Service Oriented Architecture

SOA (**Service Oriented Architecture**) is built on computer engineering approaches that offer an architectural advancement towards enterprise system. **SOA** provides a translation and management layer within the **cloud architecture** that removes the barrier for **cloud** clients obtaining desired services.

Service-Oriented Architecture (SOA) is an architectural approach in which applications make use of services available in the network. In this architecture, services are provided to form applications, through a communication call over the internet.

- SOA allows users to combine a large number of facilities from existing services to form applications.
- SOA encompasses a set of design principles that structure system development and provide means for integrating components into a coherent and decentralized system.
- SOA based computing packages functionalities into a set of interoperable services, which can be integrated into different software systems belonging to separate business domains.

There are two major roles within Service-oriented Architecture:

1. **Service provider:** The service provider is the maintainer of the service and the organization that makes available one or more services for others to use. To advertise services, the provider can publish them in a registry, together with a service contract that specifies the nature of the service, how to use it, the requirements for the service, and the fees charged.

2. **Service consumer:** The service consumer can locate the service metadata in the registry and develop the required client components to bind and use the service.
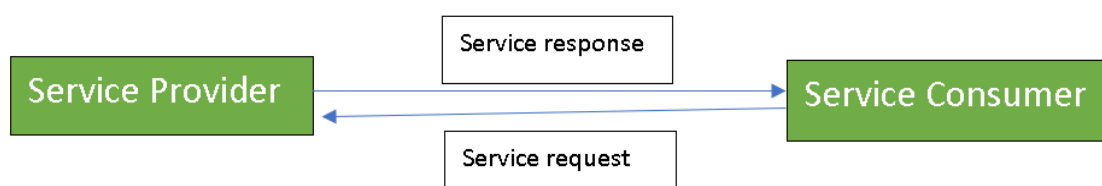
Guiding Principles of SOA:

1. **Standardized service contract:** Specified through one or more service description documents.
2. **Loose coupling:** Services are designed as self-contained components; maintain relationships that minimize dependencies on other services.

3. **Abstraction:** A service is completely defined by service contracts and description documents. They hide their logic, which is encapsulated within their implementation.
4. **Reusability:** Designed as components, services can be reused more effectively, thus reducing development time and the associated costs.
5. **Autonomy:** Services have control over the logic they encapsulate and, from a service consumer point of view, there is no need to know about their implementation.
6. **Discoverability:** Services are defined by description documents that constitute supplemental metadata through which they can be effectively discovered. Service discovery provides an effective means for utilizing third-party resources.
7. **Composability:** Using services as building blocks, sophisticated and complex operations can be implemented.

Advantages of SOA:

- **Service reusability:** In SOA, applications are made from existing services. Thus, services can be reused to make many applications.
- **Easy maintenance:** As services are independent of each other they can be updated and modified easily without affecting other services.
- **Platform independent:** SOA allows making a complex application by combining services picked from different sources, independent of the platform.
- **Availability:** SOA facilities are easily available to anyone on request.
- **Reliability:** SOA applications are more reliable because it is easy to debug small services rather than huge codes
- **Scalability:** Services can run on different servers within an environment, this increases scalability

Disadvantages of SOA:

