What are the different service oriented architecture

Service-Oriented Architecture (SOA) is a stage in the evolution of application development and/or integration. It defines a way to make software components reusable using the interfaces. Formally, 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 network call over the internet. It uses common communication standards to speed up and streamline the service integrations in applications. Each service in SOA is a complete business function in itself. The services are published in such a way that it makes it easy for the developers to assemble their apps using those services. Note that SOA is different from microservice architecture.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: 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.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. Services might aggregate information and data retrieved from other services or create workflows of services to satisfy the request of a given service consumer. This practice is known as service orchestration Another important interaction pattern is service choreography, which is the coordinated interaction of services without a single point of control. Components of SOA: Guiding Principles of SOA: Standardized service contract: Specified through one or more service description documents.Loose coupling: Services are designed as self-contained components, maintain relationships that minimize dependencies on other services.Abstraction: A service is completely defined by service contracts and description documents. They hide their logic, which is encapsulated within their implementation.Reusability: Designed as components, services can be reused more effectively, thus reducing development time and the associated costs.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.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.Composability: Using services as building blocks, sophisticated and complex operations can be implemented. Service orchestration and choreography provide a solid support for composing services and achieving business goals.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 codesScalability: Services can run on different servers within an environment, this increases scalabilityDisadvantages 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.Practical applications of SOA: SOA is used in many ways around us whether it is mentioned or not. SOA infrastructure is used by many armies and air forces to deploy situational awareness systems.SOA is used to improve healthcare delivery.Nowadays many apps are games and they use inbuilt functions to run. For example, an app might need GPS so it uses the inbuilt GPS functions of the device. This is SOA in mobile solutions.SOA helps maintain museums a virtualized storage pool for their information and content. A Service Oriented Architecture (SOA) is an architectural pattern in computer software design in which application components provide services to other components via a communications protocol, typically over a network. The principles of service-orientation are independent of any product, vendor or technology. SOA just makes it easier for software components over various networks to work with each other. Web services which are built as per the SOA architecture tend to make web service more independent. The web services themselves can exchange data with each other and because of the underlying principles on which they are created, they don’t need any sort of human interaction and also don’t need any code modifications. It ensures that the web services on a network can interact with each other seamlessly. Service-Oriented Architecture (SOA) Principles There are 9 types of SOA design principles which are mentioned below 1. Standardized Service Contract Services adhere to a service description. A service must have some sort of description which describes what the service is about. This makes it easier for client applications to understand what the service does. 2. Loose Coupling Less dependency on each other. This is one of the main characteristics of web services which just states that there should be as less dependency as possible between the web services and the client invoking the web service. So if the service functionality changes at any point in time, it should not break the client application or stop it from working. 3. Service Abstraction Services hide the logic they encapsulate from the outside world. The service should not expose how it executes its functionality; it should just tell the client application on what it does and not on how it does it. 4. Service Reusability Logic is divided into services with the intent of maximizing reuse. In any development company re-usability is a big topic because obviously one wouldn’t want to spend time and effort building the same code again and again across multiple applications which require them. Hence, once the code for a web service is written it should have the ability work with various application types. 5. Service Autonomy Services should have control over the logic they encapsulate. The service knows everything on what functionality it offers and hence should also have complete control over the code it contains. 6. Service Statelessness Ideally, services should be stateless. This means that services should not withhold information from one state to the other. This would need to be done from either the client application. An example can be an order placed on a shopping site. Now you can have a web service which gives you the price of a particular item. But if the items are added to a shopping cart and the web page navigates to the page where you do the payment, the responsibility of the price of the item to be transferred to the payment page should not be done by the web service. Instead, it needs to be done by the web application. 7. Service Discoverability Services can be discovered (usually in a service registry). We have already seen this in the concept of the UDDI, which performs a registry which can hold information about the web service. 8. Service Composability Services break big problems into little problems. One should never embed all functionality of an application into one single service but instead, break the service down into modules each with a separate business functionality. 