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Celebrating 20 Years

REST WebServices

Larsen & Toubro
Group Company

Introduction

Web Services are self-contained, self-describing, modular applications that can be published, located, and invoked over a network--generally, the Web.

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Another definition

- A Web service is a software application identified by a URI whose interfaces and binding are capable of being defined, described and discovered by XML artifacts and supports direct interactions with other software applications using XML based messages via Internet-based protocols

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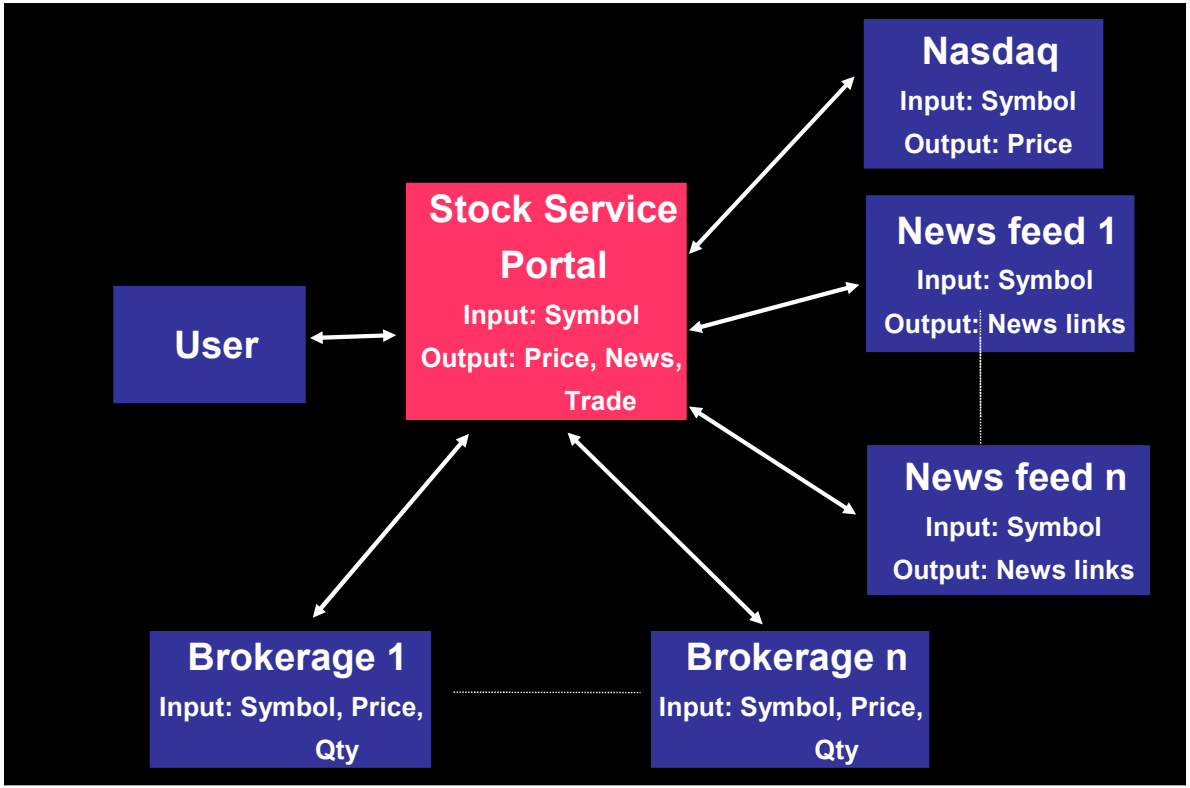
Overview



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Why WebServices?

- Platform neutral
- Accessible using standards and are Interoperable
- Simplifies enterprise integration

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Role of XML & JSON

- XML & JSON is popularly used for representing data transferred over the network between the Service provider and the Consumer
- Different APIs are used in Java to handle XML & JSON parsing

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XML Support in Java

- JAXP (Java XML Parsing API)
  - A thin and lightweight API for parsing and transforming XML documents
- Allows for pluggable parsers and transformers
- Supports parsing of XML using:
  - SAX (Event driven)
  - DOM (Tree based)
  - StAX (Pull based)

