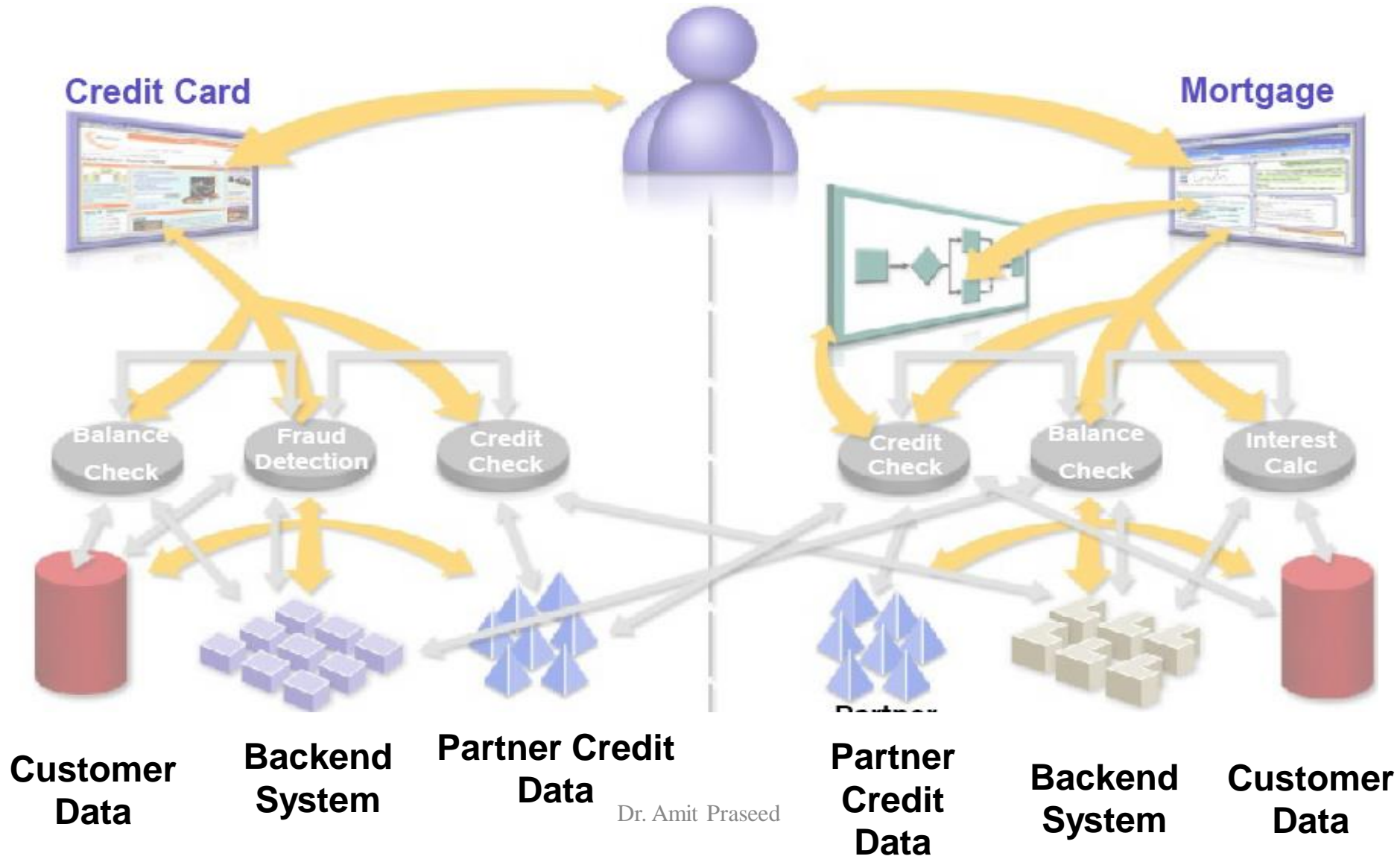


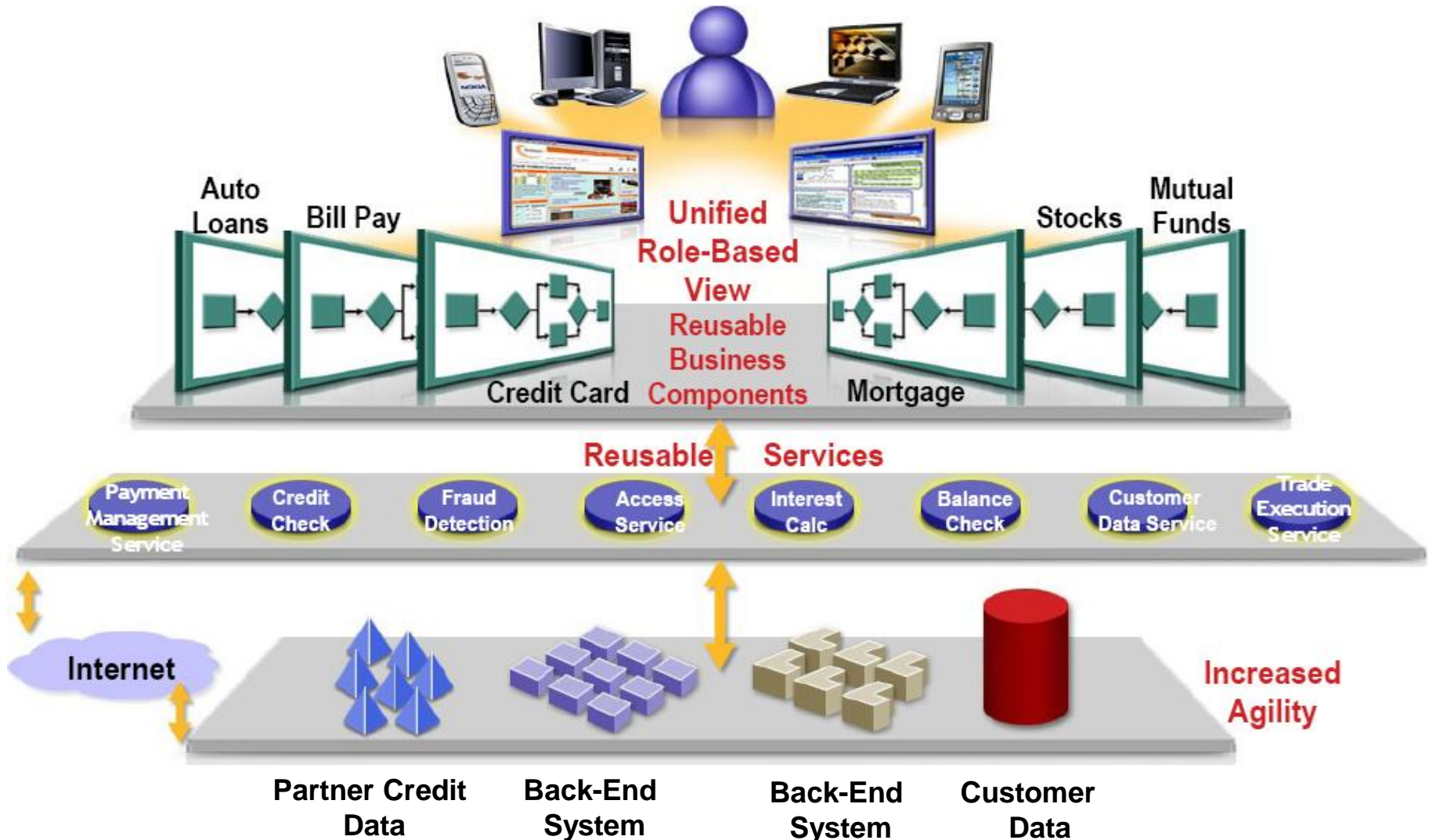
Service Oriented Architecture

Dr. Amit Praseed

