

CSC 9010 Service Oriented Architecture Design and Analysis

Introduction

What is an SOA

- *A business definition:* A set of business, process, organizational, governance, and technical methods to reduce or eliminate frustrations with IT and to quantifiably measure the business value of IT while creating an agile business environment for competitive advantage.
- *Another business definition (introduced by IBM):* A service-oriented architecture provides the flexibility to treat elements of business processes and the underlying IT infrastructure as secure, standardized components (services) that can be reused and combined to address changing business priorities.

What is an SOA

- ❑ *The widest technical (and rather minimalist) definition:* An enterprise-wide IT architecture that promotes **loose coupling, reuse, and interoperability between systems.**
- ❑ *A moderately complex technical definition:* An application architecture in which all functions or services are defined using a **description language** and have **callable interfaces** that are called to perform business processes. Each interaction is independent of each and every other interaction and the interconnect protocols of the communicating devices. Because interfaces are **platform independent**, a client can use the service from any device using any operating system in any language.

What is an SOA

- ❑ *The least common denominator definition:* A system architecture in which application functions are built as components (*services*) that are **loosely coupled and well-defined to support interoperability** and to improve flexibility and reuse.
- ❑ *The narrowest definition:* SOA is a synonym for solution architectures making use of Web service technologies such as *SOAP*, *WSDL*, and *UDDI*. Here SOA is defined as "any product and project architecture conforming to the W3C Web services architecture (WSA)."
- ❑ **Reference:** *Bieberstein et al., Service Oriented Architecture (SOA) Compass, IBM Press, 2006.*

What is an SOA

- ❑ **Service Oriented Architecture (SOA)** is an architectural style that guides all aspects of creating and using business processes, packaged as *services*, throughout their lifecycle, as well as defining and provisioning the IT infrastructure that allows different applications to exchange data and participate in business processes loosely coupled from the operating systems and programming languages underlying those applications.
- ❑ **Reference:** *Newcomer, Eric and Lomow, Greg. Understanding SOA with Web Services. Addison Wesley, 2005*

What is an SOA

- ❑ SOA represents a model in which functionality is decomposed into distinct units (services), which can be distributed over a network and can be combined together and reused to create business applications. These services communicate with each other by passing data from one service to another, or by coordinating an activity between two or more services. The concepts of Service Oriented Architecture are often seen as built upon, and the evolution of, the older concepts of distributed computing and modular programming.
- ❑ **Reference:** *Erl, Thomas. Service-Oriented Architecture: Concepts, Technology, and Design. Prentice Hall PTR, 2005*

What is an SOA

- We define SOA as an architectural style where systems consist of service users and service providers. An architectural style defines a vocabulary of component and connector types, and constraints on how they can be combined. For SOA, the basic component types are service user and service provider. Auxiliary component types, such as the enterprise service bus (ESB) and the directory of services, can be used. SOA connector types include synchronous and asynchronous calls using SOAP, bare http, and messaging infrastructure. Many properties can be assigned to these component and connector types, but they are usually specific to each implementation technology.
- **Reference:** *Bianco et al., Evaluating a Service-Oriented Architecture, TECHNICAL REPORT CMU/SEI-2007-TR-015*

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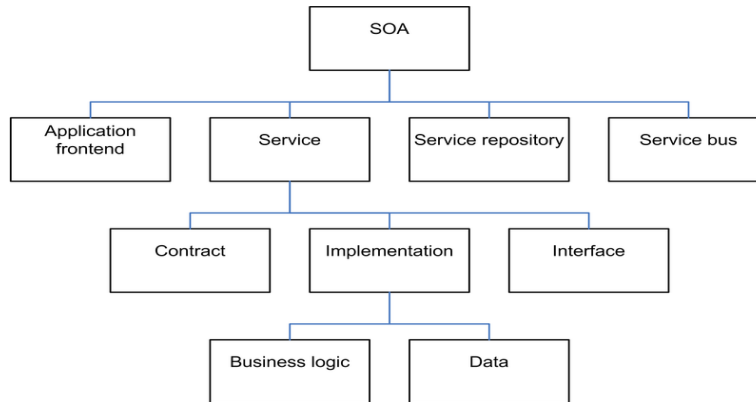
What is an SOA

- Service-oriented architecture (SOA) is an evolution of distributed computing based on the request/reply design paradigm for synchronous and asynchronous applications. An application's business logic or individual functions are modularized and presented as services for consumer/client applications. What's key to these services is their loosely coupled nature; i.e., the service interface is independent of the implementation. Application developers or system integrators can build applications by composing one or more services without knowing the services' underlying implementations. For example, a service can be implemented either in .Net or J2EE, and the application consuming the service can be on a different platform or language.
- **Reference:** *Raghu R. Kodali, What is service-oriented architecture?JavaWorld.com, 06/13/05*

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What is an SOA



Reference: *Elements of SOA*, by Dirk Kraefzig, Karl Banke, and Dirk Slama. *Enterprise SOA*. Prentice Hall, 2005

