

The Cloud and SOA-Creating Architecture for Today and for the Future

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Abstract Cloud Computing provides an abstraction layer between computing resource and its technical execution details, such as its servers, databases, and networks, in turn enabling resources to be used on demand while avoiding efforts in organization management. However, without Service-Oriented Architecture (SOA), organizations will find it almost impossible to reach the cloud. SOA, an elastic, modular approach to distributing IT services, is an essential foundation for emerging technologies like cloud. SOA provides significant advantages over current IT architectures. While it depresses costs, its main benefit is the improvement in swiftness that it provides to organizations, enabling them to respond to the increasing rate of change occurring in nearly every business around the world.

Gradually, Cloud Computing and SOA are assuming more noticeable roles in large organizations for the purpose of operational efficiency and cost reduction. These technologies already left behind the status of emergent technologies to consolidate as mature and upheld technologies. It is evident that a growing adoption of cloud platforms and service-oriented architectures is taking place in all market segments. Conversely, little is said, in fact, as SOA and cloud computing are related. Are SOA and Cloud computing approaches complementary to each other, or should they be used separately?

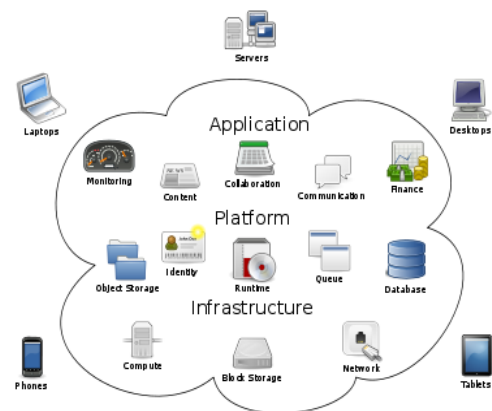
Keywords— Cloud Computing, SOA (Software Oriented Architecture), Security

I. INTRODUCTION

CLOUD COMPUTING

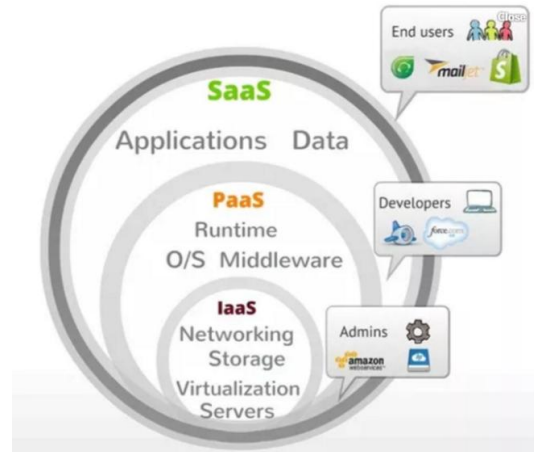
Cloud Computing is Internet-based computing, whereby information, shared resources and software are provided to computers and other devices on-demand, like a public service. Cloud computing is a model for usage based network

contact to a common pool of configurable computing resources (e.g. storage systems, networks, servers, applications, and services) that can be provided and used rapidly. IP-based services are demanded via self-service and used online autonomously. A prerequisite for this is a broadband Internet connection with low latency. The IT resources are bundled into pools and provided as required. Billing is built on the services used.



SERVICE ORIENTED ARCHITECTURE (SOA)

SOA is an architectural style that supports implementation and delivery of corporate functions as software services. Services are published for request by the applications inside or outside an enterprise in a roughly coupled and interoperable approach. Corporate applications are built by integrating and reusing services provided externally and internally. SOA is not Web Services but can be carried out using Web Services standards.



II. CLOUD COMPUTING ARCHITECTURE

In cloud computing, the ensuing models are differentiated on the base of horizontal scaling:

- **Infrastructure-as-a-Service (IaaS)** - offers a hardware platform as a service, such as **Oracle Compute Service (now in preview) or Amazon EC2**.
- **Platform-as-a-Service (PaaS)** - offers a software platform as a service, such as **Oracle Java Cloud or Google Apps Engine**.
- **Software-as-a-Service (SaaS)** - offers functions and application to be contract out by virtualizing cloud provider's software and hardware and offering the functions as services, such as **Oracle Sales Cloud or Sales force CRM**.

In deployment models, differences are made according to installation location and availability. Public clouds are services that are accessible to the public on the Internet. Private clouds are internal company's services. Hybrid clouds and community clouds symbolize mixtures of these models, such as when Amazon computing power is used in the event of an overload or failure of an internal company cloud application. Cloud Computing is a solution for concept of processing power, providing speed, physical resources, storage sized and flexibility for changes in the hardware structural design according to demand.

III. DIFFERENCES BETWEEN CLOUD COMPUTING AND SOA

1. SOA services are focused on business and Cloud Computing Services are distinctive layered software stacks.
2. SOA is for application design and Cloud Computing is for IT delivery.

In short, SOA is mainly for corporate while the cloud computing is for Internet-based services.

IV. FEATURES AND BENEFITS OF SOA

SOA is a software design that determines the features that make up an application and should be made existing as services that communicate with each other over messages. By this way, applications can be advanced into small party, facilitating management of development teams. But SOA is more than that, it is a tough architecture, focused on the integration of systems, whose main advantages are discussed below:

- **Integration between different platforms:** By exchanging XML messages between services is possible to integrate diverse platforms, such as PHP and Java. The XML language is broadly used for data exchange, XML is mainly a text file with the data and its meta-information tag.
- **Low coupling:** As services are developed to attain a specific demand, the level of cohesion is comparatively high, so a program developed for SOA is composed of numerous parts that are well defined to be accounted for only as functions that operate individually.

