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Research in Service-Oriented Architecture with Cloud and SaaS Solutions

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Abstract**—** The Software as a Service (SaaS) and Service Oriented Architecture (SOA) leads the confusion which one an apt for the nowadays. SaaS cloud delivery model becomes popular. So, the clear understanding is necessary to know the concepts of the SaaS delivery model and SOA architecture. In this paper is used to explore the concepts of SaaS and SOA to give a better understanding of these two technologies.

Keywords**—**SOA, SaaS, Cloud Computing, Service Oriented

I. INTRODUCTION

The concept of cloud computing shared a resource of computing power. John McCarthy, in 1961 has been proposed "computation should be organized as a public utility." SaaS is one of the best branches of cloud computing aims to provide on-demand and a plug-in platform like using a public utility like electricity. The web-based technology needed to support Software as a Service (SaaS) matured heading into early 2000 when Salesforce company started offering SaaS services like Customer Relationship Management (CRM). SaaS is impacting software industry and increasingly accessible to the users for its meek deployment. SaaS allows providers to serve and support many users only through a single version of merchandise with pay as you go licensing design [1].

More than 1000 enterprise software decision makers have been performed a survey in June 2010, by Forrester. The results exhibited that SaaS combined with buyers ‘desire for solutions that consent them to deploy quickly, save costs, and avoid long-term lock-in, is enduring to gain in fame [2]. Forrester's research further shows that the global SaaS business is expected to exceed US$130 billion by 2020 from US$21.2 billion in 2011 [3].

Many more applications presences delivered via the cloud, there is set to be a flareup of SaaS providers. Martin Thompson, 2014, enterprises begin to scrape back control from imperious software publishers and messy licensing and audit practice [4]. According to SaaS, Gartner research will grow $22.1bn in the market place for 2015 [5]. The revenue of SaaS subscription model is proposed to be a quarter of the new software revenue by 2016, which is an obstacle from the current 5 to 15% of the total spending in software during the same year [6].

National Institute of Standards Technology (NIST) defines SaaS as the capability provided to the consumers to use the provider's purpose running on the cloud which is accessible from various client devices through reedy client interface such as web browser [7]. Examples of SaaS applications are web-based email, Google sites, Salesforce CRM, YouTube video streaming, etc. SaaS offers both service providers and consumers. The providers provide on original hardware is used to host application that is shared multiple users (i.e.) clients and from the consumer's perspective the applications [8].

The rest of the papers describes as follows; section II deals with SaaS versus traditional software applications, section III describes the Service-oriented architecture. Section IV explains SaaS and SOA, and Section V holds the conclusion of this paper.

II. SAAS VERSUS TRADITIONAL SOFTWARE APPLICATIONS

Traditional software model can be valuable to run so that only huge companies may well be able to afford such issues and not tinier businesses which don't have the necessary skills or resources to perform such systems effectively. SaaS software needs a good internet connection and a web browser like Google Chrome, Firefox, Internet Explorer, or Safari [9].

Software Engineering is divided into generations, and it fits into the, and also it can be viewed as development + execution + automated runtime management of resources sharing and security. Rapid customization and deployment is a critical aspect of this generation [10].

SaaS design differs from the traditional web-based application. The service providers play a vital role in it. The traditional application development deals with the functional requirements as they are deployed as an on-premise application with implicit security and control operations. The non-functional requirement of SaaS differs from the traditional application. Traditional application development is hardware specific. However, SaaS provides an integrated solution over the Internet. Frequent code changes and customization is needed in the traditional application, which is replaced by a single code base in SaaS. The innovation cycle of traditional applications is annual, where some SaaS applications need weekly innovation and changes. Technical consulting is required in traditional application developments, but functional and business consulting is required for SaaS development [11].

SaaS is a centralized, scalable, configurable, and multi-tenant system which practices meta-data to provide maintenance for different customers with different requirements at the corresponding time. The SaaS provider deploying upgrades and patches to the application delivering and transparently access to end users over the Internet through a smart-client application in the technical side, Providers might even give tools that allow users to change the data schema, workflow, and other aspects of the application's operation for their use — Fig 1indicates a sample SaaS architecture[12].