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About JAXB

- Provides API, tools, and a framework that automate the mapping between XML documents and Java objects
  - Provides compiler that compiles XML schema to Java classes
- Provides an efficient and standard way of mapping between XML and Java code
  - Programmers don't have to create application specific Java classes anymore themselves
- Programmers do not have to deal with XML structure, instead deal with meaningful business data
  - *getData()* method as opposed to *getAttributes()*

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Cont’d…

- In a sense JAXB is high-level language while JAXP/SAX/DOM are assembly language for XML document management
- JAXB automates XML to Java binding so you can easily access your data
  - So that means we don’t have to use any parser explicitly in our code

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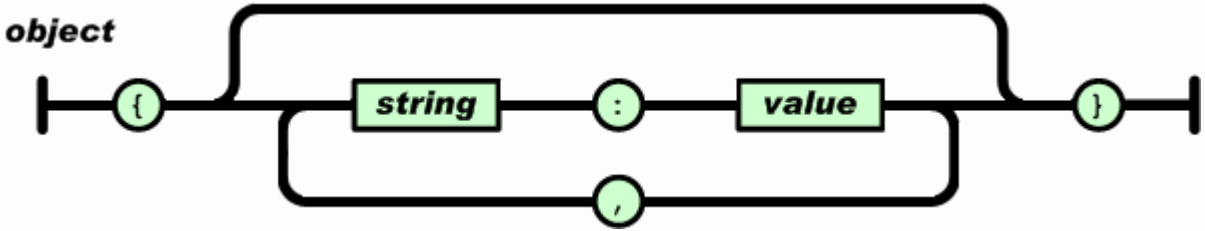
Support for JSON in Java

- A lightweight simple key:value pair based datastructure
  - Alternative to XML
- Before Java EE 7, we didn't had any standard API for JSON parsing in Java



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JSON Parsing

- Java EE 7 is the first version to introduce a standard API for parsing JSON called as JSONP
- Alternatively we have been using third party JSON parsing APIs
  - Jackson (Widely used)
  - gson
  - json-simple
  - …
- JSONB is available from Java EE 8 onwards

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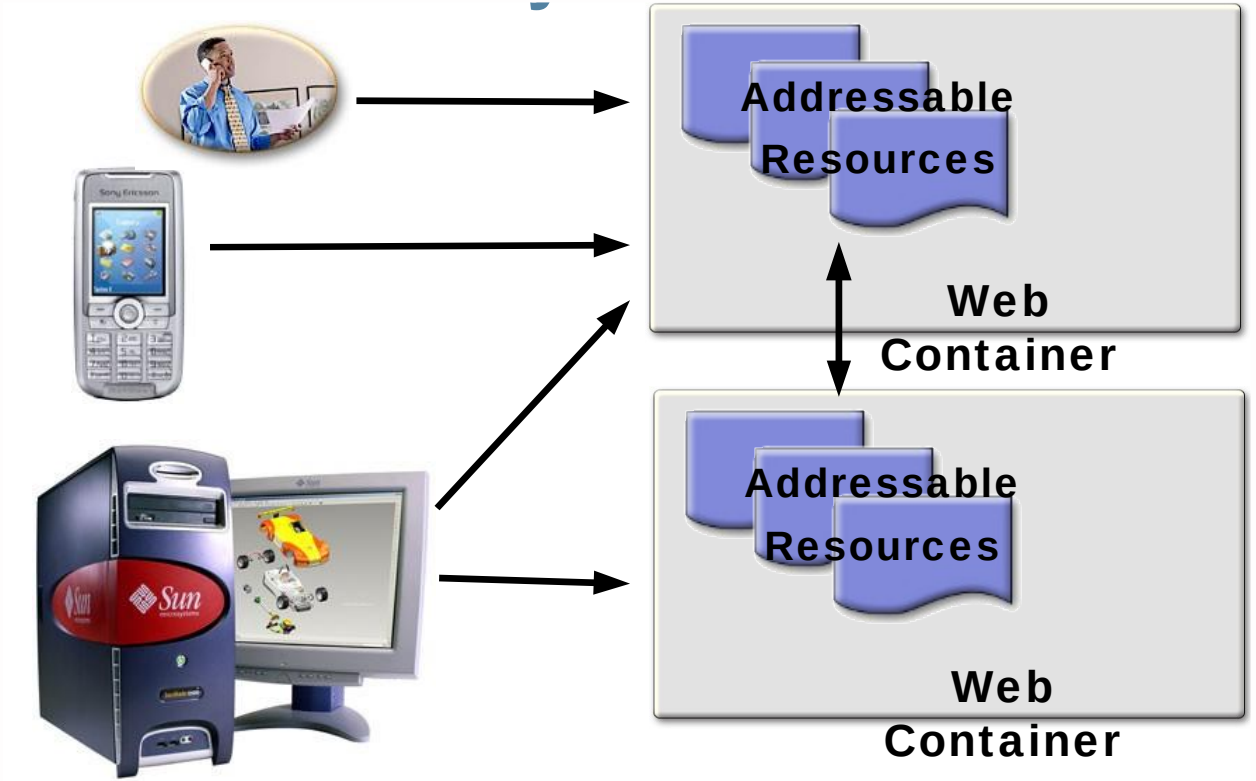
The Web Wide World