- **High overhead:** A validation of input parameters of services is done whenever services interact this decreases performance as it increases load and response time.
- **High investment:** A huge initial investment is required for SOA.
- **Complex service management:** When services interact they exchange messages to tasks. The number of messages may go in millions. It becomes a cumbersome task to handle a large number of messages.
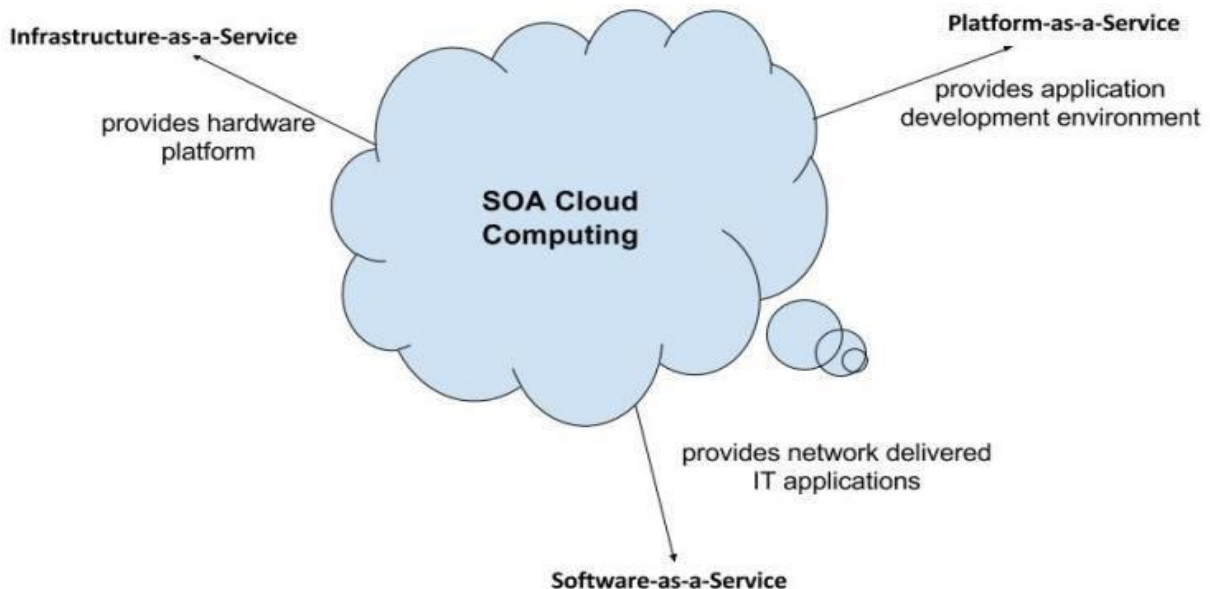
Concepts in Cloud Computing

Cloud computing is a model used for enabling convenient and usage-based network access to a configurable computing resources (eg. networks, servers etc) that can be provided and used rapidly.

- It provides a chance to business users to implement services with usage-based billing that is changed according to their requirements without need of consulting with IT department.

- It provides an abstraction layer between computing resources and its technical implementation details and sequentially enables computational resources to be used while avoiding efforts in infrastructure management.

The below figure shows the SOA cloud computing along with the models:

Below are the models that are differentiated on the horizontal scaling basis in cloud computing:

- **Infrastructure-as-a-Service (IaaS)**: It provides a hardware platform as a service.
- **Platform-as-a-Service (PaaS)**: It provides end-users an application development environment delivered over the internet.
- **Software-as-a-Service (SaaS)**: It provides end-users a standardized, network-delivered IT applications.

The distinctions are made according to availability and the location of installation in the deployment models. Private clouds are internal company services whereas public clouds are the services that are available to the public on internet.

In the large companies where IT plays an important role, internal company cloud solutions are often built in their own data centers. Small and medium companies often use public cloud services.

Cloud Computing provides a very flexible and scalable platform through processing external services and also has the ability to connect with customers, suppliers etc.

Diversified Services

Diversified is a full-service information technology service provider delivering data. deploying a data centre on virtualization and cloud computing technologies.

Virtualization:

Data centre virtualization is the process of designing, developing and deploying a data centre on virtualization and cloud computing technologies. It primarily enables virtualizing physical servers in a data centre facility along with storage, networking and other infrastructure devices and equipment. Diversified's expertise in virtualization helps data centres achieve the following benefits:

- Reduce hardware vendor lock-in
- Improve disaster recovery
- Smooth migration to cloud
- Reduce data center footprint
- Faster server provisioning

Premise, Hybrid & Cloud Computing:

The overwhelming number of vendors, products and hybrid options make it challenging to develop your future IT roadmap. Diversified aides clients in navigating the pros and cons of hosting locally, in a private/public cloud, or a combination thereof to create a strategy that works.

Storage:

A proper strategy for storage is essential for quality and cost efficiency. Diversified assists clients in selecting the proper storage to fit their needs and budget.

- Design for migrating inheritance storage solutions from drives, tapes, and arrays.
- Deployment of complete storage solutions consisting of internal and external storage, backup and storage software, storage networking, hyperconverged, cloud, and policies.

Hyperconverged Infrastructure:

The drive to reduce complexity while increasing scalability is also becoming increasingly popular in the data centre. Diversified's hyperconverged infrastructure solutions provide a software-centric architecture that tightly integrates computing, storage and virtualization resources in a single system that runs on off the shelf servers.

Performance Issues in Cloud Computing Services

Application that fits the cloud:

Not all the applications are suitable for cloud. It is extremely important to identify the most suitable applications for migration and identify any potential problems. Create a checklist to ensure a complete and successful migration.

Dealing with the performance issues:

If you are managing application performance in the cloud, you need a topological map of service delivery across all tiers. Although cloud computing offers numerous benefits, performance issues can complicate or reduce the benefits.

