RROI #: 17-00633-CORP

Web Service Development Framework and API Management

Strategy and Best Practices

Yong Cao
The Boeing Company

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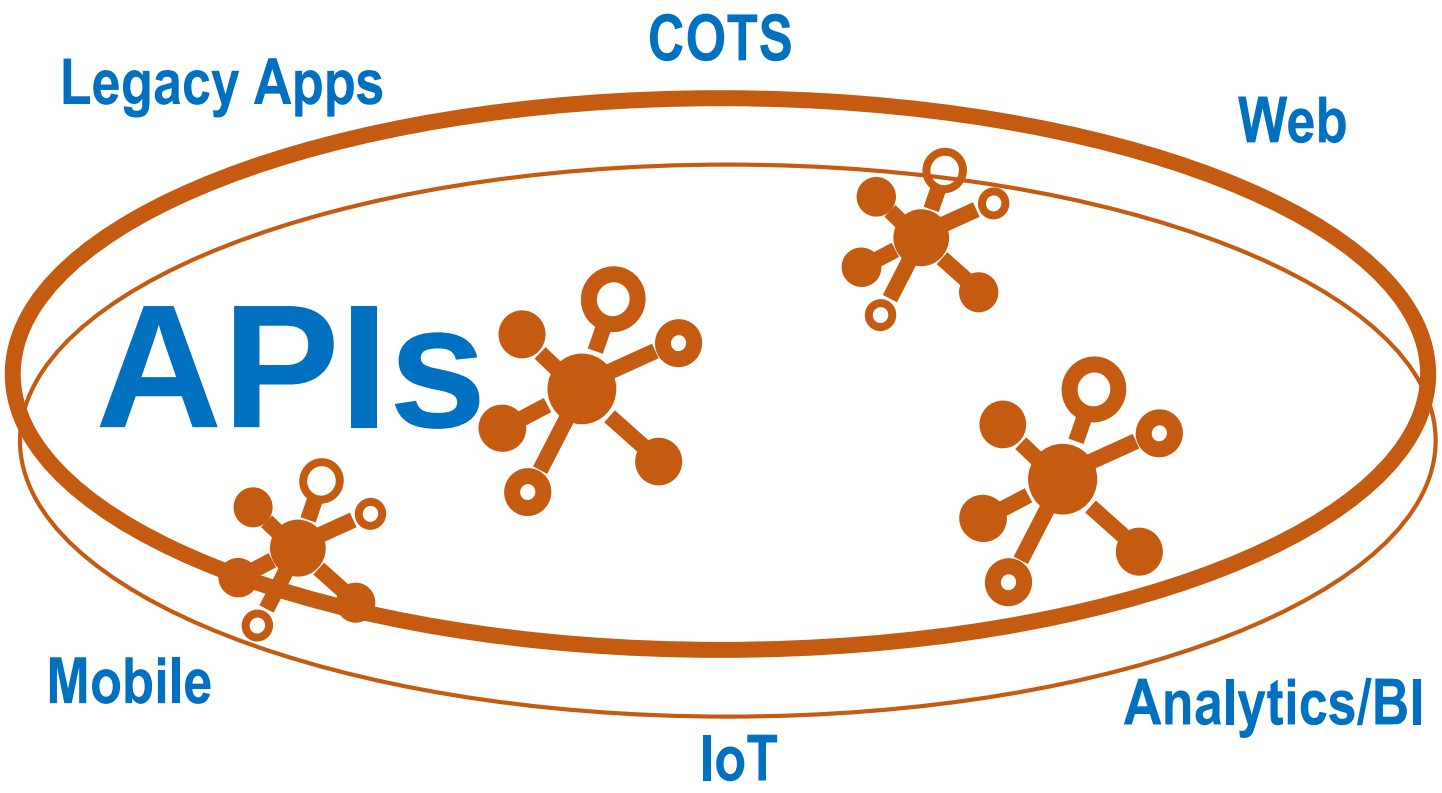
Vision: Service and Web APIs

Global Product Data Interoperability Summit | **2017**



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Vision: Service Deployment

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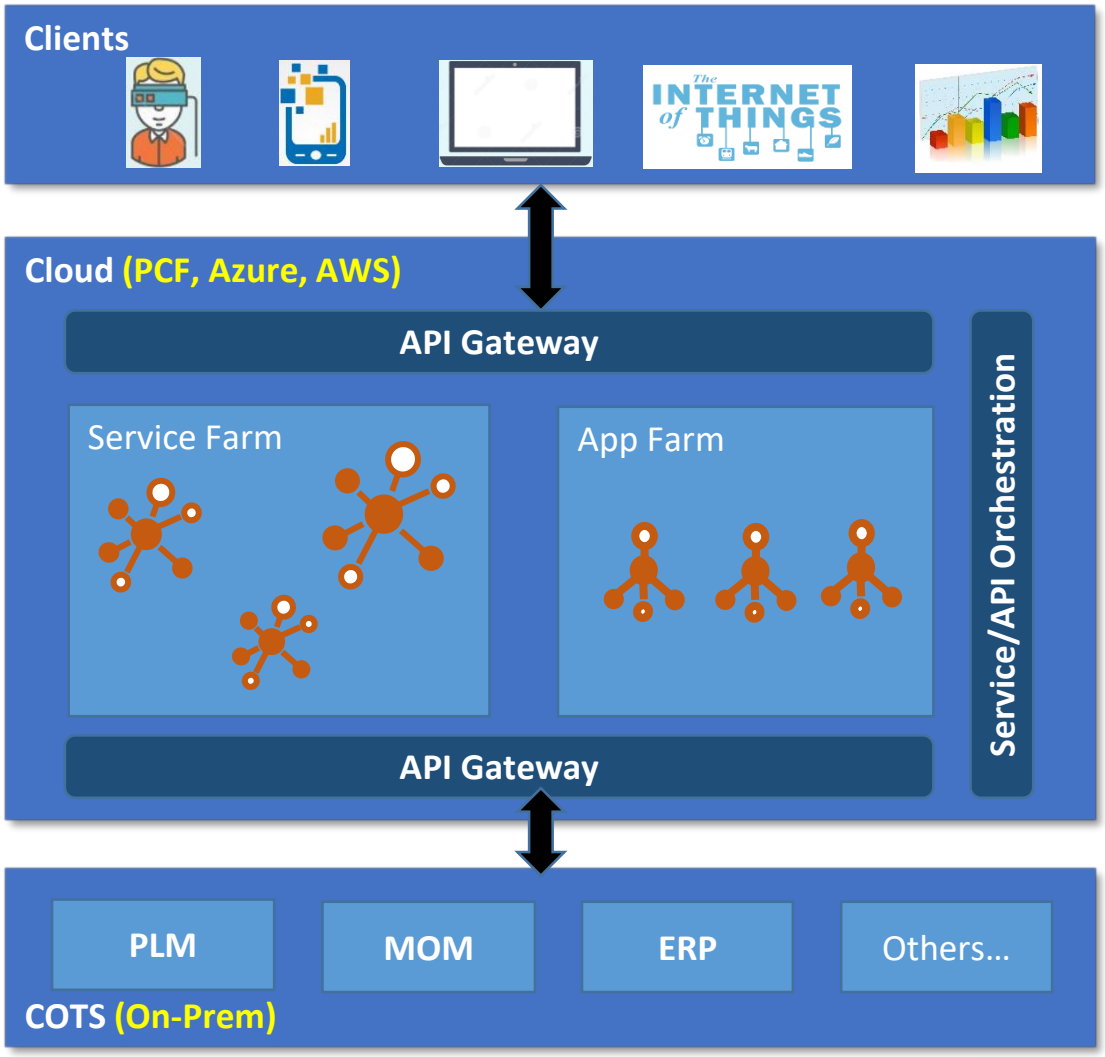