A Simple Bank Scenario



A Better Architecture

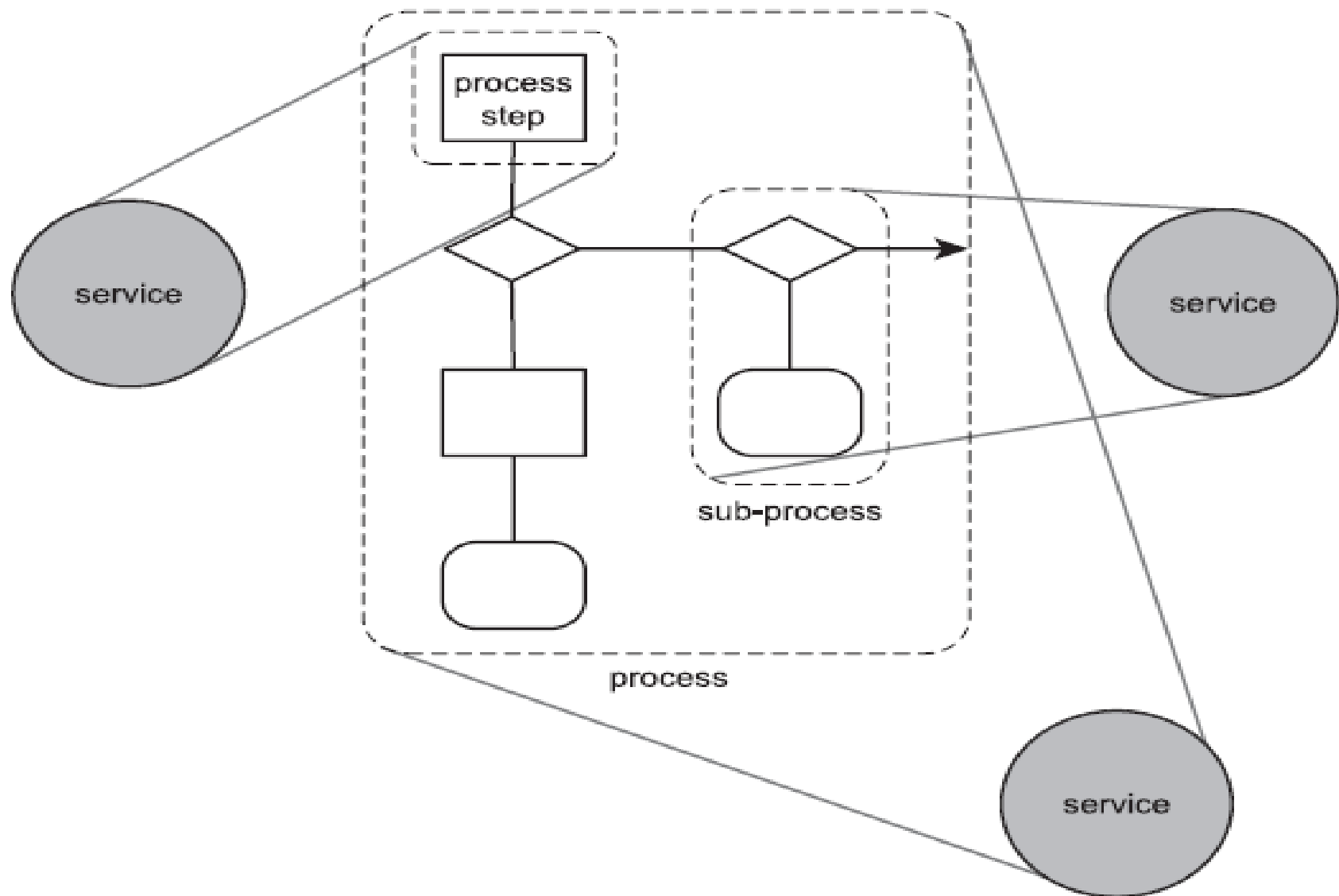


Service Oriented Architecture (SOA)

- Service-Oriented Architecture (SOA) is an architectural style.
- 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.

