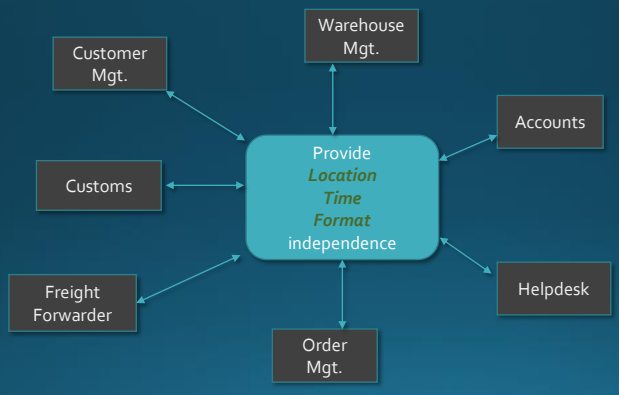
Enterprise Service Bus (ESB)

1

Recall... *Loose Coupling*



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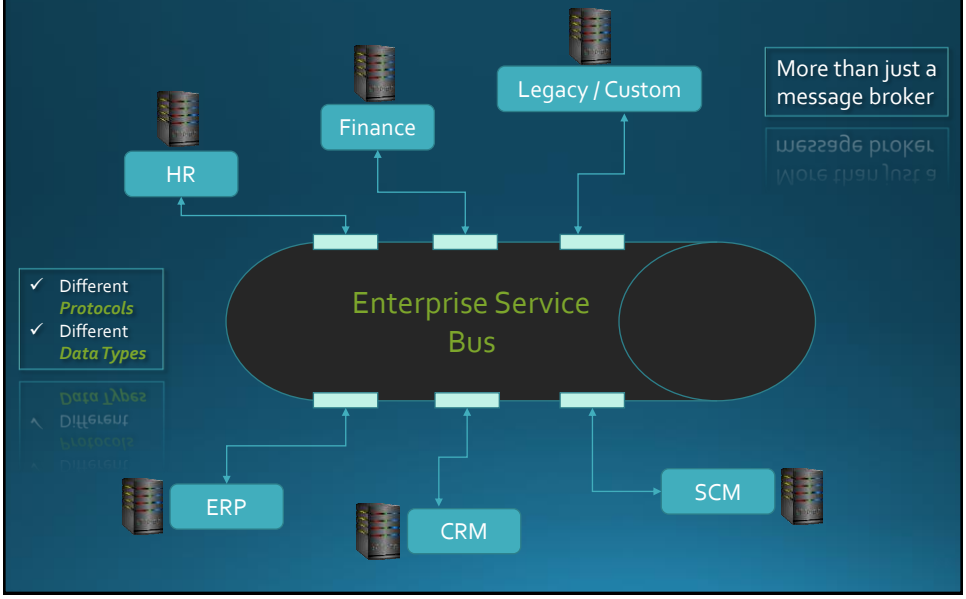
Enterprise Service Bus *(ESB)*



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Enterprise Service Bus

- An ***Architecture***
- Integrate various applications over a ***bus-like infrastructure***
- Decouple applications from each other by ***providing middleware to handle communication paths and workflows***

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Integration Principles

Transportation

Transformation

Orchestration

Mediation

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Orchestration	Composing several existing fine-grained components into a single higher order composite service. This can be done to achieve appropriate "granularity" of services and promote reuse and manageability of the underlying components.
Transformation	Data transformation between canonical data formats and specific data formats required by each ESB connector. An example of this would be transforming between CSV, Cobol copybook or EDI formats to either SOAP/XML or JSON. Canonical data formats can greatly simplify the transformation requirements associated with a large ESB implementation where there are many consumers and providers, each with their own data formats and definitions.
Transportation	Transport protocol negotiation between multiple formats (such as HTTP, JMS, JDBC). Note: Mule treats databases like another "service" by making JDBC just another transport (or endpoint) where data can be accessed.
Mediation	Providing multiple interfaces for the purpose of a) supporting multiple versions of a service for backwards compatibility or alternatively, b) to allow for multiple channels to the same underlying component implementation. This second requirement may involve providing multiple interfaces to the same component, one legacy interface (flat file) and one standards compliant (SOAP/XML) interface.
Non-functional consistency	For a typical ESB initiative, this can include consistency around the way security and monitoring policies are applied and implemented. Additionally the goals of scalability and availability can be achieved by using multiple instances of an ESB to provide increased throughput (scalability) and eliminate single-points-of-failure (SPOFs), which is the key objective for highly available systems.