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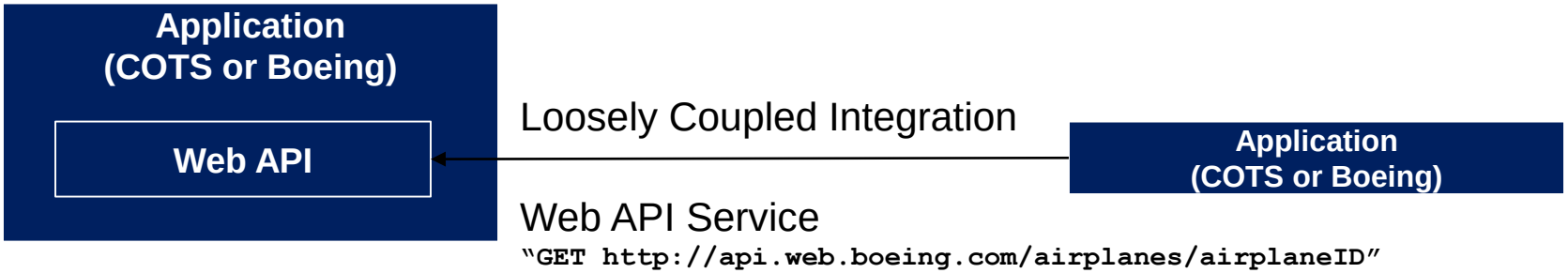
Motivation / Requirement



Independent
- Build, Test, Deployment (Agile)

Persistent
- "One Stop Shopping"
- Life Cycle Management

Universal
- Platform, OS, Device Agnostic
- Simple, User Friendly

- Fault Tolerant
- Scalable
- Universal

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Web API Demos and Documentation

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Boeing.TeardownBRT.Api

TDLApi

Show/Hide | List Operations | Expand Operations

GET	/api/tdl/assembly	Gets all the AssemblyItem objects.
GET	/api/tdl/assembly/{assemblyId}	Gets an AssemblyItem object.
GET	/api/tdl/assembly/{assemblyId}/photos	Gets all the PhotoItem objects for an Assembly.
GET	/api/tdl/assembly/{assemblyId}/children	Gets child AssemblyItem objects for an Assembly.
POST	/api/tdl/photos	Creates a PhotoItem
GET	/api/tdl/photos/{photoId}	Gets a PhotoItem object.
GET	/api/tdl/teardown	Gets all TeardownItem objects.
GET	/api/tdl/teardown/{teardownId}	Gets a TeardownItem objects.

Boeing.SLATE

ModelApi

Show/Hide | List Operations | Expand Operations

GET	/api/model	Gets all the models available in the database.
GET	/api/model/{model}	Gets all the top-level nodes for the specified model.
GET	/api/model/{model}/node/{nodeId}	Gets all the child nodes for the specified parent node.
GET	/api/model/{model}/node/{nodeId}/details	Get all the detailed information for the specified node id.
GET	/api/model/{model}/node/{nodeId}/properties	Gets all the properties for a specified node id.
GET	/api/model/{model}/node/{nodeId}/references	Gets all the references for a specified node id.
GET	/api/model/{model}/node/{nodeId}/links	Gets all the links for a specified node id.

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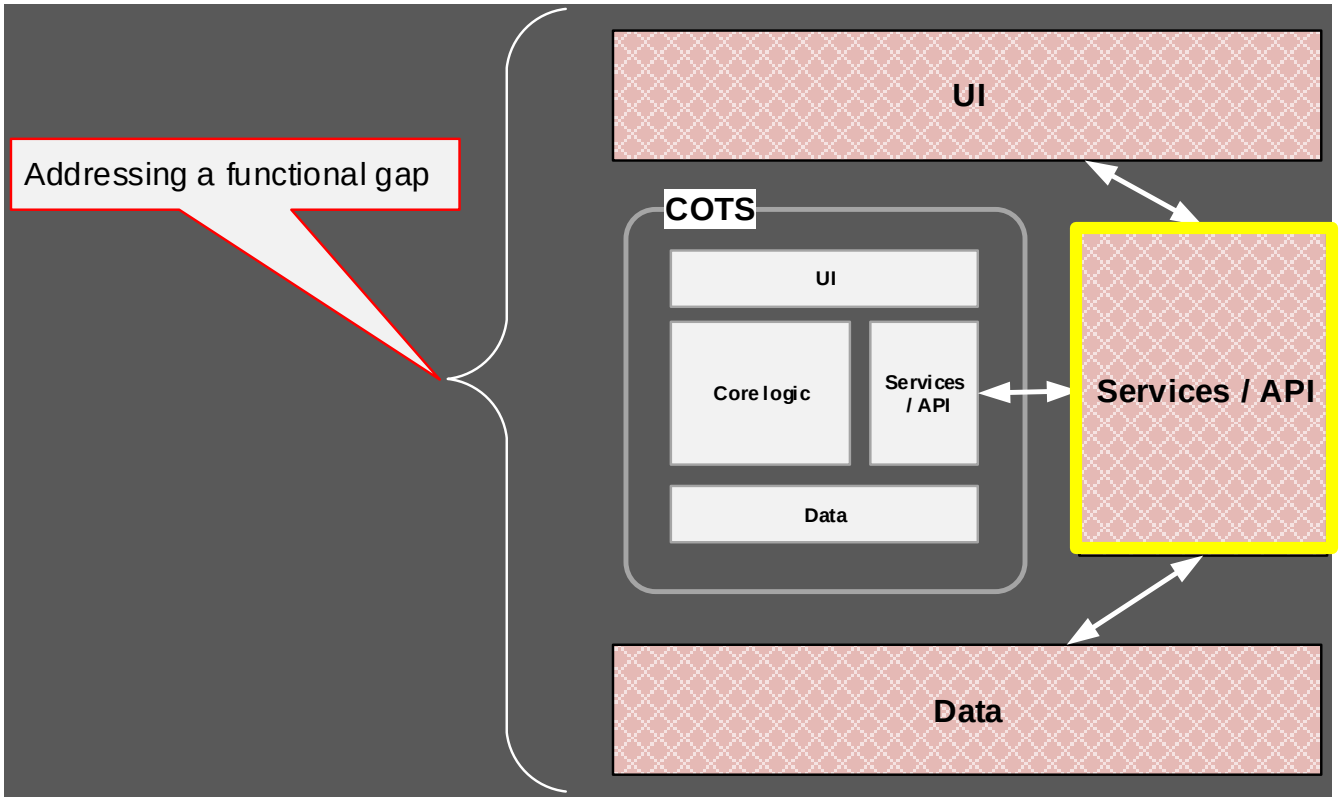
SOA Patterns: Filling a Functional Gap

Wrap COTS application around with Service APIs.