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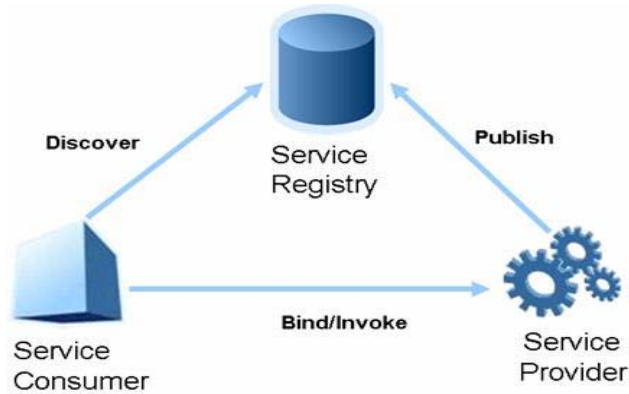
What is a Service

- The CMU/SEI report defines a service as:
 - is self-contained. The service is highly modular and can be independently deployed.
 - is a distributed component. The service is available over the network and accessible through a name or locator other than the absolute network address.
 - has a published interface. Users of the service only need to see the interface and can be oblivious to implementation details.
 - stresses interoperability. Service users and providers can use different implementation languages and platforms.
 - is discoverable. A special directory service allows the service to be registered, so users can look it up.
 - is dynamically bound. A service user does not need to have the service implementation available at build time; the service is located and bound at runtime.

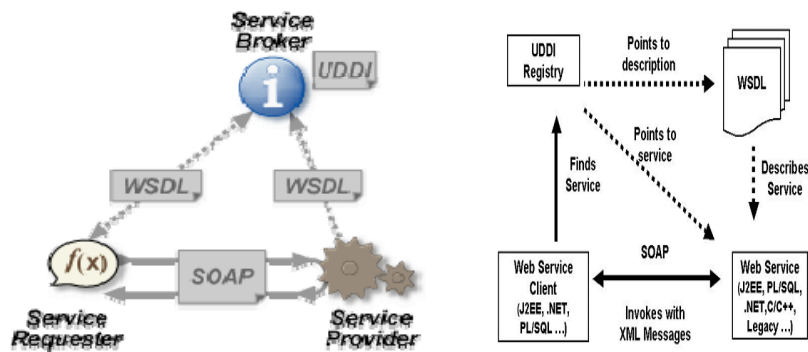
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SOA View



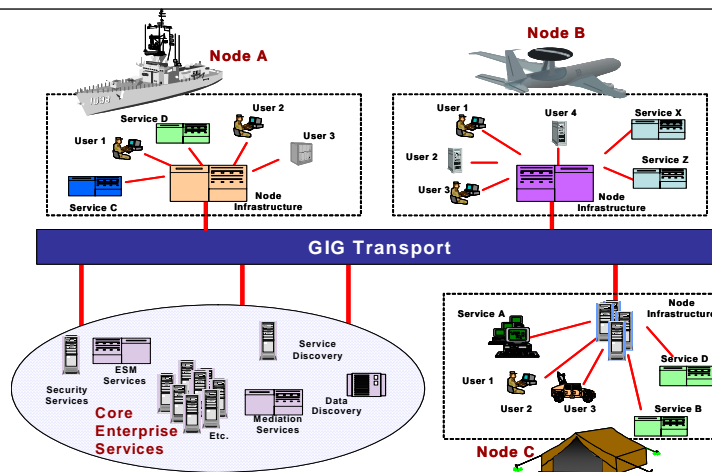
SOA vs Webservice



Why SOA-The Business Case

- integration with legacy systems
- corporate mergers
- realignment of responsibilities through business reorganizations
- changing business partnerships (e.g., relationships with suppliers and customers)
- modernization of obsolete systems for financial, functional, or technical reasons
- leverage existing investments in applications and application infrastructure to address newer business requirements
- Compliance with new regulations

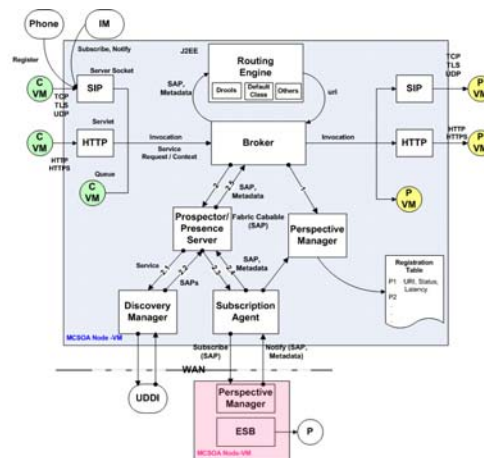
SOA in Defense



SOA in Defense-Added Requirements

- Dynamic service discovery
- Interoperable multiple connection types
- Availability awareness
- Load balancing
- Real-time constraints
- Reliability
- Security
- ...

An Example Architecture



Dynamic Discovery