Integration Principles

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Architectures

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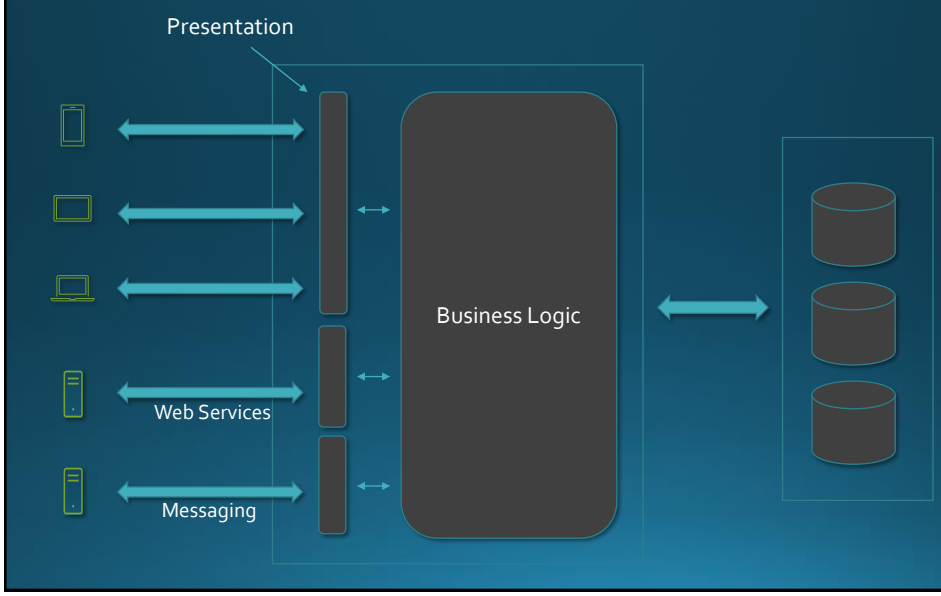
Example Architecture

"monolith"



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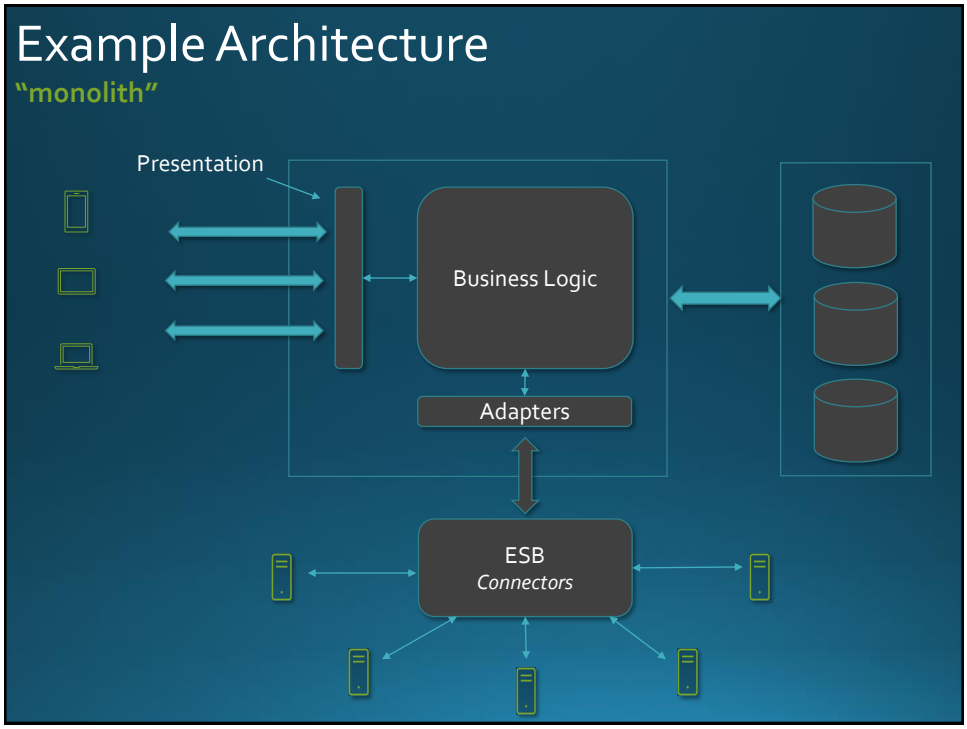
Example Architecture
"monolith"
Presentation
Business Logic
Adapters
ESB
Connectors