- **Code reuse:** The high cohesion and low coupling allow each service to be used in several diverse systems without large efforts or rework of the teams involved.
- **Ease of construction and maintenance:** Save time by reusing service and the possibility of change within a point of the system; in case of upcoming maintenance or errors, correction radically decreases the time unavailability in the system.
- **Ease distribution of functionalities:** It's essential to disclose the service descriptor, and features will be offered to any developer who requests to use them.

V. THE IMPORTANCE OF SOA TO CLOUD COMPUTING

After understanding more about Cloud Computing and SOA, the residue of this article will emphasis on the advantages of using these two technologies together and why this union can afford a complete services solution.

"If corporate is interested in Cloud Computing, SOA is particularly important. The perhaps and best the only way to prepare corporate to successfully achieve the cloud is transmuted its IT infrastructure for internal use SOA."

To yield full advantage of a Cloud Computing atmosphere, it is necessary to assess several requirements and make many decisions. However, if the enterprise is already working with SOA, most of these decisions have been ready and are working properly.

One of the profits of adopting SOA is the ability to show horizontal services that span the entire corporate. When we think about simply virtualizing our current IT environment, we are thinking of expanding this horizontal view of current services to an off-site server, dropping both workload and cost. Still, thinking about virtualization SOA situation, we get a great cost-effectiveness due to reuse of services, so that multiple persons can use a service while being in the corporate network.

"By having a flexible and integrated approach to the delivery of services, SOA is a simple element in the model of cloud computing. While Cloud Computing and SOA reduce costs for firms, their main advantage is the improvement in alertness it provides, allowing

it to respond to the increasing rate of change that occurs in almost all corporate around the world."

SOA assists the distribution of software-as-a-service to be used in the cloud while cloud computing provides processing power on claim so that services are flexible and robust, giving organizations more elasticity in time to meet the operational needs of the same.

The use of SOA and Cloud Computing together fetches numerous benefits, and the implementation of applications under the two approaches should be well-thought-out. But it is important to understand that while Cloud Computing is an tactic to infrastructure, naught prevents SOA applications from running on corporate servers. However, beyond the usual set-up costs, there's concern about the scalability of the platform.

Cloud Computing guarantees frame, including hardware and software, to applications while SOA guarantees the delivery of software-as-a-service, considering that the two approaches are balancing and difficulties are resolute by the benefits of the other and vice versa. While cloud computing offers options for deployment and delivery of applications, SOA deals with the base architecture that makes it possible.

One of the main necessities for acceptance of cloud computing for businesses is the guarantee of service as well as the prices charged for these services. For this, Service Oriented Architecture (SOA) provides a standard procedure called "Governance and Services Management" which serves as a source for the virtualization of the IT environment.

Among technical benefits related to this mixture, we can also mention the design of applications, development time and scalability from SOA to Cloud Computing. However, there are many other profits that are not only technical, but issues of processes and governance that make managing the atmospheres more connected with issues of corporate business through one of the necessities of SOA that is related to providing service management and improved governance within a cloud environment.

VI. SECURITY IN SOA

Along with the implementation of a Cloud Computing atmosphere, there is a need for well-defined security policies and access control. At this

point, access control and the policy of security derived from the SOA architecture will also increase the probabilities of success.

There are actions that can be taken to certify that security risks are reduced when dealing with a service-oriented atmosphere. Policies are created that inspire development designs and the way the services are consumed. Example: include compulsory username / password to access URL services, encryption of data exchanged between the server and the client, and the joint work between professionals and developers specialized in information security at development time to detect good practices and key standards to minimize risks, among many other initiatives.

Moreover, systems must be designed to exploit the advantages of public clouds with flexibility. This means that one should not just transfer the applications to the cloud without due care. Safety practices and proper recovery must include still in the process to activate in the cloud, and carefully evaluate the phrases in these respects. In practice, the responsibility for risk management is shared between its customers and the cloud provider.

VII. CONCLUSION

Although both Cloud Computing and SOA have the probability of independent use, the benefits of an integrated design with these two solutions is shown as a largely fortunate strategy in the categories of ease of maintenance, speed of development, cost and governance. This happens due to the unique characteristics of each method, which end up complementing each other. For example, cloud computing provides development platforms, infrastructure and applications-as-services, but without worrying to define the management and architecture of applications. SOA provides principles, guidelines and techniques to the development of services, and strictly describes the architecture of service-oriented systems.

Disadvantages in the usage of Cloud Computing without SOA are mostly related to management of services developed, security and breaking the pattern of companies that do not have a culture focused on the reuse of code and documentation. Each approach has its focus and concerns on certain aspects of an IT solution. With SOA, cloud services implement and manage security policies and manage issues with business processes—worries are managed that are beyond the scope of Cloud Computing. Due to the

scale of the subject, the target of this paper was to obtain a reference that serves as an initial point to begin additional study in order to reduce problems and risks in case of implementation of a SOA in the Cloud Computing model.

VIII. REFERENCE

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