderstanding between the two parties on any of these questions, the relationship will likely be rocky at best. Again, SOA has already dealt with this issue, with the concept of "contracts" — agreements that specify the responsibilities of each party. When an organization uses the cloud, everyone in IT should know how to work with contracts, and the best way to create this knowledge is by using SOA as the internal architecture in addition to the interface to the cloud.

**5 Adherence to standards** since services delivered through the cloud will use SOA, it is important that a company's applications follow all standards that the cloud service will expect. How does the enterprise ensure that all its services meet these standards and even industry-wide best practices? Policy enforcement is used within a SOA to automatically ensure that standards and best practices are followed by all of the services accessing the cloud; so again, it is important that a company utilizes SOA in its organization. And if the organization has standards that need to be followed, for example concerning data access security, policy enforcement can be critically important.

## 4. Issues

SOA with Web services causing complexity of current software environments. i. e the client organizations applying software applications for interact using the internet must cope with complex problems such as system availability, reliability, scalability, and application integration. SOA may

be inefficient, if large datasets have to be transferred between services; for instance, geospatial services. SOA services are independent of each other and consequently they cannot exchange information by passing storage addresses such as monolithic type line of codes. However, a possible solution to this problem is to pass references to data processing services instead of the data itself. Client applications may not be able to work effectively on remote servers [6].

## 5. Conclusion

In this paper, we have discussed about the cloud computing, SOA and its issues. Choice of appropriate network is an important consideration while we are using cloud computing. The sample questionnaire is prepared based on proposed model and then the response is taken from 250-industry person to evaluate it. The average response is calculated and is found that the proposed architecture is very suitable for the integrating business activities in SMEs. Proposed hypothesis is also accepted at 5 percent level of significance and it can be concluded that the sample data indicates that proposed integrated SOA-Cloud Model is more efficient in terms of cost and adaptability than traditional ERP systems. Further study conducted by the research firm Gartner in the year 2008, adoption of hosted applications reduces cost of ownership by about 30% by lowering the software support, labor and hardware costs. This study further supports the papers findings. In a nutshell, we conclude that proposed SOA Cloud integrated model is ideal for medium and small sized enterprises both in terms of cost benefits. However, for enterprises the most important factor to adopt Cloud Computing will stay cost till today but security is still not the added value of Cloud Computing for enterprises despite its benefits.

## References

- [1] Pioneer Consulting Report, "The WiMAX Report Emergence of Fixed & Mobile Solutions", March, 2006.
- [2] Keiji Tachikawa, "A Perspective on the evolution of mobile communications", IEEE Communications Magazine, October 2003.
- [3] Lu, Willie W, Open Wireless Architecture and Enhanced Performance, Guest Editorial, IEEE Communication Magazine, June 2003.
- [4] ETRI Paper, "Broadband Mobile Communications towards a Converged World", ITU/MIC Workshop on Shaping the Future Mobile Information Society, March 4-5, 2004.
- [5] Andrew Dursch, David C. Yen, Shi-Ming Huang, "Fourth generation wireless Communications: an analysis of future potential and implementation", Computer Standards & Interfaces 28, 2005, 13-25.
- [6] 3G Americas, "Mobile Broadband: The Global Evolution of UMTS/HSPA", July, 2006.
- [7] WiMAX Forum, "Mobile WiMAX: The Best Personal Broadband Experience", June, 2006.
- [8] Qualcomm Report, "IEEE 802.20: Mobile Broadband Wireless Access – A Technical Overview", June 2006.
- [9] WiMAX Forum, "Mobile WiMAX: Part2: A Comparative Analysis", May 2006.
- [10] Sunil Vadgama, Stephen Truelove, "Evaluation of Software Defined Radio Technology", February, 2006.
- [11] Wireless World Research Forum, The Book of Vision 2001 Version 1, December 2001.
- [12] Brian Low, Wesley J. Johnston, "Relationship equity and switching behavior in the adoption of new telecommunication services", Industrial Marketing Management 35, 2006, 676-689.
- [13] ITU Report, "Broadband Mobile Communications Towards a Converged World", ITU/MIC Workshop on shaping the future mobile information society, March 2004.
- [14] [http://news.yahoo.com/s/ap/20100530/ap\\_on\\_hi\\_te/us\\_tec4g\\_hype](http://news.yahoo.com/s/ap/20100530/ap_on_hi_te/us_tec4g_hype).
- [15] <http://en.wikipedia.org/wiki/3G>.
- [16] <http://en.wikipedia.org/wiki/4G>.
- [17] Al-Muhtadi, J., D. Mickunas, and R. Campbell. "A lightweight reconfigurable security mechanism for 3G/4G mobile devices." IEEE Wireless Communications 9.2 (2002): 60–65.
- [18] ArrayComm. "IEC: Smart Antenna Systems." International Engineering Consortium (2003). 6 April 2003.
- [19] Butcher, Mike. "UWB: widening the possibilities for wireless." New Media Age. 5 April 2003. Cefriel. "4th Generation Networks (4G)." Cefriel. 6 April 2003.
- [20] Aggregation of SOA and Cloud Computing: A Recent Emerging Technology Shrabanee Swagatika, Dr. Prasanta Kumar Pattnaik on National Conference RTCT-11, pp: 76-79.