Addressing the topological dependencies:

While moving to cloud, various businesses need to face the impact of moving from a primarily static to dynamic network architecture. Firewall, load balancing and security services are still required for the network architecture.

Monitoring consumption for every service:

While transitioning from a resource focused cost center to a business service focused profit center, it demands assessing the resource consumption. Unfortunately, the traditional chargeback and AMP (Advanced Malware Protection) tools lack the ability to enable the business aligned costing and chargeback paradigms. This means that you need to come up with a solution to monitor consumption for every service across multiple applications and tiers.

Have a clear picture of resource consumption:

In order to make it sure that SLA's in cloud are met, you need to prioritize the allocation of resources based on the measurement of the end user performance. It demands a clear picture of the resource consumption at the transaction level.

Lack of infrastructure configuration for service deployment:

The lack of knowledge and infrastructure configuration for the service deployment has limited the ability of researchers to study the impact of resource management inside the cloud infrastructures on the service performance through measurement-based evaluations. This makes it difficult for a service customer to use a measurement-based method to get insight about the performance behaviours of new Cloud services.

Depending upon the size and the type of business you are running, the cloud offers you various benefits. For a startup, cloud computing provides essential differentiators to keep the business up and running quickly with minimal up-front costs. Larger businesses often

face complex challenges to ensure the availability and performance of the high traffic websites.

You will face various risks along the way along that can be complex to manage. Transitioning to the cloud is a non-trivial decision that demands a proper evaluation of both the data and services. It is important to perform a thorough evaluation on the cloud service performance as this is what will be beneficial for both service providers as well as customers.

Overall, cloud performance issues are considerable and demands innovation to overcome the challenges.

Data Centre

Data centres are simply centralized locations where computing and networking equipment is concentrated for the purpose of collecting, storing, processing, distributing or allowing access to large amounts of data. They have existed in one form or another since the introduction of computers.

Data centre refers to on-premise hardware while the cloud refers to off-premise computing. The cloud stores your data in the public cloud, while a data centre stores your data on your own hardware.

They are also responsible for data backup and recovery, as well as networking. These centres also host websites, manage e-mails, and instant messaging services. They support cloud storage applications and e-commerce transactions. Even online gaming communities require data centres to manage their online activities.

Data centres connect communication networks so end-users can access information remotely. These vast numbers of clustered servers and related equipment can be found in a room or even in an entire compound.

Evolution of Data Centres:

Decades ago, early computers were massive machines that can occupy whole rooms. But as technology evolved, equipment shrunk and became cheaper than before. However, with this progress, data processing demands have also begun to increase exponentially.

Unlike before, where data centres are just one big supercomputer, modern aged data centres functions using multiple servers to optimize further and boost its processing power. Now data centres consist of thousands of potent and tiny servers that run non-stop around the clock.

Importance of Data Centres:

Almost every modern business and government offices need their very own data centre, or they may decide to lease data centr. Big corporations and government institutions may choose to build and manage them in-house if they have the resources. While others choose to rent servers at 'colos' or colocation facilities. Some business owners also have the choice to use public cloud-based services.

Corporations that handle education, finance, telecommunication, retailers, and social networking services process a lot of information every day. This business that produces and utilizes data requires data centres in running their operations. Without these centres, they will suffer the absence of speedy and secure access to data. This failure in delivering services will ultimately lead to the loss of clients and profits.

Now, we must remember that all of this information needs to be housed somewhere. The idea of running or storing our data and resources at home or work computers is getting replaced by faraway storing mentality. Many firms are also migrating their professional applications to data centre services to minimize the cost of running an in-house server.

That is why data centres are an essential resource for a business that wants to run their operation without worries. The importance of data centres in the modern world has increased ten times due to the rising demand of information trading.

How Do Data Centres Work?

The data that is stored on a data centre server is distributed into packets before transmission and is sent via routers that decide the most suitable path for that data to progress.

It then uses a series of wired and wireless networks to reach the user's Internet service provider and finally arrive at the end user's computer. Every time a Web address is enters into a browser, it automatically requests information from a server. If the end-user wants to upload information, then the process will be reversed.

Types of Data Centres:

With how data centres are essential in running big corporations and with even small-medium enterprises joining the trend, choosing one to fit a business model is essential. There are different types of data centres and service models.

Here are four main types of data centres:

Colocation Data Centers:

Colocation data centers or most commonly known as "colo" is a company that rents space within a data centre that they do not own and is housed outside the company's premises. The colocation data centre provides the infrastructure like the building itself, cooling,

bandwidth, and security, among others. While the company produces and maintains the components, which include the servers, storage system, and security firewalls.