What constitutes a Service?

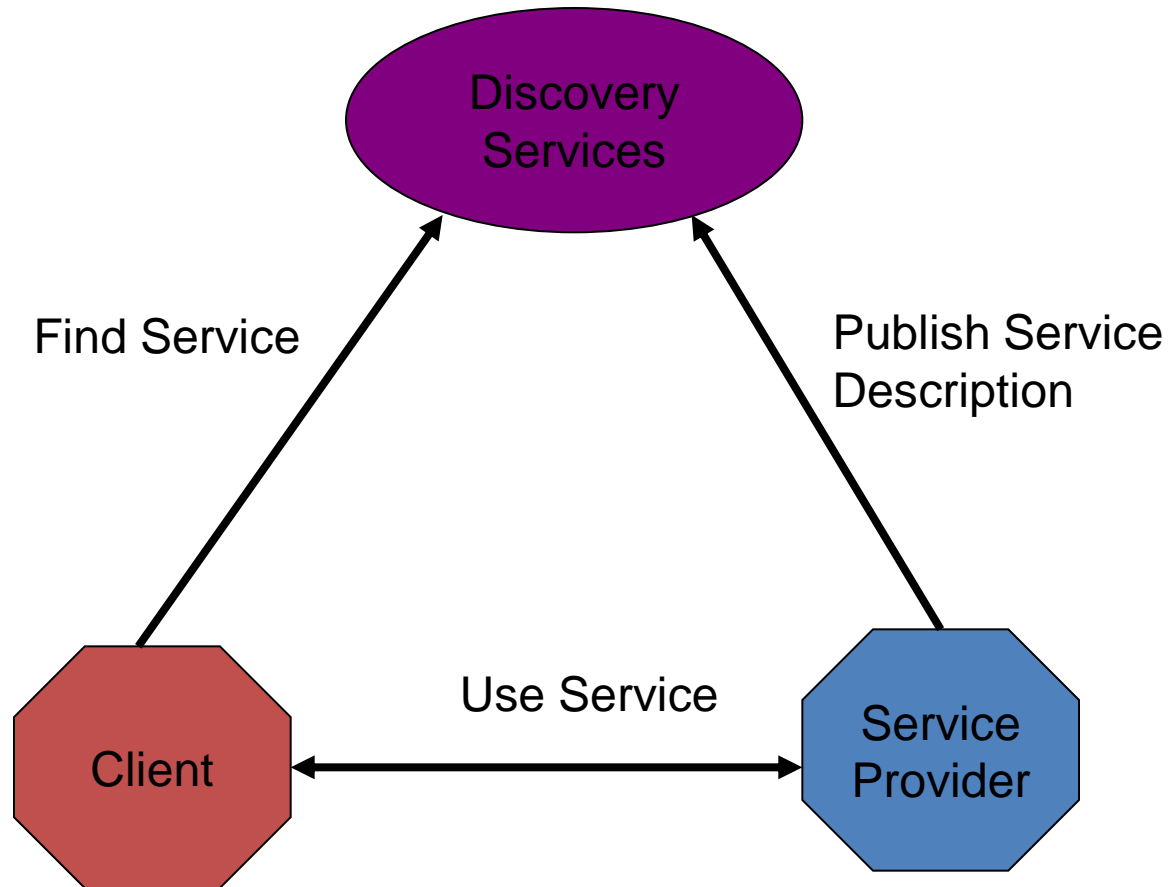
- A logical representation of a repeatable business activity that has a specified outcome (e.g., check customer credit, provide weather data, consolidate drilling reports).
- Self-contained.
- *May be* composed of other services
- Is a “black box” to consumers of the service.