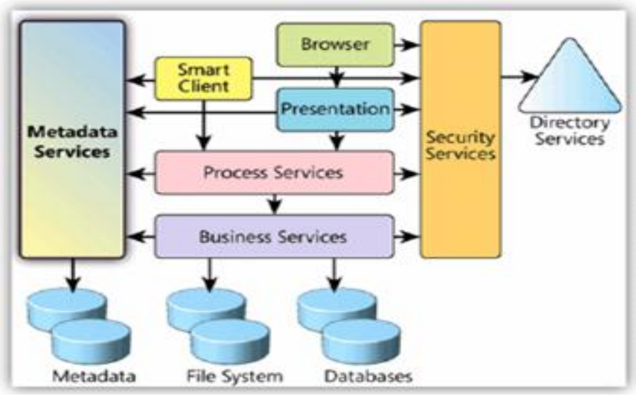


Figure 1. Simple SaaS Architecture

Compare to traditional software SaaS has some of the advantages [13][14] shown in Fig 2.

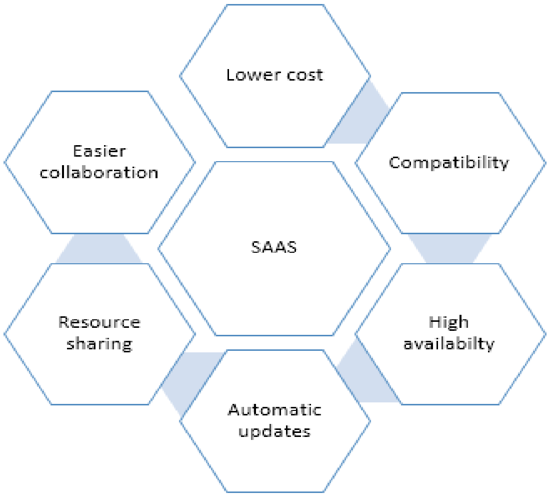


Figure 2. SaaS Advantages

However, SaaS has some of the disadvantages[13] are indicates in Fig 3.

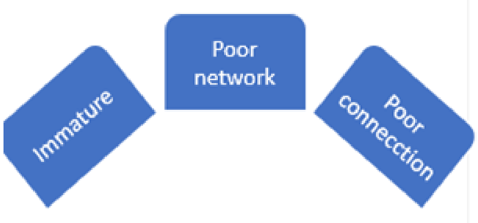


Figure 3. SaaS Disadvantages

The success of SaaS design depends on the way it is built on. Cloud service needs to be built on the fundamental principles shown in Fig 4.These apply to SaaS also and are also called as SaaS DRESS code [15]. SaaS design is expected to be agile, dynamic, and highly flexible. The SaaS design differs from traditional design in terms of architecture, database partitioning, database architecture, scalability issues, user interface design, use of APIs, and workflow [8] [16].

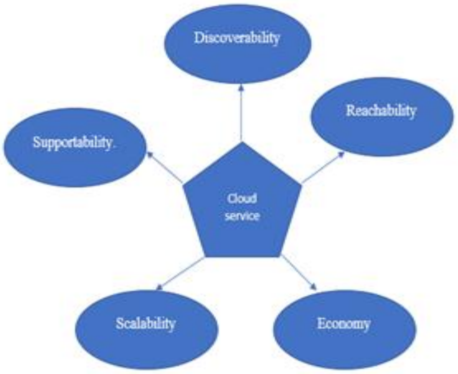


Figure 4. Cloud Service Fundamental Principles

III. SERVICE ORIENTED ARCHITECTURE (SOA)

SOA is an approach for designing managing and deploying systems that represent reusable business functionality. Web services are used to implement the SOA in which service interface describes using the web services description language (WSDL) and extensible markup language (XML). The message is transmitted using simple object access protocols (SOAP) over hypertext transfer protocol (HTTP) [17].