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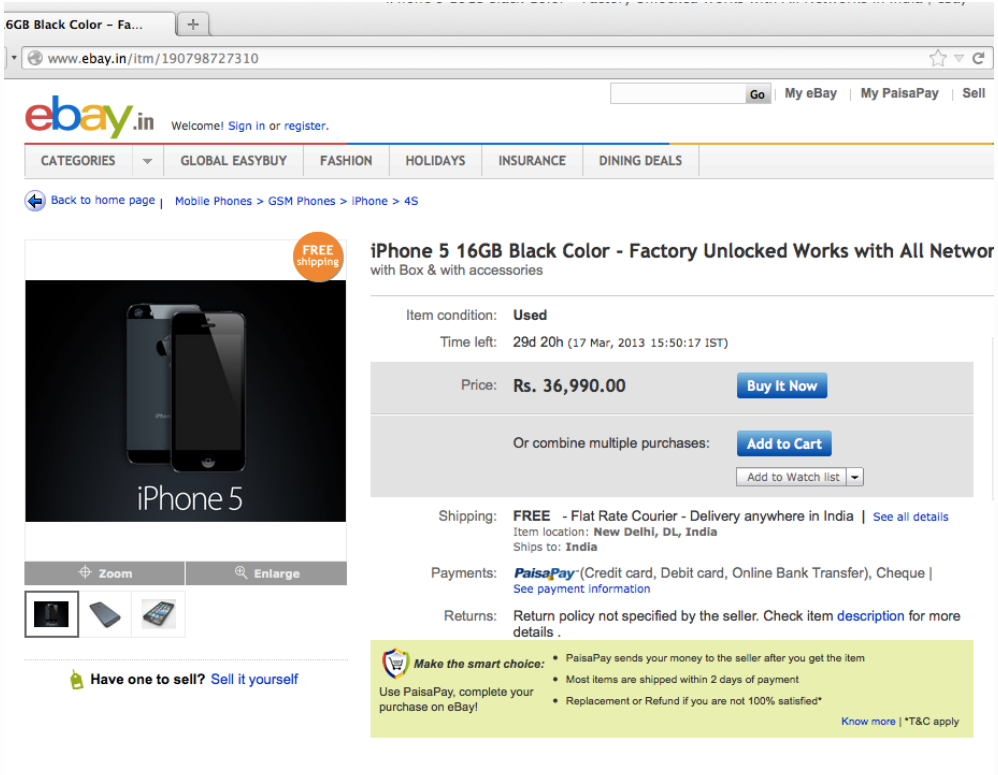
Everything is an URL



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REST

- Representational State Transfer it is
- RESTful services are stateless
- RESTful services have a uniform interface
- REST-based architectures are built from resources (pieces of information) that are uniquely identified by URIs
- REST is considered as the rebirth of HTTP, in a way somewhat similar to the 1995 Karan Arjun movie in Bollywood ;-)

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Cont’d…

- REST is an architectural principle applied for developing distributed applications. RPC, RMI, CORBA, DCOM, SOAP/WS-* and now REST very much existed/exist for this very specific requirement

- The architectural principles defined are as follows:
  - Addressable resources
  - A uniform, constrained interface
    - GET, POST, PUT, and DELETE
  - Representation oriented
  - Communicate statelessly
    - Each request from client to server must contain all the information necessary to understand the requesT
  - HATEOAS (Hypermedia As the Engine Of Application State)