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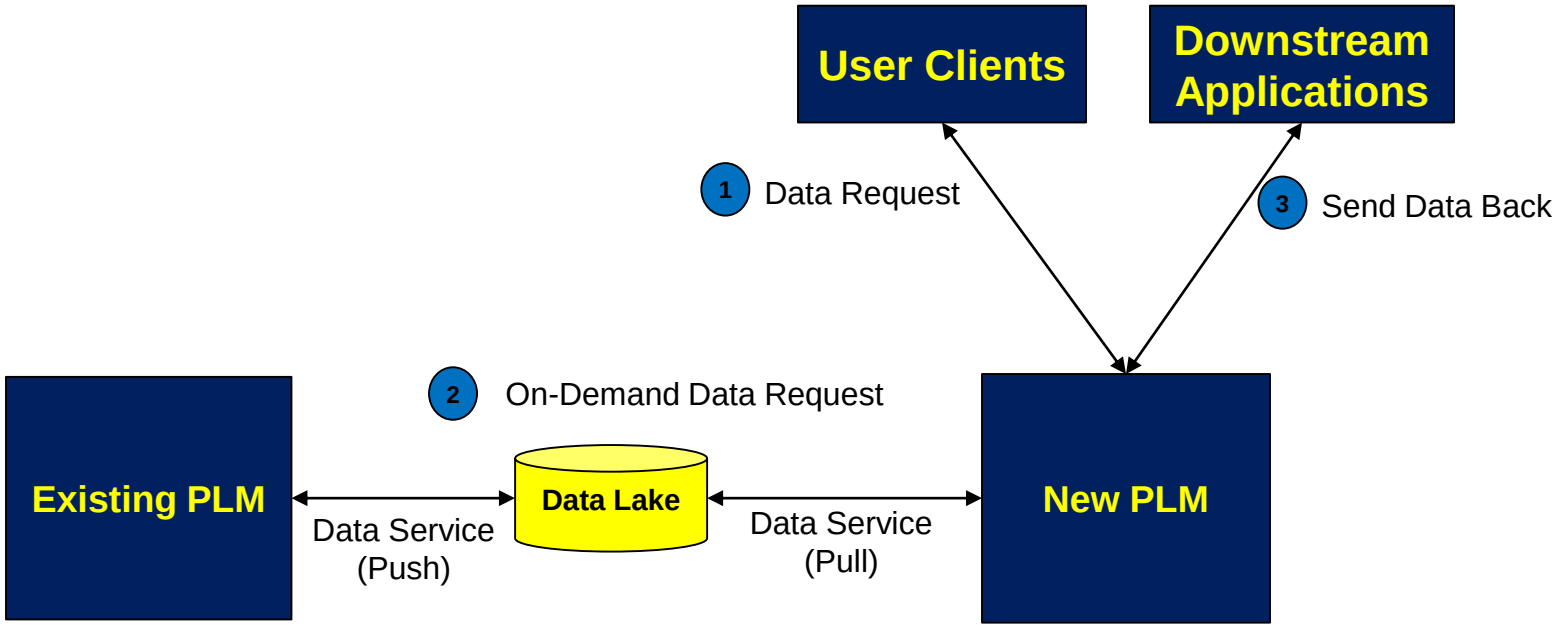
SOA Patterns: On-Demand Data Migration



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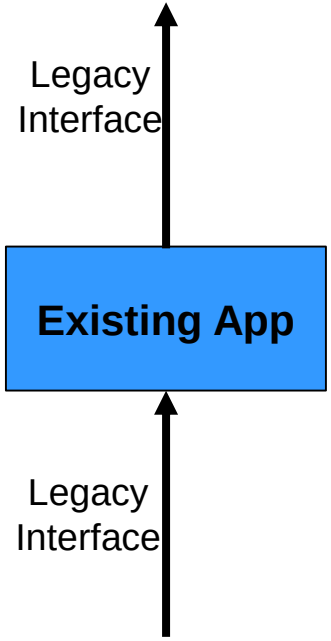
SOA Pattern: Transitional Architecture

Current Implementation



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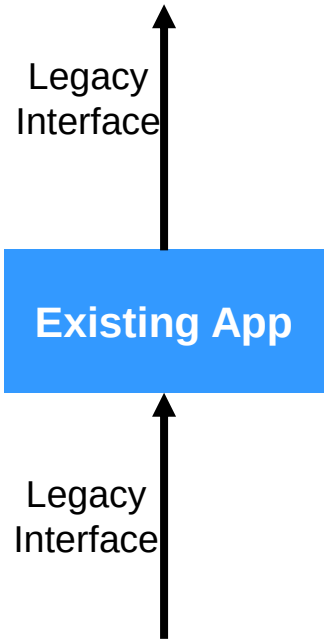
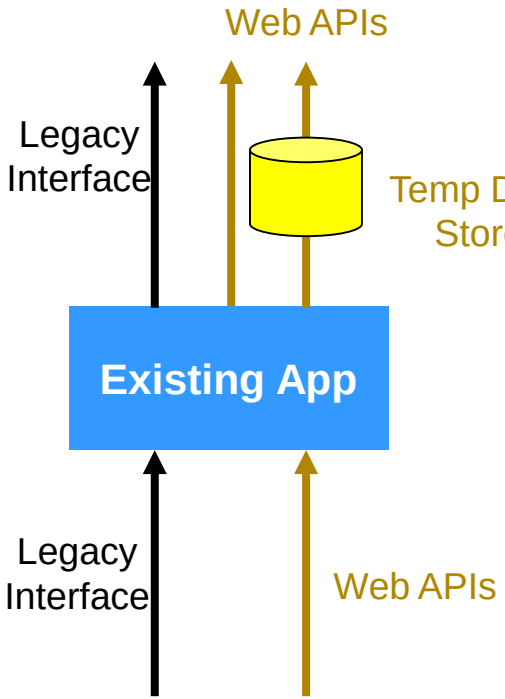
SOA Pattern: Transitional Architecture