Enterprise Data Centres:

Enterprise data centres are established, owned, and managed by companies. These data canters are operated under a single purpose and that this optimized service for their end-user clients. Enterprise data canters are often located inside corporate compounds.

Managed Services Data Canters:

These data canters are operated by a third-party entity or a managed services provider instead of the company. The company rents the equipment and infrastructure to cut costs.

Cloud Data Canters:

Cloud data canters are an off-premises form of a data centre. The most common cloud hosting services are Amazon Web Services (AWS), Microsoft (Azure), and IBM Cloud.

How Reliable Is a Data Centre Facility?

Business owners are in constant need of reliability when in terms of maintaining a smooth operation. Good thing that a Data centre is built to withstand a 24/7 service easily. However, the components require a significant amount of infrastructure support in both hardware and software areas.

These include power subsystems, stable and uninterruptible power supplies, proper ventilation, high-quality cooling systems, fire control, reliable backup generators, and connections to external networks.

The business world is moving at an incredibly fast pace that matches the overwhelming demand for information. With the ever-changing requirements of the modern business model, many companies place their confidence in data canters, as these facilities play a crucial role in reaching their IT specifications.

Data centre service providers are capable of handling higher volumes of traffic without making compromises on security and storage capacity of data. Generally, a typical data centre carries the responsibility of managing significant characteristics like data workloads, operating conditions, data protection and security fulfilment.

Data canters are more than just a safe and secure facility with space that is equipped with reliable power, and network. They are becoming a valuable addition to many businesses as they prove to be a dependable extension of their IT team. That is why data canters in modern business set up are increasingly becoming an essential factor for success.

Legal issues in cloud computing service provision

Cloud computing, being one of such recent advancements, have raised a number of legal issues including privacy and data security, contracting issues, issues relating to the location of the data, and business considerations. Issues relating to contractual relation between the cloud service provider and the customer.

Cloud computing is bringing amazing advantages and benefits companies. But it also brings some challenges. There are several legal issues that must be taken into consideration when moving into the cloud. Let's see which are the most challenging legal issues around cloud computing.

Security procedures:

The majority of companies which implemented cloud solutions and services do not have security procedures in place. Also, they lack measures to approve or evaluate cloud applications. When adopting the BYOD trend for example, organizations needed these security procedures more than ever. General data security trainings, multiple levels of security, rigorous procedures to use one's own device and to transfer or copy data are some of the options available to protect data in organizations. The bottom line is that security procedures must be established according to every company's objectives and work flow.

[Bring your own device (**BYOD**) refers to the **trend** of employees using personal devices to connect to their organizational networks and access work-related systems and potentially sensitive or confidential data. Personal devices could include smartphones, personal computers, tablets, or USB drives.]

Third party access issues:

Third-party involvement could be a risk. All third parties using a multi-tenant shared cloud are using the same administration interface, so make sure multi-factor authentication and enhanced security is present. Also, look for HIPAA (Health Insurance Portability and Accountability Act) compliant providers – a business associate agreement (BAA) with third-party vendor who access Protected Health Information (PHI) is necessary to ensure privacy and security requirements. A partnership with a HIPAA solutions provider that signs a BAA is an efficient method to make sure this goes smoothly and everything is secure. And don't forget to read carefully the terms and conditions before signing up for a cloud based services.

Intellectual Property Rights:

Intellectual Property Rights differ from one country to another, so it is not very clear what intellectual property laws will apply in the cloud computing environment. Make sure you are aware of the regulations and rights from the country you store your intellectual work. The provider you choose should know how to protect intellectual property it stores and how to avoid potential infringement pitfalls.

Confidential data theft attacks:

Data stored in the cloud might be compromised or breached. Therefore, most cloud computing providers also offer the customer different levels of security protection, which allows for more enhanced security. Encryption might seem to have failed in protecting data from theft attacks, but other methods have been discovered and implemented, including monitoring data access in the cloud to detect abnormal data access patterns. The customer has to understand the cloud provider's disclosure policy and how quickly the breach would be disclosed to them. Most of the U.S. states have security breach disclosure laws requiring the provider to inform the customers when their data has been compromised.

Many of these legal issues and the methods to inform about them or to solve them should be mentioned in the Service Level Agreement. It is essential to understand all the terms of the cloud's provider and to consider the needs and objectives of the enterprise before signing an agreement.