CLOUD COMPUTING APPLICATIONS

Cloud Computing Glue: Service Oriented Architecture and SOAP

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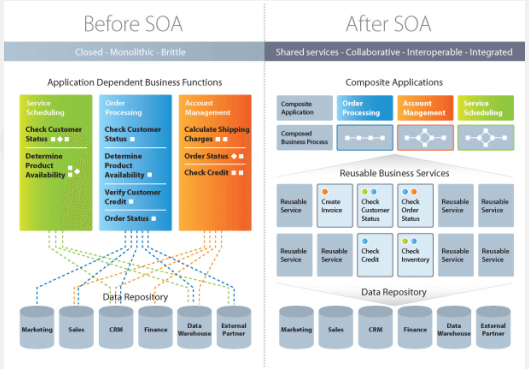
Service Oriented Architecture

- Came out of the needs of the business sector, enterprise and B2B applications
  - *"SOA is the philosophy of encapsulating application logic in services with a uniformly defined interface and making these publicly available via discovery mechanisms."*
- Benefits of SOA
  - Reusable Code
  - Interaction
  - Scalability
  - Reduce Costs
- The term "Web Services" typically relates to this type of communication
  - Web Services are one option to implement SOA
  - Other options include: Java Business Integration (JBI), Windows Communication Foundation (WCF) and data distribution service (DDS)
- An example Technology was / is SOAP



Simple Object Access Protocol (SOAP)

- SOAP-based Web APIs use XML validation to ensure structural message integrity
  - XML schemas provisioned with WSDL documents
- Evolved as the successor to XML-RPC
- Characteristics:
  - Extensible
  - Neutrality (from transport layer)
    - Can run on HTTP, WebSocket, even SMTP
  - Independence

```
POST /InStock HTTP/1.1
Host: www.example.org
Content-Type: application/soap+xml; charset=utf-8
Content-Length: 299
SOAPAction: "http://www.w3.org/2003/05/soap-envelope"

<?xml version="1.0"?>
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/soap-envelope" xmlns:m="http://www.example.org">
  <soap:Header>
  </soap:Header>
  <soap:Body>
    <m:GetStockPrice>
      <m:StockName>T</m:StockName>
    </m:GetStockPrice>
  </soap:Body>
</soap:Envelope>
```

Example Message

** From Wikipedia*

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Example WDSL

** From Wikipedia*

```
<!-- Abstract interfaces -->
   <interface name="Interface1">
      <fault name="Error1" element="tns:response"/>
      <operation name="Get" pattern="http://www.w3.org/ns/wsdl/in-out">
         <input messageLabel="In" element="tns:request"/>
         <output messageLabel="Out" element="tns:response"/>
      </operation>
   </interface>

<!-- Concrete Binding Over HTTP -->
   <binding name="HttpBinding" interface="tns:Interface1"
            type="http://www.w3.org/ns/wsdl/http">
      <operation ref="tns:Get" whttp:method="GET"/>
   </binding>

<!-- Concrete Binding with SOAP-->
   <binding name="SoapBinding" interface="tns:Interface1"
            type="http://www.w3.org/ns/wsdl/soap"
            wsoap:protocol="http://www.w3.org/2003/05/soap/bindings/HTTP/"
            wsoap:mepDefault="http://www.w3.org/2003/05/soap/mep/request-response">
      <operation ref="tns:Get" />
   </binding>
```

Simple Object Access Protocol (SOAP)

- It's popularity has somewhat diminished, but still very relevant in enterprise applications
  - SOAP is still used most often in the enterprise world, where communication between different services needs to *conform to a set of rules and contracts (*)*
  - Because it follows objects, rules, and constraints, SOAP is a more strict *(*)* protocol than REST
  - ** But do enterprises really conform to strict rules? Agile seems to work best in practice*
    - It might have been too rigid for its own good
- E.g. Salesforce SOAP API to create, retrieve, update or delete records, such as accounts, leads, and custom objects
- E.g. The PayPal SOAP API is based on open standards known collectively as web services, which include the Simple Object Access Protocol (SOAP), Web Services Definition Language (WSDL), and the XML Schema Definition language (XSD)

SOA and MicroServices

- MicroService Architecture is very similar, modern reincarnation of SOA
  - SOA mainly 2000~2010
  - MicroServices 2015~…
  - "*Microservices are the kind of SOA we have been talking about for the last decade. Microservices must be independently deployable, whereas SOA services are often implemented in deployment monoliths.*" - *Torsten Winterberg*
- What has changed? Adoption of:
  - Containerization
  - Asynchronous Programming
  - Distributed Computing mindset
  - CICD and Agile workflows