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REST

- In REST system, resources are manipulated through the exchange of “representations” of the resources
  - For example, a purchase order resource is represented by an XML or JSON document
  - In a RESTful purchasing system, each purchase order is made through a combination of HTTP POST method with XML document, which represents the order, sent to a unique URI

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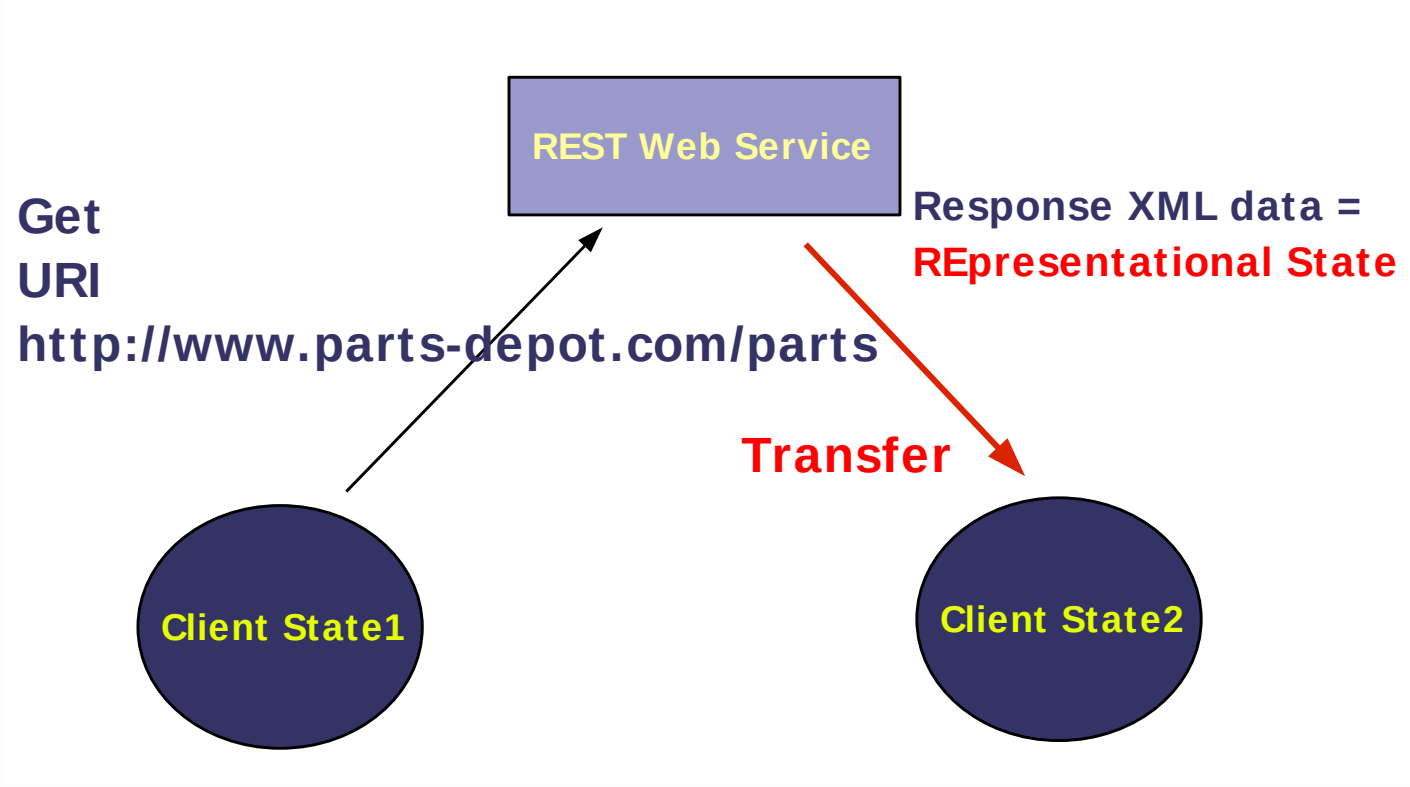

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ID is a URI

- Every Resource has an ID

http://example.com/widgets/foo
http://example.com/customers/bar
http://example.com/customers/bar/orders/2
http://example.com/orders/101230/customer