Current Implementation



Transition



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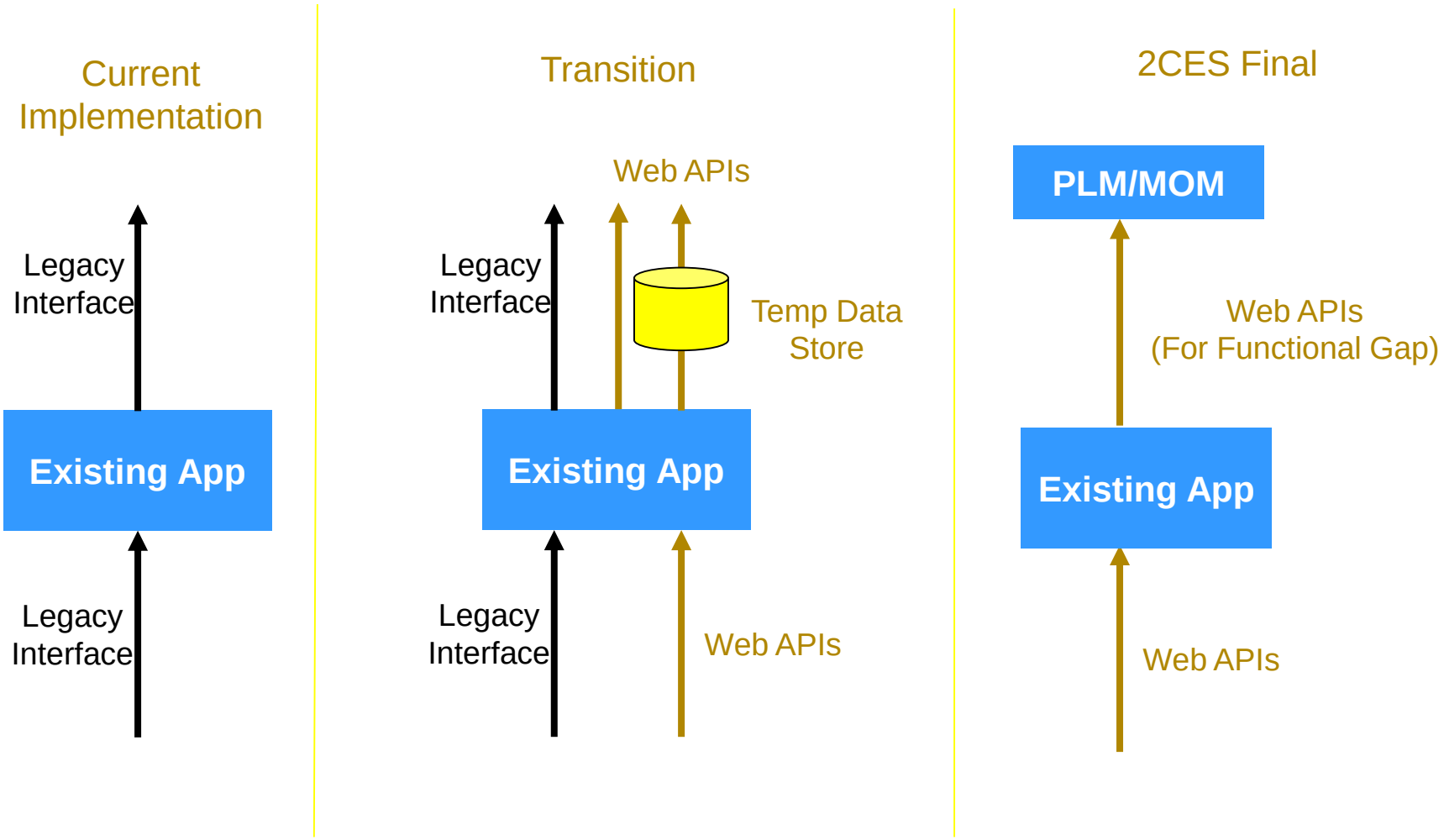
SOA Pattern: Transitional Architecture



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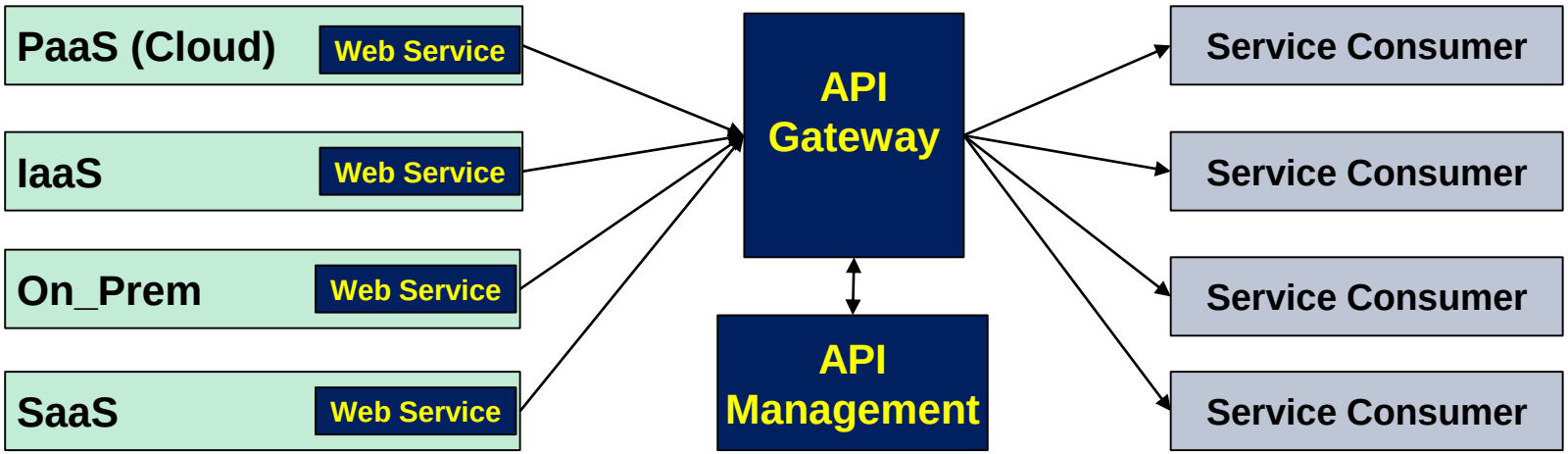
Hybrid Integration / Deployment



- Security
- Monitoring/logging
- SLA
- Queriable API
- Protocol Translation

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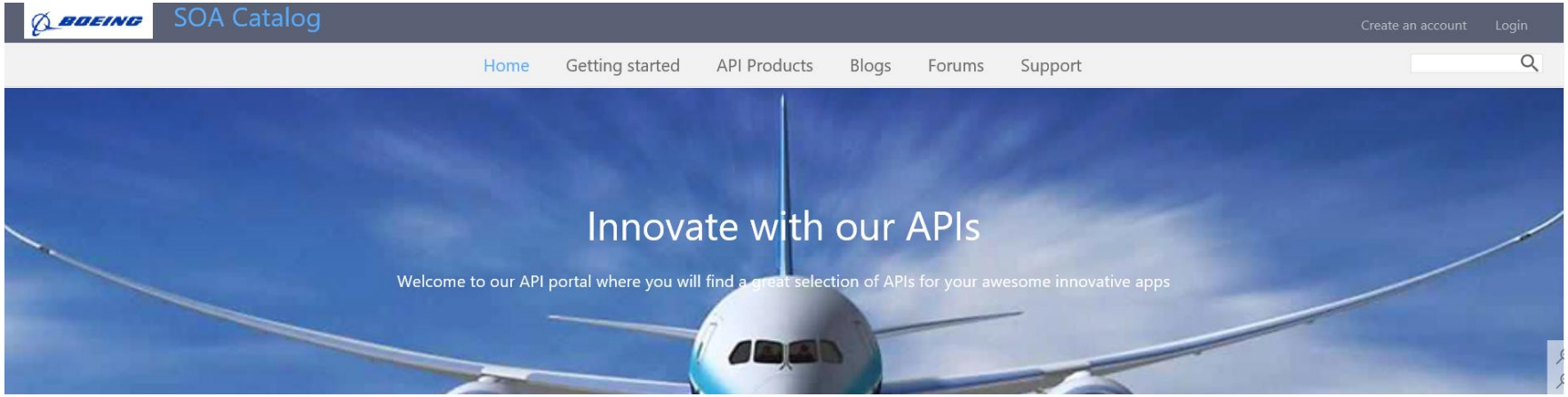
Demo: IBM API Connect



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Boeing Service Map/Market Place