9. Service Interoperability Services should use standards that allow diverse subscribers to use the service. In web services, standards as XML and communication over HTTP is used to ensure it conforms to this principle. Service oriented architecture (SOA) refers to the software architecture design paradigm that allows software components to behave as separate, autonomous, loosely coupled network-accessible units. The use of SOA is on the rise. Let’s take a look at how SOA works—and why businesses are adopting it. How service oriented architecture works In SOA, software components function as their own loosely coupled units. These units provide services or data using a network protocol, making them independent of vendors or proprietary technology systems. These services can be independent, repeatable, and self-contained tasks of a global system functionality—consider them the building blocks of a large consumer service where each feature is composed of multiple small services that can be developed, managed, modified and replaced independently of other components (and services). (Compare SOA to microservice architecture.) Service Oriented Architecture allows the flexibility to treat every component independent of the global service that requires those components. This approach solves some of the key challenges facing large enterprise IT systems and has driven the growth and popularity of the SOA design paradigm. Most of the drivers are shared across earlier design philosophies like object-oriented programming and component-based engineering, such as: Multiple use Non-context-specific Composable Encapsulated Components independent deployment and versioning Before we discuss why it’s important to adopt an SOA approach for software and systems design, it’s important to understand its characteristics and driving factors. What makes SOA valuable to organizations operating large complex and distributed IT environments? What is loose coupling? Let’s start with the term loose coupling. The term “loose coupling” refers to the client of a service, and its ability to remain independent of the service that it requires. The most important part of this concept is that the client, which in itself can be a service, can communicate with the service even if they are not closely related. This facilitated communication is achieved through the implementation of a specified interface that is able to perform the necessary actions to allow for the transmission of data. A common example of this increased ability to communicate without service constraints involves coding languages used by these services. There is an array of different languages from which software platforms are created and not all of these languages can interact fluently, without encountering communication issues. By using an SOA, it is not necessary for the client to understand the language that is being used by the service, but instead, it relies on a structured interface that is able to process the transmission between the service and the client. Drivers of service oriented architecture The more prevalent factors driving interest and growth of SOA capabilities in the modern software engineering landscape include: Distributed systems Modern enterprise IT solutions are built on multiple layers of technology that evolve constantly. New components are integrated and legacy systems are updated, infrastructure resources are provisioned and scaled to meet variable and unpredictable demand. When the underlying services are loosely coupled, they can be located and communicate with each other through an interface, such as an API, over the network using standardized protocols of the OSI model. These protocols are supported by open source and proprietary technology vendors alike. Designing the software architecture specifically with the openness and standardization to interact with a variety of services is a necessary imperative for large-scale distributed networks. Ownership limitations Business organizations subscribe to cloud-based services for the convenience of provisioning hardware resources without doing any of the heavy lifting. Cloud solutions are operated and managed by third-party vendors while customers access the service through a Web interface. These customers must also ensure that the cloud service interacts with their existing systems and with their data assets without technical limitations such as: Integration Performance Standardization issues Cloud vendors, on the other hand, can only offer limited control and visibility into the hardware components that power their cloud services. The conflict in ownership domains of these underlying components is a driving factor for services in distributed systems to interact with each other, without requiring ownership and control over those components. Customers of cloud services cannot modify the behavior of the cloud infrastructure. Similarly, it’s important for vendors to modify small system components, without necessarily modifying the system-wide functionality. Heterogeneity Large, distributed, and complex systems inherently lack harmony. Many systems are developed in different times—some evolve and replace, some are maintained as legacy systems. Old programming languages and platforms do not maintain the same high level of support or popularity over the course of their entire lifecycle. The Service Oriented Architecture supports this behavior—allowing organizations to adopt agile design methodologies. Heterogeneity of the entire architecture itself is not the goal of SOA, but it ensures practices such as: Vendor diversity Agnostic platforms Programming languages When the diverse services are interoperable, organizations can avoid vendor lock-in and establish independent services that can be leveraged without having to modify or control the underlying components and services. There is no doubt that as web application technologies continue to evolve, more businesses will utilize the power of SOA. By switching to a standardized communication protocol, engineers will be able to create software applications without having to worry about the languages on which platforms are built, and can instead rely upon the interoperability that the SOA structure creates. Finally, SOA can help ensure that applications can be easily scaled, while at the same time decreasing the costs that are often encountered when developing business service solutions. Related reading These postings are my own and do not necessarily represent BMC's position, strategies, or opinion. See an error or have a suggestion? Please let us know by emailing blogs@bmc.com.

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