SOA Features

- *Loose coupling*
- *Service contract*
- *Autonomy*
- *Abstraction*
- *Reusability*
- *Statelessness*
- *Discoverability*

SOA Framework



Web Services

- A web service is “a software system designed to support interoperable **machine-to-machine** interaction over a network”
- It differs from a web application in one key point
 - Web applications enable communication between human clients and machines
 - Web services enable communication between clients

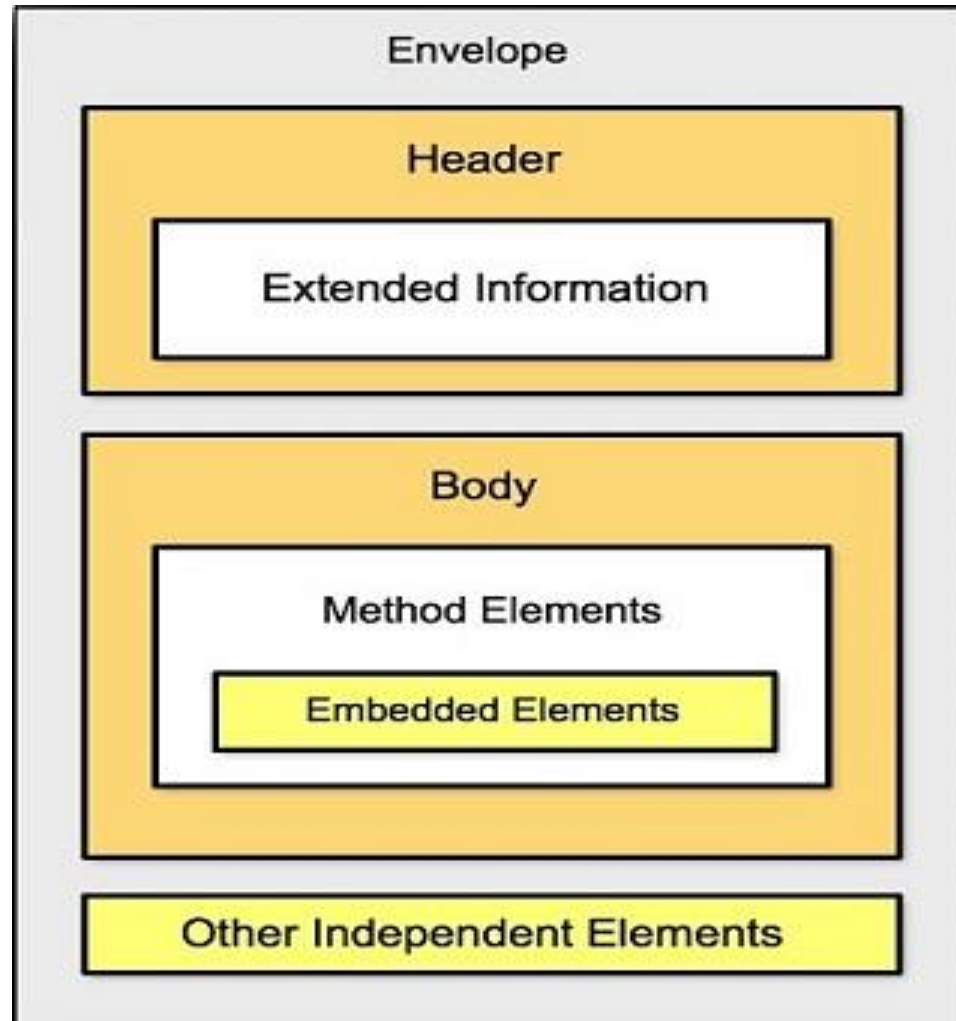
Composition of Web Services

- SOAP – Simple Object Access Protocol
 - XML based protocol used for communication
- WSDL - Web Services Description Language
 - describes the interface, a set of operations supported by a web service in a standard format.
- UDDI - Universal Description, Discovery, and Integration
 - provides a global registry for advertising and discovery of web services