Service bearings present an evolutionary approach to developing distributed software. It facilitates loosely coupled integration with its inherent scalability and resilience. Service Oriented Architecture (SOA) donates resolutions as services in an architectural model. Settings in SOA form a group of self-sufficient gatherings which are more related to the service interface rather than comparing to each other. The assistance in SOA can run on different Operating System (OS), write in any programming languages (Java, C#) and various locations [18].

SOA is a fixed base for a SaaS design due to its synchronization between business and technology, loose coupling, increased interoperability, and federation [19]. SOA provides support for understanding the advantages of computing and systems that are service-oriented. In

SOA architecture, the client switches to another task while is waiting for the answer, but in traditional client-server architectures, the client should wait idly for its turn to be served [12].

IV. SAAS AND SOA

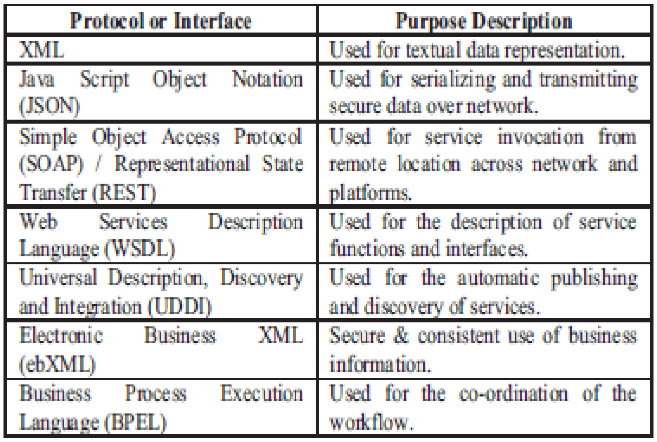
The Cloud applications (SaaS) are based on SOA. The idea of using SaaS first exploded up in the late 1990s. SaaS is talented the software usage hosted by a third party instead of buying additional hardware or software to support [20]. SaaS is a software delivery model, and SOA is a software construction model [21].

SOA provides a tool to arrange and quickly re-configure as business conditions change the applications and databases owned by a company. Using web services, the SaaS application is build based on the SOA design style to build a SaaS application. SOA, like architecture, can be achieved by web service. The other technologies that can utilize SOA are CORBA [22][23].

Service Oriented Software Engineering (SOSE) incorporates the working style of SOA and Cloud. Structured Information Standard (OASIS) and World Wide Web Consortium (W3C) have established a variety of protocols and service interfaces for developing loosely coupled, reusable, composable, stateless and discoverable applications using SOA. Some of the protocol and interfaces used in SOA are given in Table 1 [24].

The Cloud application such as SaaS includes both software components used by the developers as well as the consumers. The Quality of Service (QoS) of loosely coupled services challenge of SOA, It can be handled by the resource allocation and virtualization feature of Cloud computing. Building SaaS on top of the SOA is preferable and makes the application easier to scale. [25].

Table 1: Protocols and Interfaces used in SOSE



Protocol or Interface	Purpose Description
XML	Used for textual data representation.
Java Script Object Notation (JSON)	Used for serializing and transmitting secure data over network.
Simple Object Access Protocol (SOAP) / Representational State Transfer (REST)	Used for service invocation from remote location across network and platforms.
Web Services Description Language (WSDL)	Used for the description of service functions and interfaces.
Universal Description, Discovery and Integration (UDDI)	Used for the automatic publishing and discovery of services.
Electronic Business XML (ebXML)	Secure & consistent use of business information.
Business Process Execution Language (BPEL)	Used for the co-ordination of the workflow.

V. CONCLUSION AND FUTURE SCOPE

The SOA concepts come with the SaaS cloud those who are all deals the SOA they are misunderstanding the concepts. SaaS is supported by SOA. SaaS is a software delivery model, while SOA is a software construction model. This survey describes the concepts of SaaS and SOA and also compared with traditional software applications.

REFERENCES

[1] Chou, D.C. and A.Y. Chou, “Software as a Service (SaaS) as an outsourcing model: An economic analysis," 2008.

[2] AFST, “SaaS Applications: Security and Interoperability. AFS Technologies”,2014.