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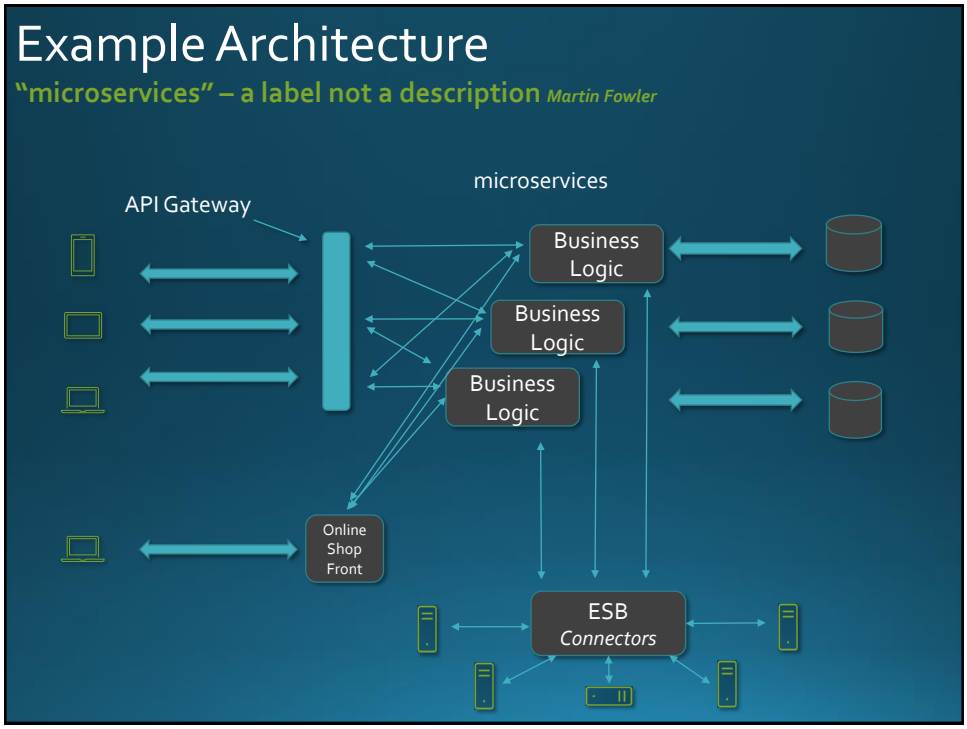
Example Architecture
"microservices" – a label not a description Martin Fowler
microservices
API Gateway
Business Logic
Business Logic
Business Logic
Online Shop Front
ESB
Connectors