SOAP Message Example

```
<?xml version="1.0"?>
<SOAP:Envelope
  xmlns:xsi="http://www.w3.org/1999/XMLSchema/instance"
  xmlns:xsd="http://www.w3.org/1999/XMLSchema/instance"
  xmlns:SOAP="urn:schemas-xmlsoap-org:soap.v1">
  <SOAP:Body>
    <calculateArea>
      <origin>
        <x xsi:type="float">10</x>
        <y xsi:type="float">20</y>
      </origin>
      <corner>
        <x xsi:type="float">100</x>
        <y xsi:type="float">200</y>
      </corner>
    </calculateArea>
  </SOAP:Body>
</SOAP:Envelope>
```

SOAP Message Structure



SOAP Protocol Extensions

- **WS-*** is used to refer to extensions to the basic Web services framework established by first-generation standards
 - **WS-Security**: Handles encryption and digital signatures
 - **WS-Policy**: Expands on WS-Security, enabling you to more specifically detail how and by whom a service can be used.
 - **WS-I**: Provides a set of standards and practices to prevent interoperability issues, as well as standardized tests to check for problems.
 - **WS-BPEL**: Provides a way to specify interactions between multiple web services, such as branching and concurrent processing

Issues with SOAP

- SOAP was meant to facilitate easier communication between machines using a common platform of XML
 - Difficult to debug
 - Difficult to build
 - Difficult to use
- Salesforce had built an “Internet as a Service” package for selling APIs, but their use of complex XML proved to be a major deterrent.

REST

- A simpler way to implement SOA is using REpresentational State Transfer (REST)
 - Resource Identification through URI
 - Uniform, Constrained Interface
 - Self-Descriptive Message
 - Stateless Interactions
- The use of REST made API calls effortless, leading to companies like EBay, Amazon and Flickr cashing in