[3] Collier, M., “SaaS enablement”,2012.

[4] CW," Predictions 2014: How CIOs plan to spend their 2014 IT budget" Computer Weekly, 2014.

[5] McLellan, C., "Saas-pros-cons-and-leadingvendors",Oracle Service Cloud,2013.

[6] e-Core, "Cloud and SaaS solutions", e-Core,2009.

[7] Mell, P., & Grance, T., "The NIST definition of cloud computing", Special Publication 800-145, National Institute of Standards and Technology, available at http://csrc.nist.gov/ publications/ PubsSPs.html#800-145,2011.

[8] Eyad Saleh, Nuhad Shaabani, and Christoph Meinel, "A Framework for Mitigating Traditional Web Applications into Multi-Tenant SaaS," INFOCOMP 2012, The Second International Conference on Advanced Communications and Computation.

[9] Jaffe, L. "SaaS-Software as a Service", 1-4,2013.

[10] Yinong Chen, "A Dream of Software Engineers – Service Orientation and Cloud Computing", 6th IEEE Joint International Information Technology and Artificial Intelligence Conference Keynote, accessed from www.public.asu.edu/~ychen10 /activities/jicsit11/ChenKeynote11.pdf on August 2013.

[11] Jaroslav Gergic, "Software Engineering in the age of SaaS and Cloud Computing", a whitepaper from www.gooddata.com, August 2013, retrieved on Sep 2013.

[12] Bedin, W. and M. Moinuddin, "An overview of software as a service in retail",2007.

[13] Santosh, T., "Software as a service",2014.

[14] Merker, L., "Considering enterprise software as a service? University Business".2009.

[15] Hanu Kommalapati and William H. Zack, "The SaaS Development Lifecycle", a white paper from www.infoq.com, Oct 2011, accessed on Sep. 20, 2013.

[16] David Brumbaugh, "Developing Cloud-based SaaS Applications", an article from news.dice.com, June 2013, accessed on September 2013.

[17] Abhishek Kumar, Manindra Singh, "An Empirical Study on Testing of SOA based Services", *I.J. Information Technology and Computer Science*, 2015, 01, 54-66 Published Online December 2014 in MECS (http://www.mecs-press.org/) DOI: 10.5815/ijitcs.2015.01.07.

[18] Rahmansyah, R. and F. Gaol, "Service-oriented architecture governance implementation in a software development project as an enterprise solutions", J. Comput. Sci., 9: 1638-1647. DOI: 10.3844/jcssp.2013.1638.1647.\.,2013.

[19] Karthik Vishwanaathan, "Right Engineering SaaS: Successfully deploying Software as a Service Models", a white paper from Aspire Systems, retrieved from www.sandhill.com/assets/pdf/Right_Engineering_SaaS.pdf on September 2013.

[20] Farhat, T, "Software-as-a-Service (SaaS) as-a secure-service". Slideshare,2013.

[21] Phillip A. Laplante, Jia Zhang, Jeffrey Voas, "What's in a name? Distinguish between SaaS and SOA". IT Pro May/June 2008 article published by IEEE Computer Society.

[22] Jabr, M.A. and H.K. Al-omari," E-learning management system using service-oriented architecture", 2010, J. Comput. Sci., 6: 285-295. DOI:10.3844/jcssp.2010.285.295.

[23] Sabasti, I., Siluvai, P. Jawahar, V.and Kumar, S., "A framework for simple object access protocol messages to detect expansion attacks for secure web services". J. Comput. Sci.,2013., 9: 308-313. DOI: 10.3844/jcssp.2013.308.313.

[24] Stephen S. Yau and Ho G. An, "Software Engineering Meets Services and Cloud Computing", an article published by IEEE Computer Society and InfoQ, 2011, pp 47-53.

[25] Nassif, A.B., and M.A.M. Capretz, 2013. Offering saas as SOA services. Innovat. Adv. Comput. Inform., Syst. Sci. Eng.. 152: 405-414. DOI: 10.1007/978- 1-4614-3535-8.