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Back to HTTP

- Offer data in a variety of formats
  - XML
  - JSON
  - XHTML
- Support content negotiation
  - Accept header
    - GET /foo
    - Accept: application/json
  - URI based
    - GET /foo.json

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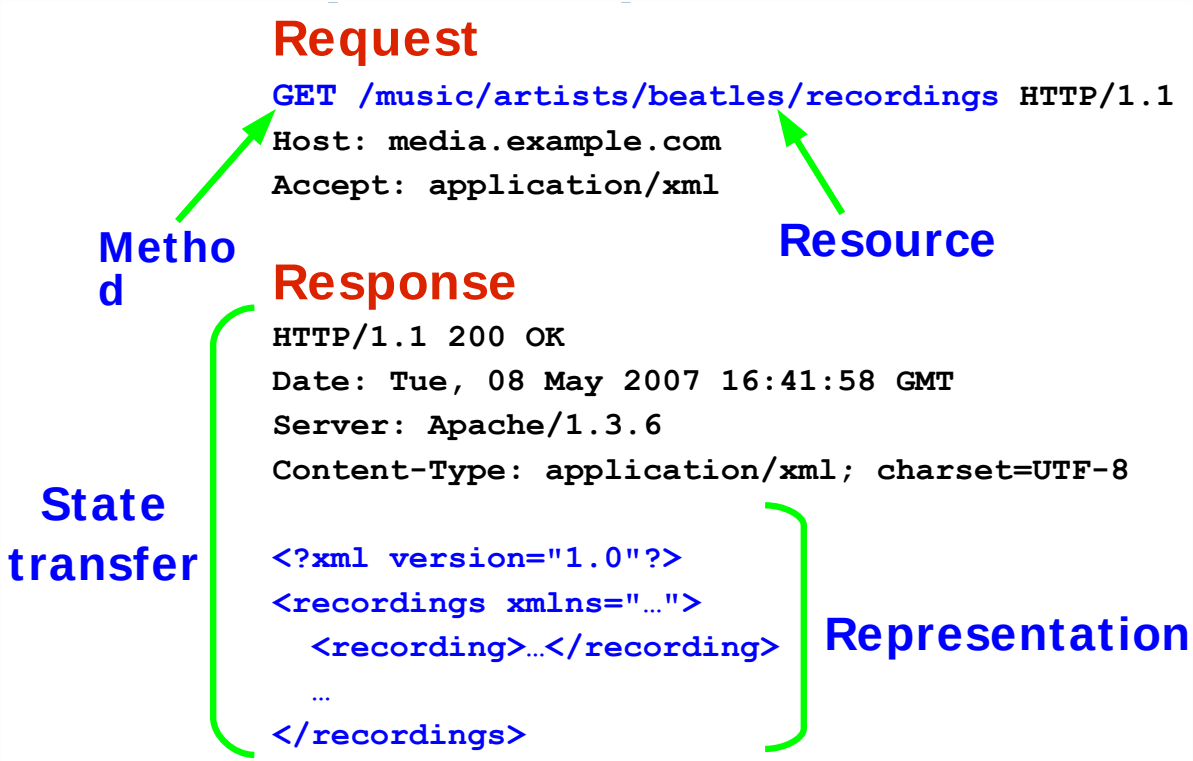
RESTing



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CRUD HTTP

CRUD Operations	4 main HTTP methods	
	Verb	**Noun**
Create (Single)	POST	Collection URI
Read (Multiple)	GET	Collection URI
Read (Single)	GET	Entry URI
Update (Single)	PUT	Entry URI
Delete (Single)	DELETE	Entry URI

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GET

- GET to retrieve information
  - GET /music/beatles
- Cacheable

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POST

- POST to add new information
  - POST /music/beatles

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PUT

- PUT to update information
  - PUT /songs/beetles/123-567890

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DELETE

- Remove the data
  - DELETE /songs/beatles/idontknow

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REST vs SOAP

- “Traditional” SOAP-based web service
  - Few URIs (nouns), many custom methods (verbs)
    - musicPort.getRecordings(“beatles”)
  - Uses HTTP as transport for SOAP messages
- RESTful web service
  - Many resources (nouns), few fixed methods(verbs)
    - GET /music/artists/beatles/recordings
  - HTTP is the protocol