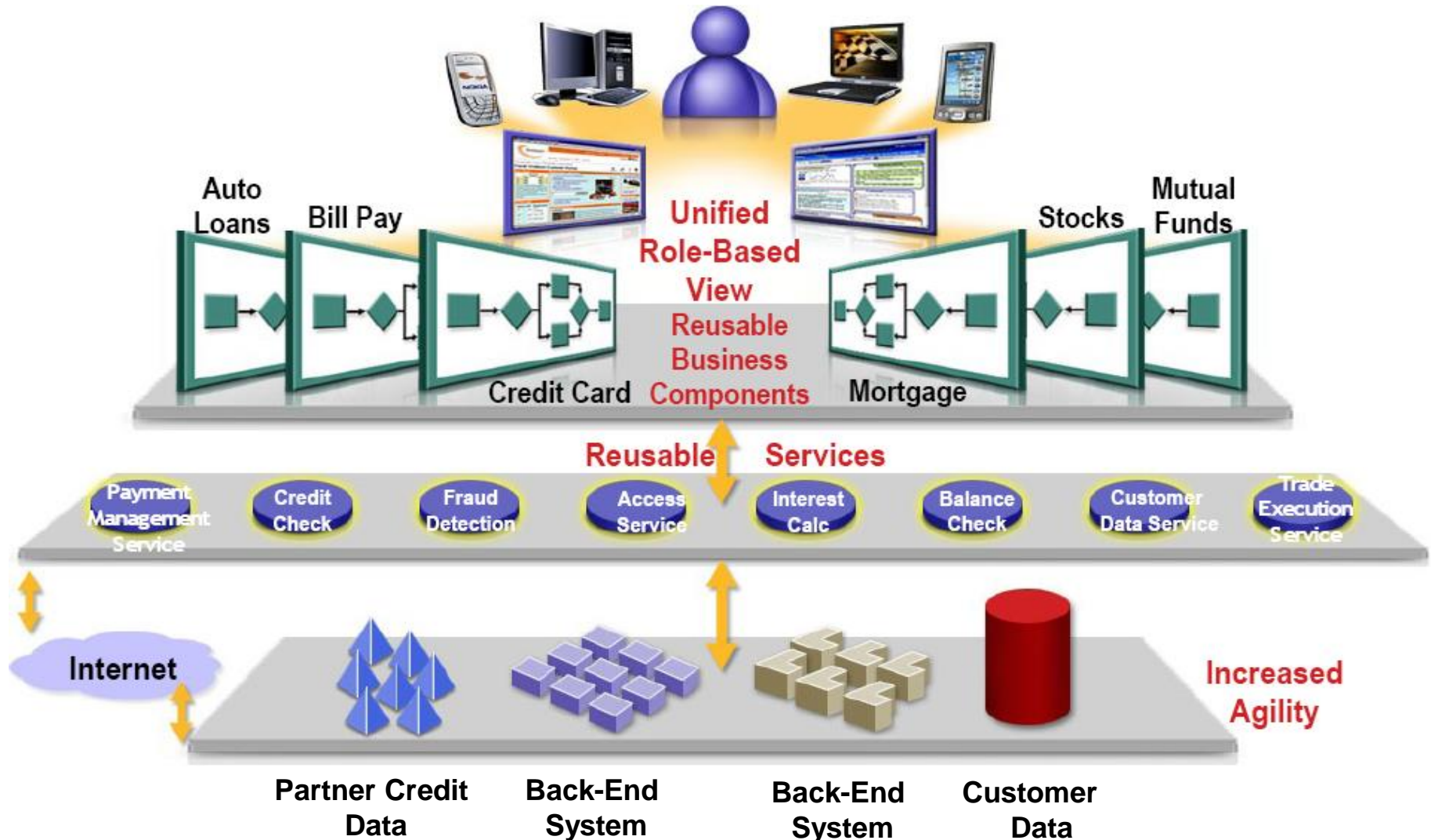
A Comparison

Feature	SOAP	REST
Nature	Protocol	Architectural Style
State	Stateful/Stateless	Stateless
Format	XML	XML, JSON, plaintext etc.
Transfer Protocol	HTTP, HTTPS, TCP, FTP, SMTP etc.	HTTP, HTTPS
Security	WS-Security, ACID, HTTPS, SSL	HTTPS, SSL
Speed	Slow	Fast
Learning Curve	Difficult	Easy
Community	Small	Large

So, is SOAP dead?

- REST is a simple and efficient way to build and use a Service Oriented Architecture
- Currently, nearly 83% of APIs use REST
- However, SOAP does have its benefits
 - Inbuilt successful/retry mechanism
 - Inbuilt security features
 - Extensible
 - Customizable

A Look Back at the SOA Architecture



Microservices : The Next Evolution

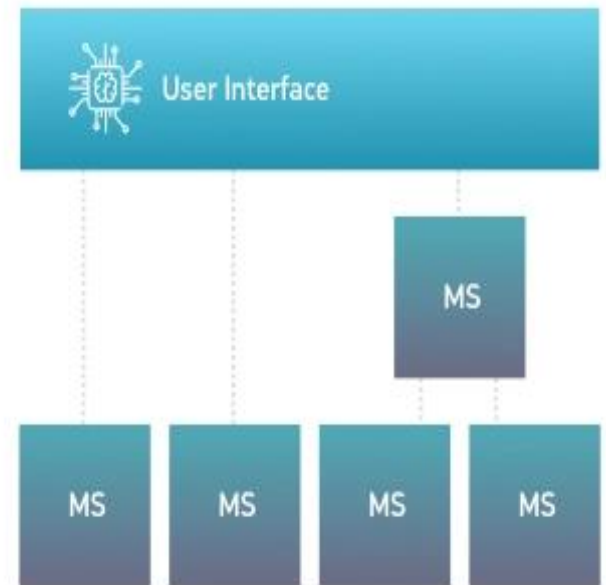
- Microservice Architecture involves the splitting of large software applications into decoupled modules, running unique processes and communicating through APIs
- Every microservice is an independent software component by itself, so they do not have to be modified frequently
- Almost all popular organizations like EBay, Amazon and Netflix employ microservices



Monolithic



SOA



Microservices

Service Registration and Discovery

- Registration
 - Self Registration
 - Third Party Registration
- Discovery
 - Client Side Discovery
 - Server Side Discovery