Service Oriented Architecture

Reference

MIDDLEWARE & ENTERPRISE INTEGRATION TECHNOLOGIES

By

G. SUDHA SADASIVAM, RADHA SHANKARMANI

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What is Service-Oriented Architecture?

- Service-Oriented Architecture (SOA) is an architectural style for building Enterprise Solution based on Services.

- Applications built using an SOA style deliver functionality as services that can be used or reused when building applications or integrating within the enterprise or trading partners.
SOA

- Uses open standards to integrate software assets as services
- Standardizes interactions of services
- Services become building blocks that form business flows
- Services can be reused by other applications
What is Service Oriented Architecture (SOA)? (General Architecture)

- An SOA application is a composition of services
- A “service” is the atomic unit of an SOA
- Services encapsulate a business process
- Service Providers Register themselves
- Service use involves: Find, Bind, Execute
- Most well-known instance is Web Services
SOA Actors

- **Service Provider**
  - Provides a stateless, location transparent business service

- **Service Registry**
  - Allows service consumers to locate service providers that meet required criteria

- **Service Consumer**
  - Uses service providers to complete business processes
Elements Of SOA

SOA

GUI

SERVICE

IMPLEMENTATION

CONTRACT

REPOSITORY

INTERFACE

DATA

BUSINESS LOGIC

MIDDLEware

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1) Application User Interface - The element of SOA that interacts & delivers output to end-users.

2) Service - A software Component that encapsulate high level business concept. Service have a way of describing & advertizing capabilities to entities like Components. A client service invoke service through interface.

3) Contract - A service contract consist of Technology specific API. A service contract contains documents Such as Service Level Agreement (SLA) that describes additional quality of service, behavior & limitation.

4) Interface - The functionality of Service is exposed to client through interface.

5) Implementation - The service Implementation provides the required business logic & appropriate data.

6) Service Repository - It registers services & their attributes to facilitate the Discovery of Service, Operation, Access right etc. Here Registry hold reference to the Service (discovery, Description etc.) while Repository hold the actual Service (code, Version etc).

7) Middleware (ESB) - It’s an infrastructure for integrating application & Service by routing Message, Transforming protocol, Providing QOS, Security & Managing interaction among the Services.
Business Value Of SOA

- With reuse of services & components from different users, new applications can be quickly assembled to respond to changing market conditions or business demands.
- SOA virtually eliminates inter application complexities, creates infrastructure for business adaptability.
- SOA framework supports run-time deployment of services across the network, which reduces the costs of application integration & deployment by automating these time consuming process across business boundaries.
- Easy development & deployment: design & run time reduces time taken to implement & deliver working process.
• Reusing legacy system: shares information & processes from systems

• Tested services: core services & processes thoroughly tested, & chances of potential bug reduced

• Continuous improvement: implementation of service encapsulated so not visible to requestor

• Standard user interface: each service made available to entire organisation through standard interface

• Other benefits: less duplication, reduced costs,
Characteristics of a Service

- It provides reusability, which includes granularity, modularity, composability, and interoperability.

- Supports open standards for integration: Although proprietary integration mechanisms may be offered by the SOA infrastructure, SOA’s should be based on open standards. Open standards ensure the broadest integration compatibility opportunities.
SOA CHARACTERISTICS / FEATURES OF SERVICES

• **Service Encapsulation**
  Implementation Details & data Structure Hidden from Interface Operation & Semantic Model. Services encapsulates set of business functionalities that accessed from components.

• **Service Loose coupling**
  Dependencies between Consumer and provider is minimized i.e. degree of interdependency of one service on another is very less.

• **Service Contract**
  Services are governed by policies, SLAs and service-description documents.

• **Service Abstraction**
  The services provides layer of abstraction by hiding the logic of components from the outside world.

• **Services are self contained & Modular**: Services Should maintain granularity, Modularity, componentization and interoperability. They provide higher degree of modularity by grouping functionality of set of Components.

• **Consistency and isolation**
  Services are responsible for discrete task of specific resource they provide single place for each function Providing consistency and reducing redundancy.
Service Reusability

- Logic is divided into services with the intention of promoting reuse.
- This division of business functionalities in to service promotes higher degree of reusability.

Service composability

- Collections of services can be Combined with other services to compose new services for Business process

Service autonomy

- Services can be deployed, modified and maintained independently from each other and solution to use them

Service optimization

- Services can be optimize for performance.

Service Discoverability

- Services are designed to be descriptive such that they can be found and assessed via available discovery mechanisms.

Stateless

- services are depends on functionality not on state of Other Services
Characteristics of a Service

- Stateless: The service does not maintain state between invocations. It takes the parameters provided, performs the defined function, and returns the expected result. If a transaction is involved, the transaction is committed and the data is saved to the database.
Service Hierarchy

- Enterprise Business Process
  - Business Service
    - Domain Service
      - implemented by
      - Internal Business Process
        - uses
        - Business Component
          - uses
          - Foundation Service
            - uses
Service Hierarchy

- **Business Service**: it is of higher granularity & is compose of Lower Level Services.