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SOAP vs REST

- SOAP based web services is about services SOA
  - Stock quote service
  - quoteService.**purchase**(“oracle”, 2013, 6.0f);
- REST is Resource-Oriented Architecture (ROA)
  - Stock quote resource
  - Resources are manipulated by exchanging representations
  - POST /stocks/quotes/oracle

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JAX-RS Design Goals

- Support REST concepts
  - Everything is a resource
  - Every resource is address'able via URI
  - HTTP methods provides uniform interface > Representations (formats)
- Support High level and Declarative programming model
  - Use @ annotation in POJOs
- Generate or hide the boilerplate code
  - No need to write boilerplate code for every app

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Implementations of JAX-RS

- Jersey – reference implementation of JAX-RS
  - Comes with Glassfish, other Java EE 6 servers
- Other open source implementations of JAX-RS
  - Apache CXF
  - JBoss RESTEasy
  - Restlet

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Development Tools

- IDE – for general purpose RESTful Web service development
  - NetBeans, Eclipse, Intellij IDEA
- Client tools – for sending HTTP requests
  - RESTClient
  - Lot's of plugins available for browsers
- Several command line tools
  - curl
- soapUI

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Service Oriented Architecture

- An architectural principle for structuring systems into coarse-grained *services*
- Technology-neutral best practice
- Emphasizes the loose coupling of services
- New services are created from existing ones in a synergistic fashion
- Strong service definitions are critical
- Services can be re-composed when business requirements change

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The right approach

- Developers need to build end-to-end applications
  - Front-end user interface
  - Middle-tier business logic
  - Back-end resources
- With the right approach, developers can…
  - Reuse existing parts
  - Build new parts
  - Glue old and new parts together
- With the wrong approach, developers must…
  - Re-implement functionality existing elsewhere
  - Spend massive effort to evolve applications

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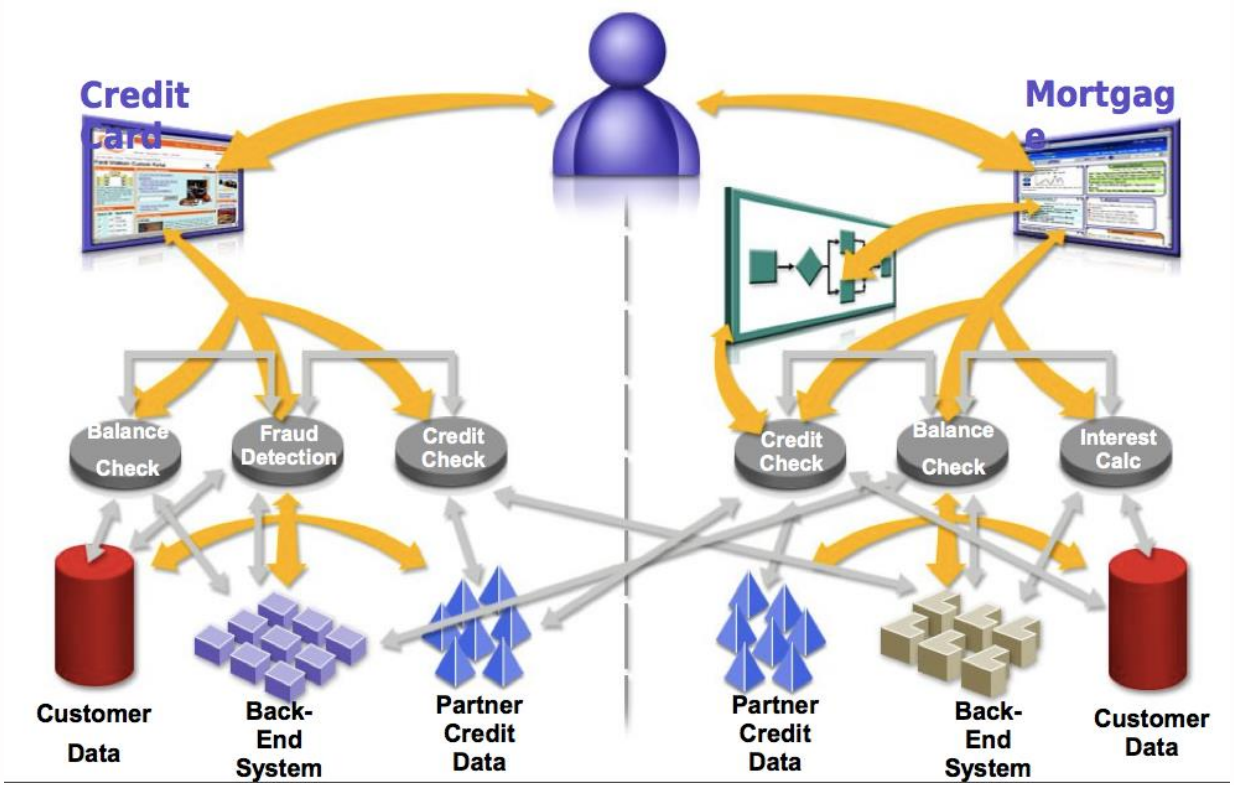
Before SOA