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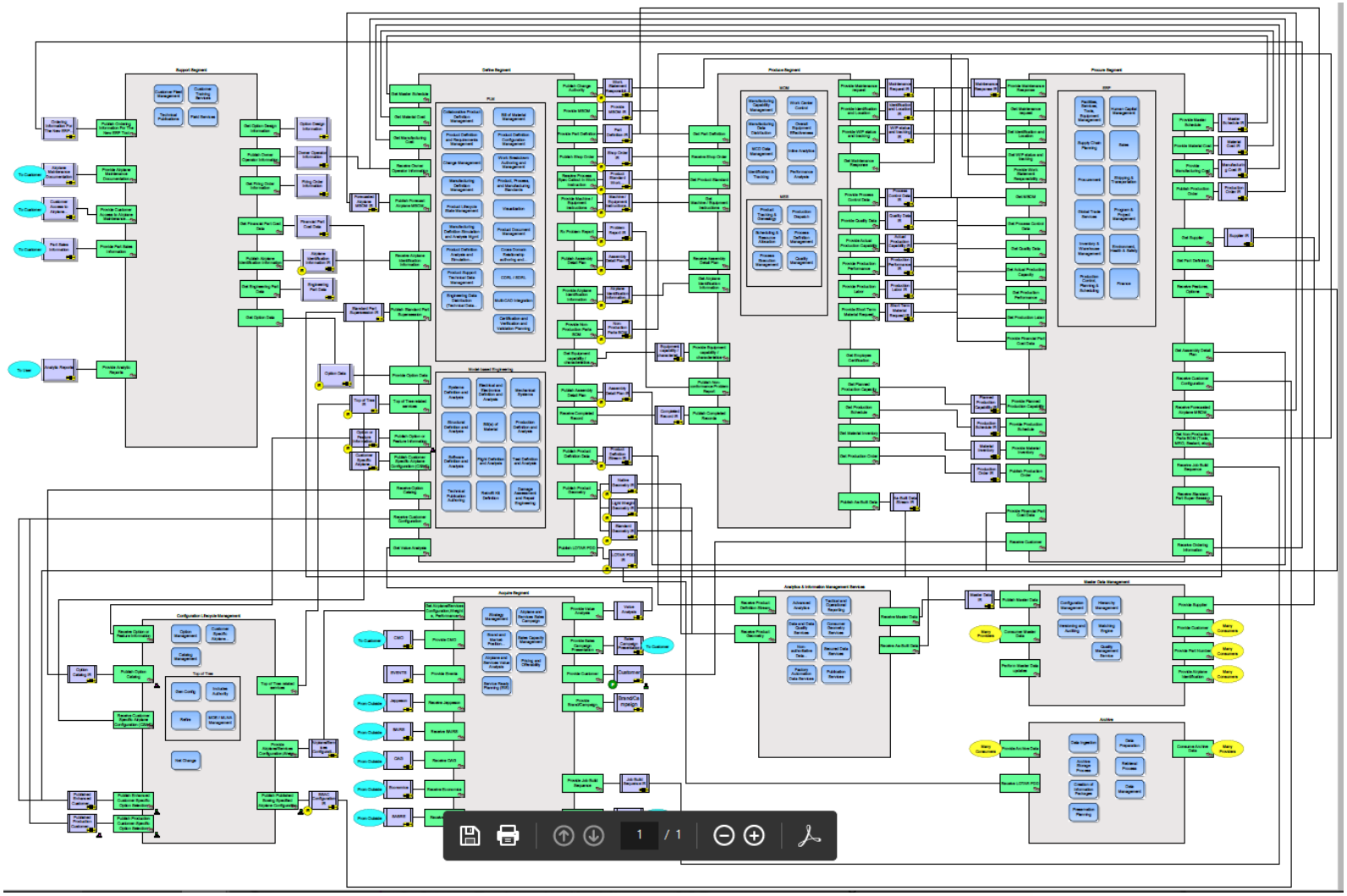

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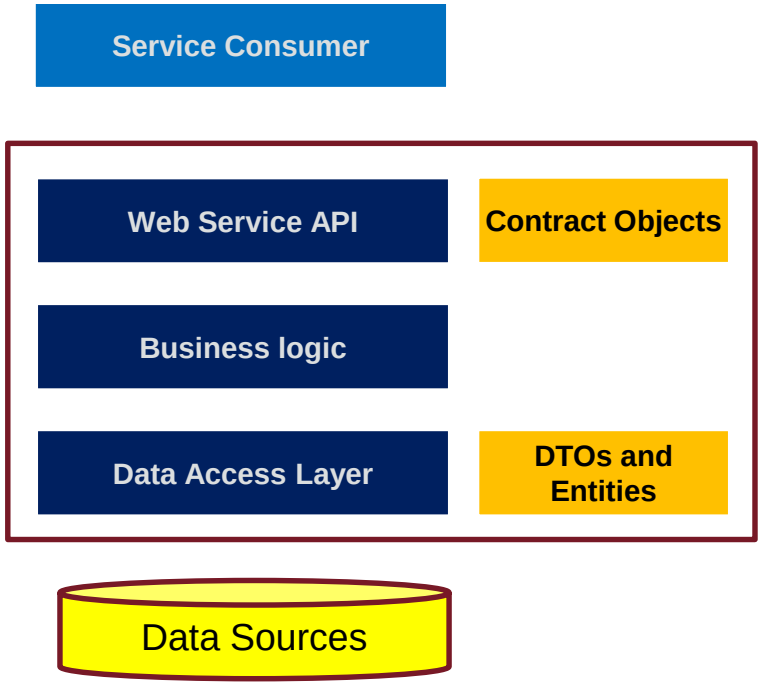
Service Oriented Architecture (.Net)



