Evolution of Cloud Computing

Technological advancements
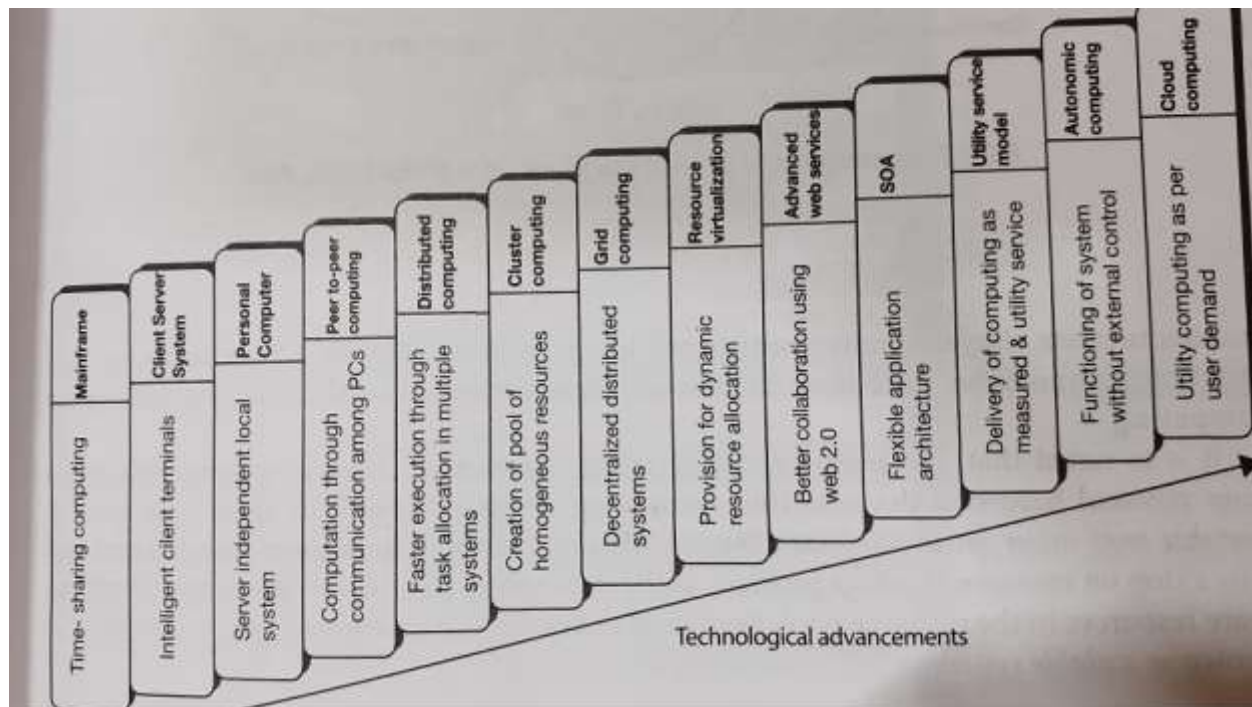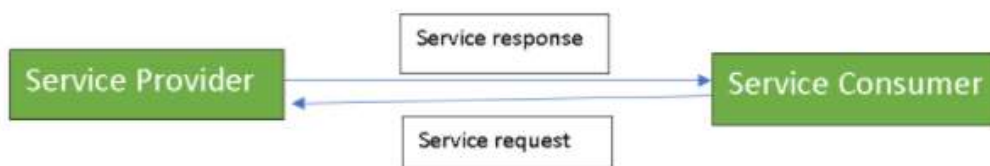
Service-Oriented Architecture