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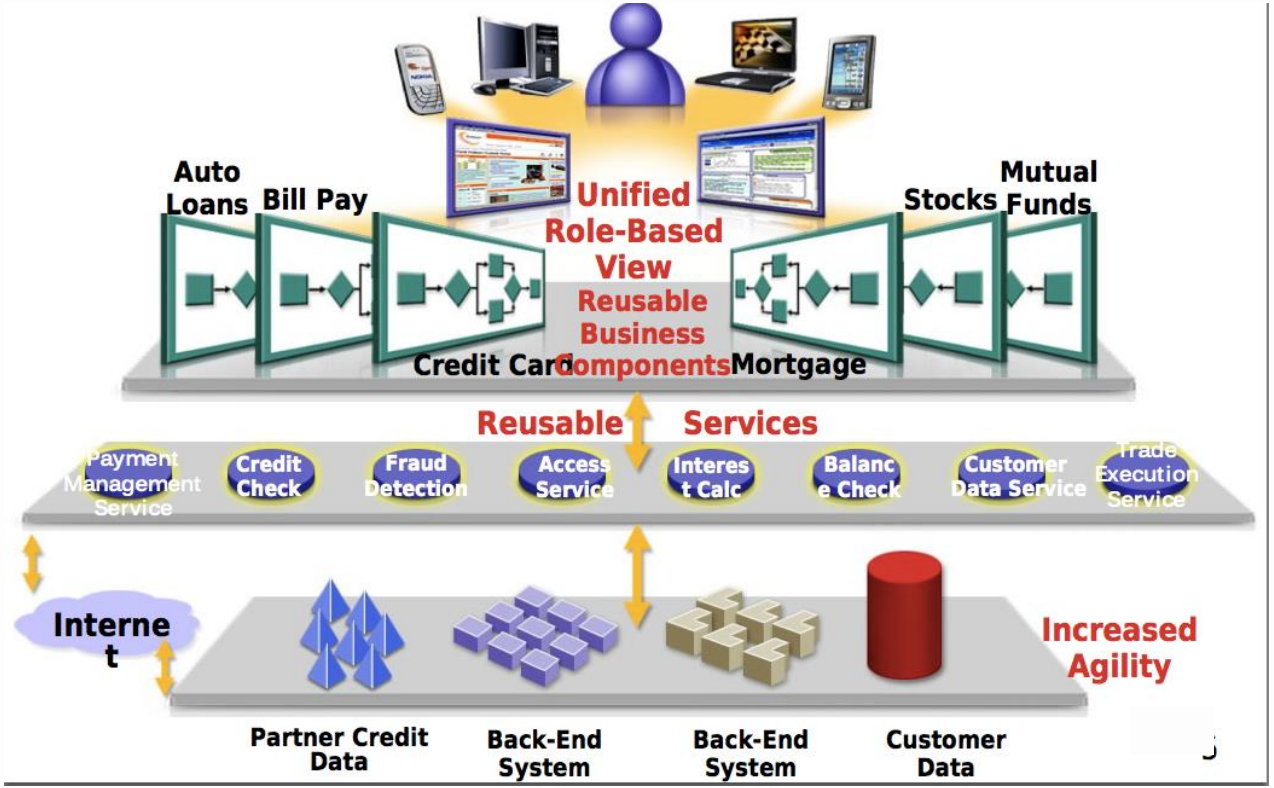
SOA Enabled



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