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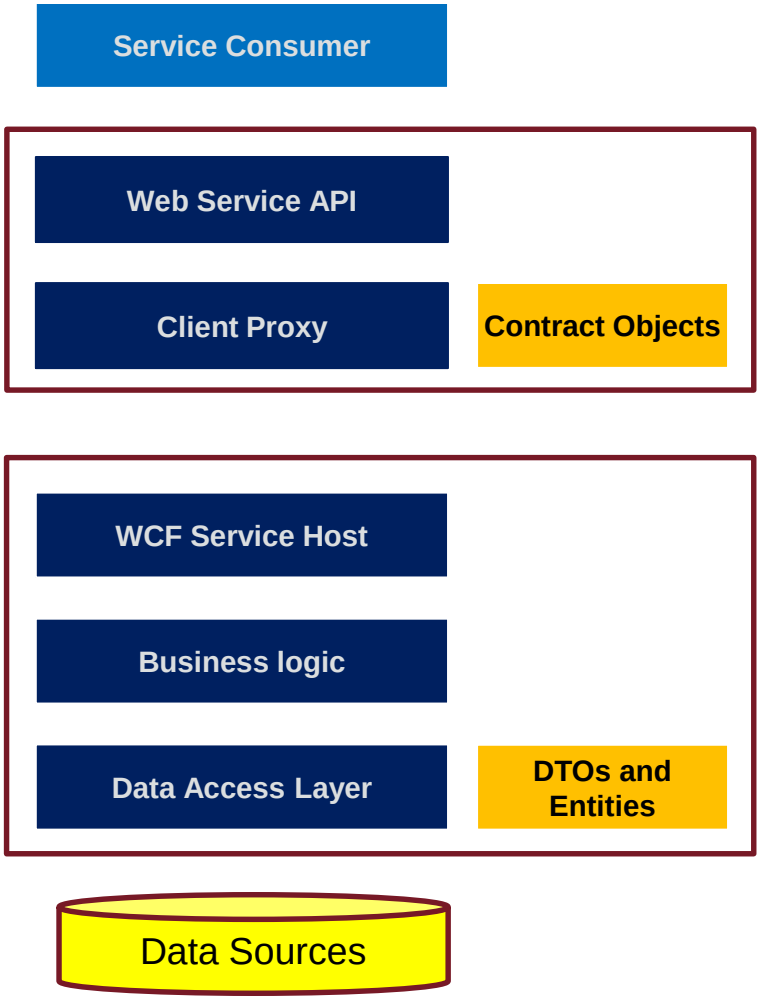
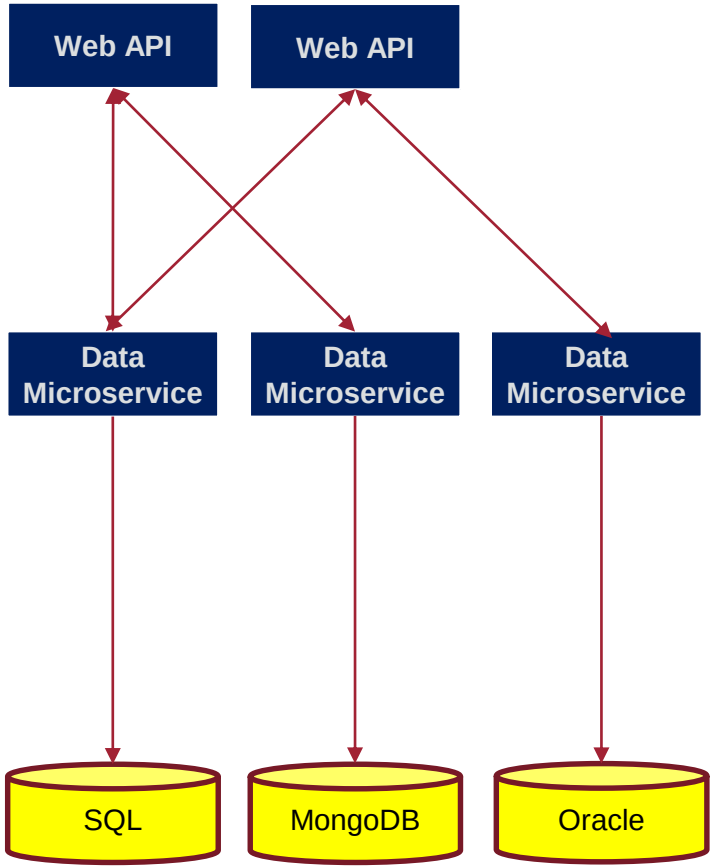
Service Oriented Architecture (.Net)



Microservices Architecture



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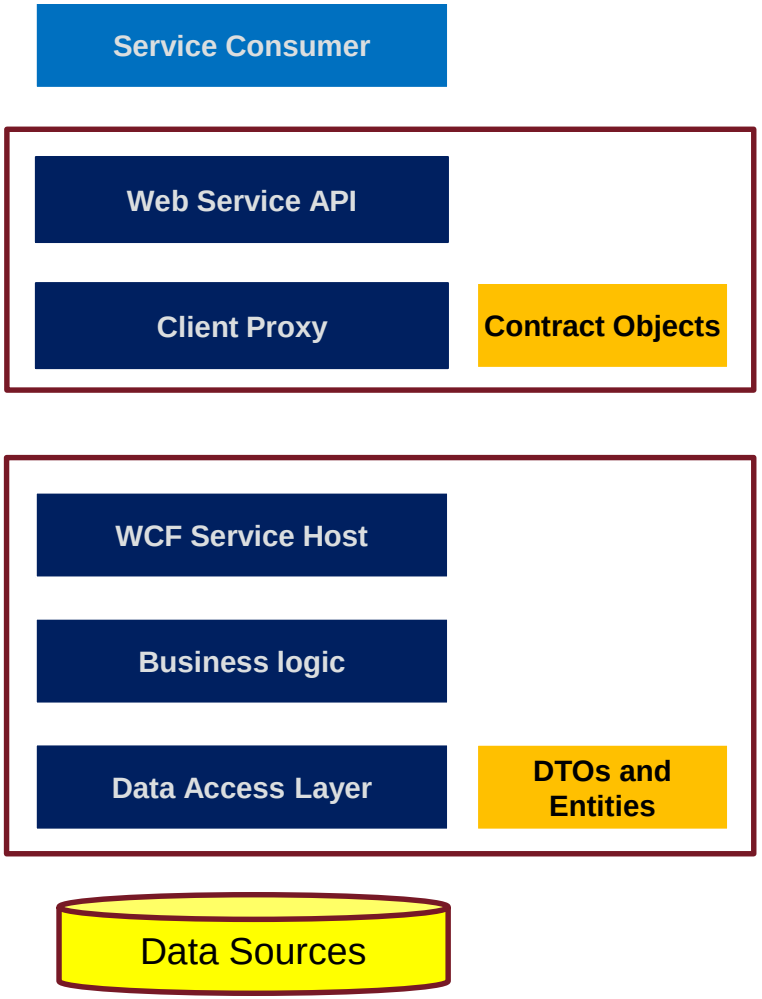
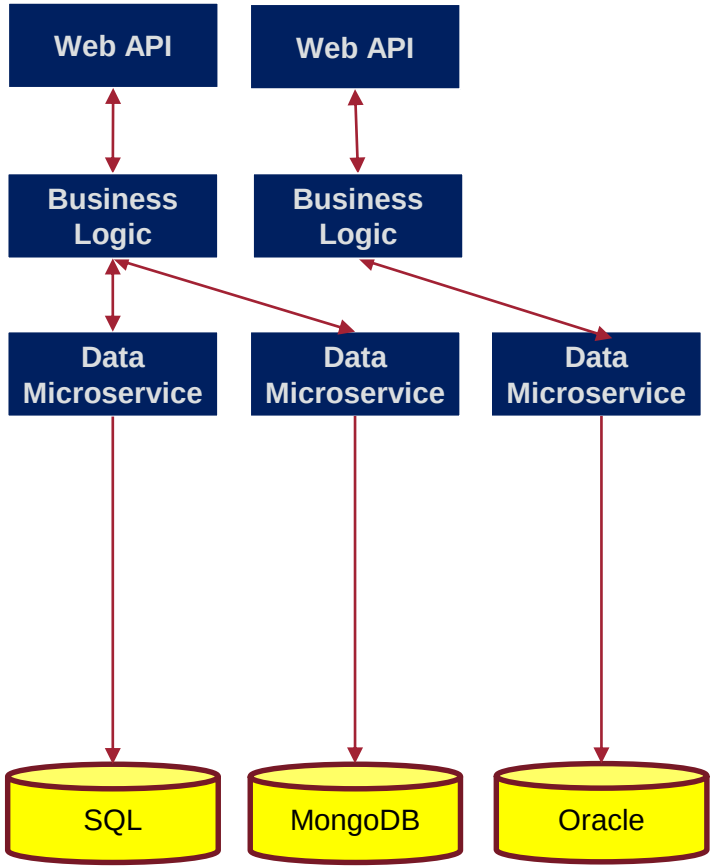
Service Oriented Architecture (.Net)



Microservices Architecture



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Product System SOA Integration Team

- **Motivation: "Jump Start" for every new integration in 2CES**
  - **Enterprise SOA Standard**
  - **Software Development Best Practices**
  - **DevOps**

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Product System SOA Team SharePoint Site

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Link: https://collab2.web.boeing.com/sites/PS_SOA/SitePages/Home.aspx

Product Systems SOA EDIT LINKS

Product Systems SOA

Search this site

Project Documents

- Opportunity Evaluation (P100)
- SOA Direction and Training Materails
- Service Use Cases
- Infrastructure Details
- Agile Team Overview

.NET SOA COE

- SOA Framework Architecture Guidance (.NET)
- SOA .NET Technology Stack

Java SOA COE

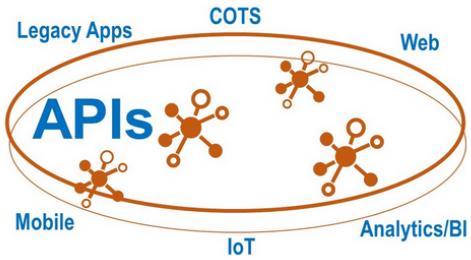
- SOA Framework Architecture Guidance (Java)
- SOA Java Technology Stack
- Java Service Generator
- OnBoarding Java developer

Reference Links

- Enterprise SOA Standards
- Gartner Application Summit 2016

Product Systems - Service Oriented Architecture

Vision:



Goals:

Implement a SOA approach to address application/system integration issue for 2CES effort.