Difficulty Level : Medium • Last Updated : 23 Dec, 2020

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
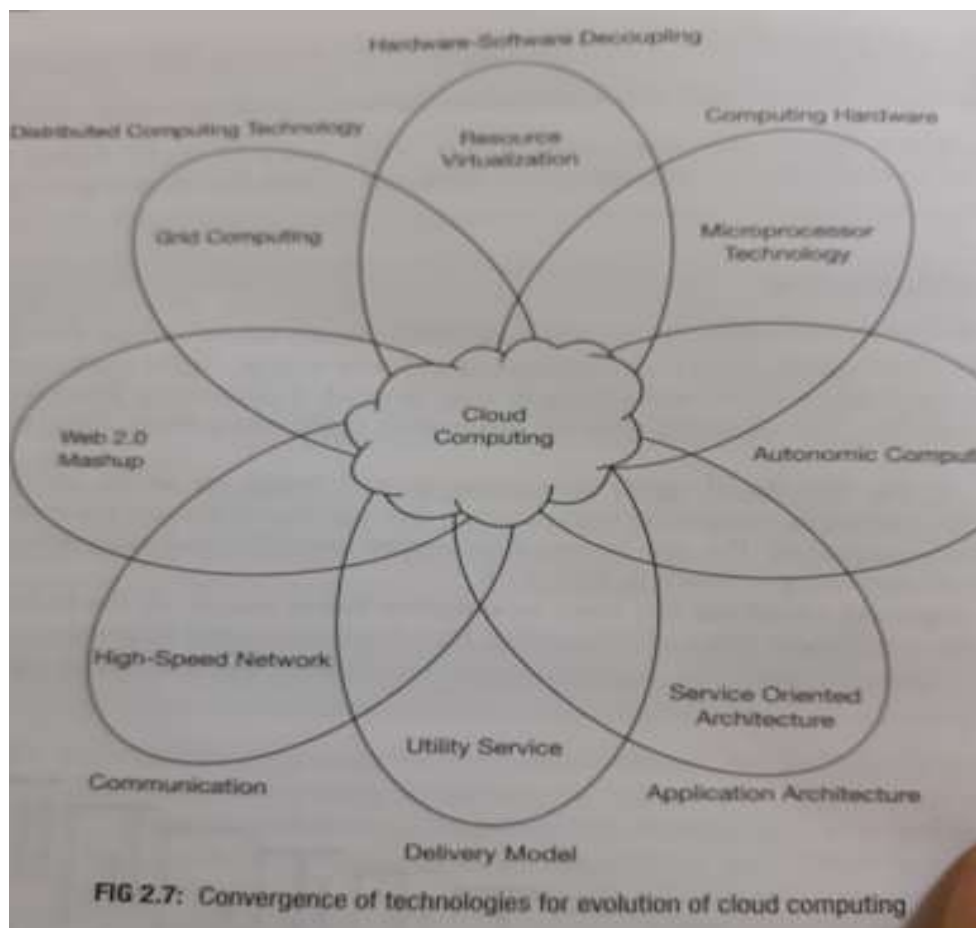
- SOA based computing packages functionalities into a set of interoperable services, which can be integrated into different software systems belonging to separate business domains.

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.

Autonomic Computing:

1. Self-Configuration
2. Self-healing
3. Self-optimization
4. Self-protection

FIG 2.7: Convergence of technologies for evolution of cloud computing

Cluster Computing	Grid Computing	Cloud Computing
A cluster is normally formed with computers of a single location, otherwise the system becomes complex.	Grid is inherently more distributed by its nature. The computers need not to be in the same geographical location.	It allows total distribution of resources like the grids. Hardware resources are maintained in multiple data centers spread across the globe.
Computation job takes place in one administrative domain owned by a single party.	Computation could occur over many administrative domains owned by multiple parties as connected together.	Computing resources of a cloud is usually owned by a single party. But multiple administrative domains can be combined together to perform the job.
In a cluster, all computing nodes should have similar hardware systems. That is, the system should be homogeneous in nature.	It can be heterogeneous in nature. The computers that are part of a grid can be made of different hardware architectures.	It can use heterogeneous collection of commodity hardware.
It features the centralized task management and scheduling system.	It features the distributed task management and decentralized scheduling.	It features the decentralized task management with more dynamic computing infrastructure.
Resources are generally pre-reserved for specific type of task.	Resources are generally pre-reserved for specific type of task.	Resources are not pre-reserved for specific task. Resource utilization is mainly demand-driven.
System is not dynamic in nature. Application mobility is not possible.	System is not dynamic in nature. Application mobility is not possible.	It is a dynamic system. Mobility of application is an inherent feature in this system.
One whole cluster behaves like a single system. As resources are managed by centralized resource manager, the individual computers can not be operated as separate computers.	Every node is autonomous that is, it has its own resource manager and behaves like an independent entity. So, each computer can be operated independently as distinct computer.	There is no concept of directly accessing any particular physical computing nodes. Underlying computing infrastructure remains hidden from the users.

References

- *Cloud Computing*, Sandeep Bhowmik
- References: https://www.geeksforgeeks.org/service-oriented-architecture/