- **Domain Services**: It provides Common functionality that is used in Composition of business services within a business domain.

- **Foundation services**: It doesn’t provide business functionality but aid in construction of other services like rule engine, data routing service & Workflow Systems
Implementation Of Business Service using Enterprise Business Process
- Utility Service -: it comprises smallest & least grained services that provide common functionality across enterprise.
- Integration service -: it expose existing application as services for use by rest of enterprise
- External service -: it provide access to system & existing applications.
- Workflow -: it’s a style of computing in which process is decompose in to a series of steps, Activities.
- Orchestration -: it’s a specific type of workflow that is generally applied to construction of process from business services or composite services.
What is a Service?

- A service is a reusable component that can be used as a building block to form larger, more complex business-application functionality.
- A service may be as simple as “get me some person data,” or as complex as “process a disbursement.”
- Self-describing: service-contract provides a complete description of service interface, its operations, i/p & o/p parameters & schema
- Governed by policy: relationships b/w consumers & providers & b/w & service domains are governed by policies & STA
- Independent of location, language & protocol: services are accessible to any authorized user, on any platform & from any
Concept Of service

- A service provides a discrete business function that operates on data. Its job is to ensure that the business functionality is applied consistently, returns predictable results, and operates within the quality of service required.
Concept Of service

- How the service is implemented, and how a user of the service accesses it, are limited only by the SOA infrastructure choices of the enterprise.
- From a theory point of view, it really doesn’t matter how a service is implemented.
- Explain FEATURES Of SERVICES
SOA Conceptual Model
Life Cycle Of SOA

Business Drivers

Incremental Iterative

SOA LIFECYCLE

EXPOSE

CONSUME

COMP"
SOA Advantages

1. Reusability: saves application development cost & time
2. Interoperability: interaction b/w clients & services communicating with each other across platforms, systems & languages
3. Scalability: easy to scale
4. Flexibility: easy to evolve with changing requirements
5. Cost Efficiency: reuse business functions
6. Leverage existing assets: existing assets in company can be wrapped as services up to provide the business functionality
7. Easier to integrate & manage complexity:
8. More responsive & faster-time-to-market: new services composed from existing services
9. Reduces cost & increases reuse:
SOA Disadvantages

- Not suitable under following circumstances:
  1. When IT environments are stable or homogeneous
  2. When an organization does not plan to offer its software functionality as services to its customers
  3. When the scenarios are real-time. This is because SOA relies on loosely coupled asynchronous communication
  4. IT applications are highly complex – maintenance & enhancement are major challenges faced by IT
Challenges in SOA

1. Management of services metadata: management of interaction of service is complicated task
2. Security: application managed security is not suitable, hence separate technology & standards to be followed
3. Shortage of skilled persons: SOA & Web Services are continuously changing – shortage of manpower for integration & construction of services
4. Interoperability: interoperability of SOA-based web services with existing standards is major challenge
Challenges in SOA

- Business service governance & auditing: business services depend on number of other services
- Business service lifecycle management: business services require a collaborative lifecycle management to ensure that consistent information is shared among business people, developers & operators
SOA Architecture

Architectural elements of SOA

- SOA elements are categorized as functional elements & QoS elements
- The architectural stack is divided into two halves
- Left half addresses the functional aspects of architecture
- Right half addresses the QoS aspects
1. Functional aspects describe the functionality of system. It includes:

- **Transport**: this mechanism concerned with movement of the service requests from the service consumer to the service provider & back
- **Service communication protocol**: this is agreed mechanism that the service provider & service consumer use to communicate what is being requested & what is being returned
- **Service description**: this is agreed schema for describing service for what the service is & how it is invoked
- **Service**: actual service made available for use
- **Business process**: composition of services. This services are invoked in a particular order with particular set of rules, to meet a business needs
• Service registry: repository of service & data description. Used by service providers to publish their services & service consumers to discover or find available service
2. QoS aspects describe the quality of system. It includes:

- Policy: set of conditions or rules under which service provider makes the service available to consumers. As some aspects of policy are functional, while the others relate to quality, policy is common to both the categories.

- Security: set of rules that might be applied to identification, authorization, and access control of service consumers invoking services.

- Transaction: set of attributes that enable services to deliver a consistent result. They ensure atomicity, durability, and consistency of a transaction.

- Management: set of attributes used to manage the services provided or consumed.
Elements of SOA Architecture

- Service Registry
  - Business Process
  - Service
  - Service Description
  - Service Communication Protocol
  - Transport Layer

- Policy
- Security
- Transaction
- Management
Layers of SOA

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Thank You