Tasks and Steps:

1. Identify architecture patterns for system integration in 2CES to-be architecture.
2. Develop SOA use-cases established in step 1.
3. Develop software architecture patterns using SOA approach to address the use cases.
4. Implement general SOA integration solutions with key technical stacks as a reuseable library, source code packages, and deployable services.
5. Test the integration solution using a prototyping approach on several typical and important 2CES projects (PLM and MOM).
6. Create support and governance processes to promote these reusable solution for all (new) 2CES projects.

Deliverables:

1. SOA architecture patterns for system integrations to support 2CES/BC2020 (Collaborate with BC2020/2CES Team)

Current Projects

- MESci - SkyLight
- Teardown Lab
- WCM Plant centric
- Performance Testing
- Customer Config

The Team

Kumar, Hemanth
Program Sponsor

Cao, Yong
Lead Architect

Davis, Lana S
Project Manager

Suyam Prakash
Technical Architect

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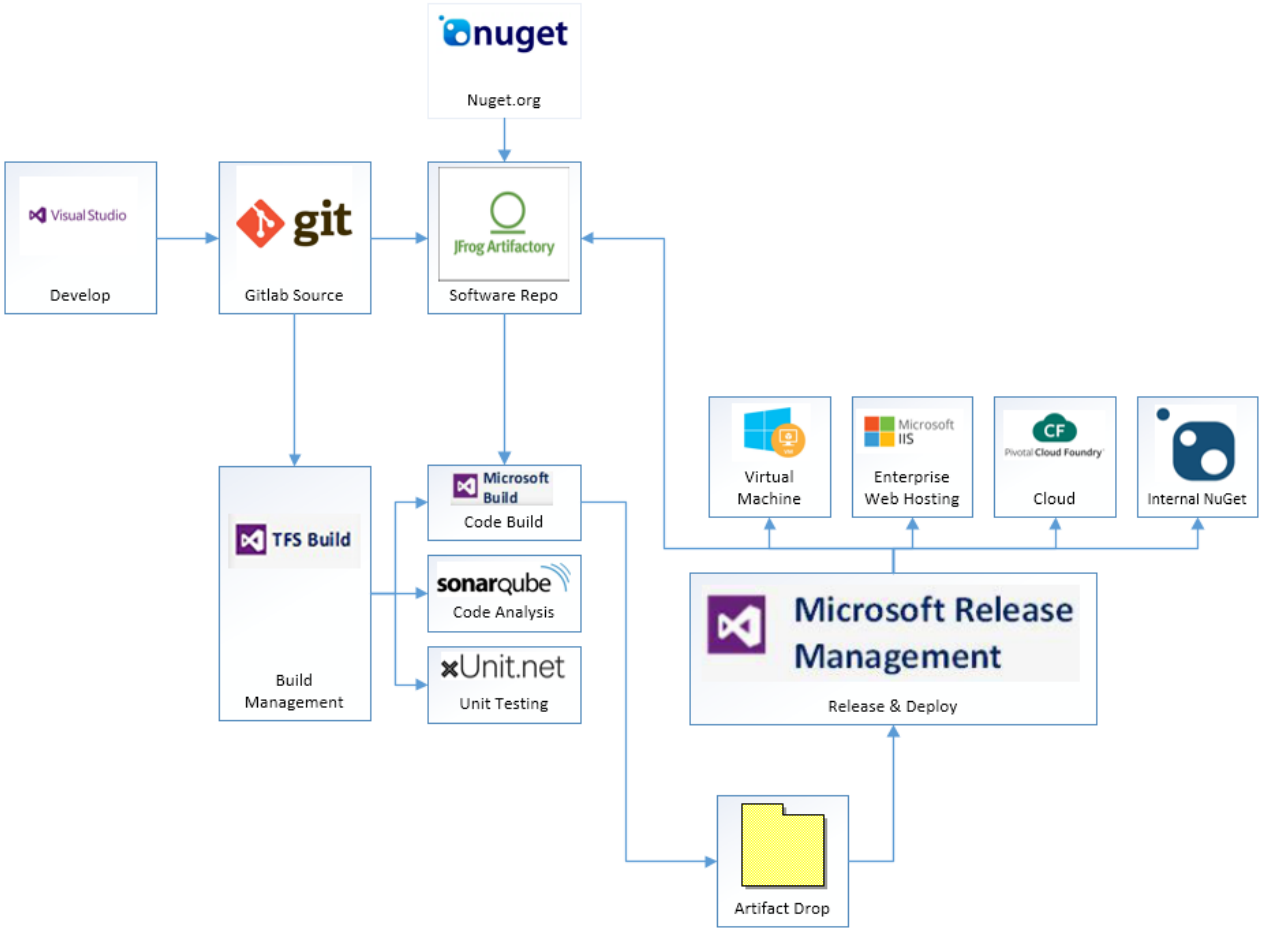
DevOp: .Net



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SOA Template Source Code

GITLAB Sources

- **Template Project**
  - **.Net: https://git.web.boeing.com/ps-soa/dotnet-soa-framework**
  - **Java: https://git.web.boeing.com/ps-soa/j-rat**
- **Reuse Package Projects**
  - **https://git.web.boeing.com/ps-soa/dotnet-soa-reuse**
  - **NuGet Namespace Prefix: Boeing.Reuse.SOA**
- **SOA Gen**
  - **https://git.web.boeing.com/ps-soa/soagen**

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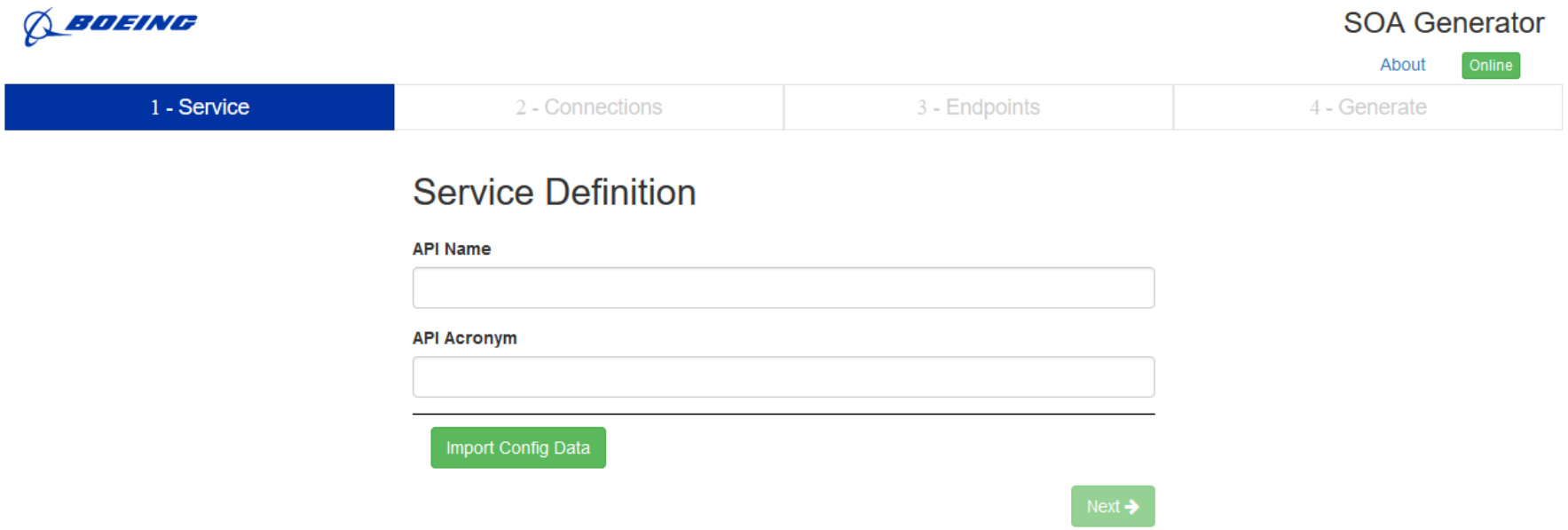
SOA Generator

https://soagen.apps.pcfpre-phx.cloud.boeing.com/home



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Backup Slides

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Technical Advantages of SOA

Programming Revolution:

- **Procedural (e.g. C, Fortran)**
- **Object Oriented**
- **Component**
- **Service**

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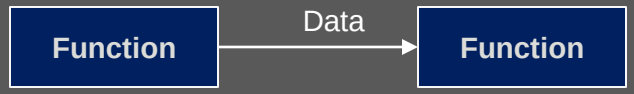
Technical Advantages of SOA



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Technical Advantages of SOA

Programming Revolution:

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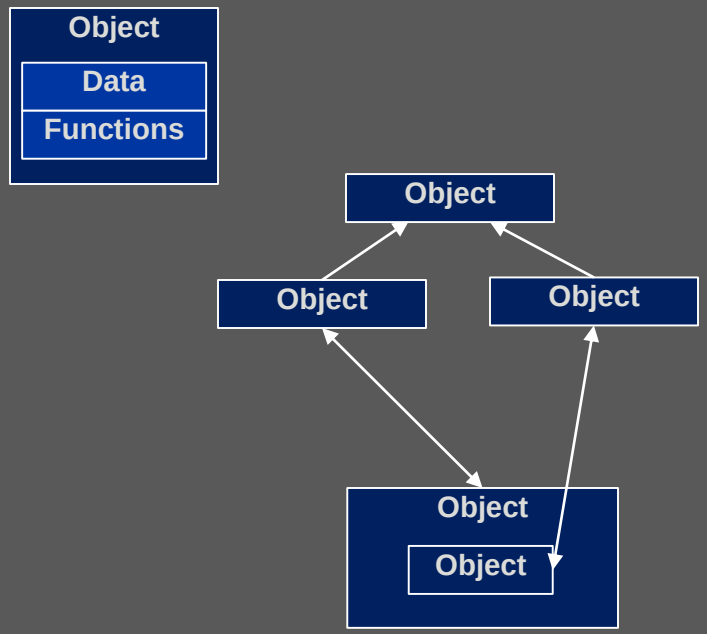
- **Object Oriented (C++)**
- **Component**
- **Service**



Pros: Programmability
Cons: Object Dependency Hard to maintain

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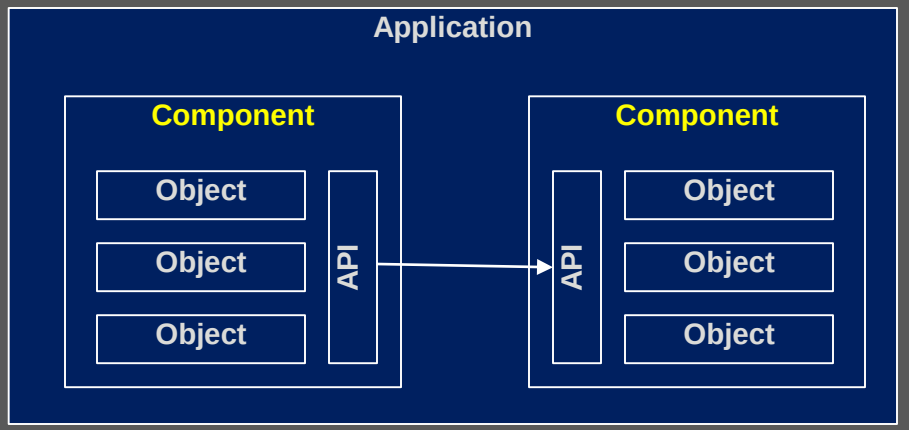
Technical Advantages of SOA

Programming Revolution:

- **Procedural**
- **Object Oriented**
- **Component (Java, C#)**
- **Service**



Pros: Reduced Dependency
Cons: Build Together Hard to build, test and deploy

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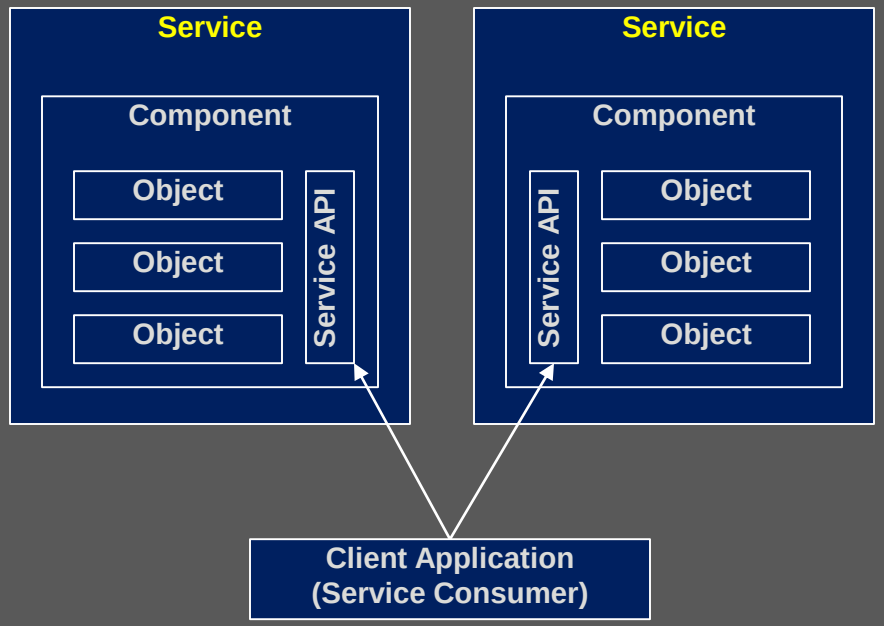
Technical Advantages of SOA

Programming Revolution:

- **Procedural**
- **Object Oriented**
- **Component**
- **Service (Cobra, Web)**



Pros: ***Decoupled*** service component (Swap any service component independently)

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