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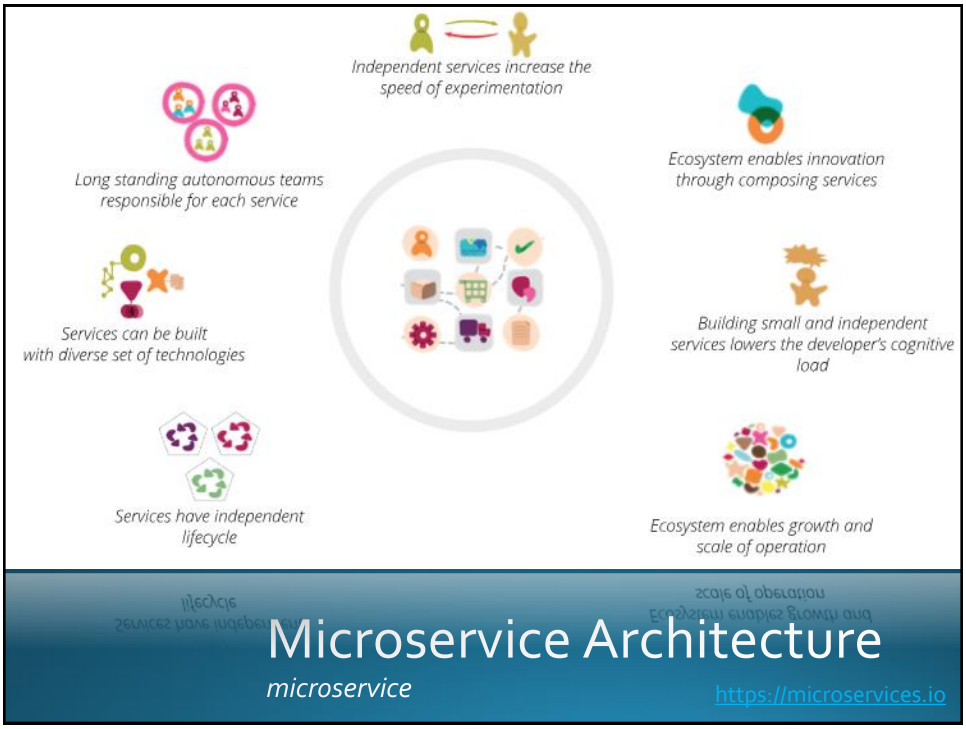

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Enterprise Architecture *Monolith versus Microservices*

- **Monolith Advantages**
  - Simple to develop (once developers familiar with codebase)
  - Simple to deploy
  - Simple to scale (though data volumes might cause issues)
- **Monolith Disadvantages**
  - Steep learning curve for new developers can exist
  - Overloaded containers can impact developers
  - Continuous deployment is difficult
- **Microservice Advantages**
  - Highly maintainable / testable
  - Loose coupling
  - Independent deployment
- **Microservice Disadvantages**
  - Complexity of a distributed system
  - Data consistency
  - Query's that span data managed by multiple services

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Decompose by domain-driven design subdomain.

Decompose by verb or use case and define services that are responsible for particular actions. e.g. a Shipping Service that's responsible for shipping complete orders.

Decompose by nouns or resources by defining a service that is responsible for all operations on entities/resources of a given type. e.g. an Account Service that is responsible for managing user accounts

Moving from Monolith to Microservices

https://microservices.io

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ESB Products

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Example *ESB* Products

- IBM WebSphere ESB
- Microsoft BizTalk Server
- Oracle Enterprise Service Bus
- Sonic ESB
- Red Hat - JBoss Fuse
- ***Mule ESB (Community / Enterprise Edition)***

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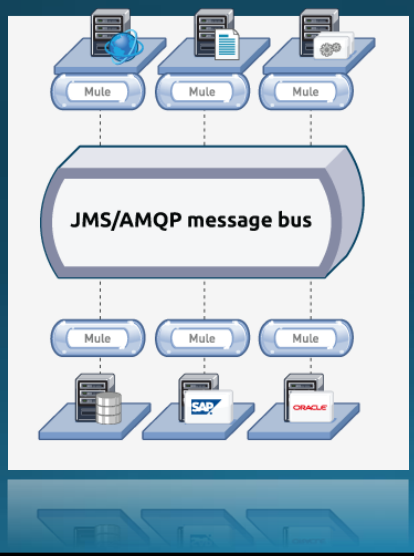
Example ESB from *MuleSoft™*



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Anypoint Studio IDE

Anypoint Studio

Eclipse based development tool from *Mulesoft*

Embedded Mule Server

Visual & XML application editor

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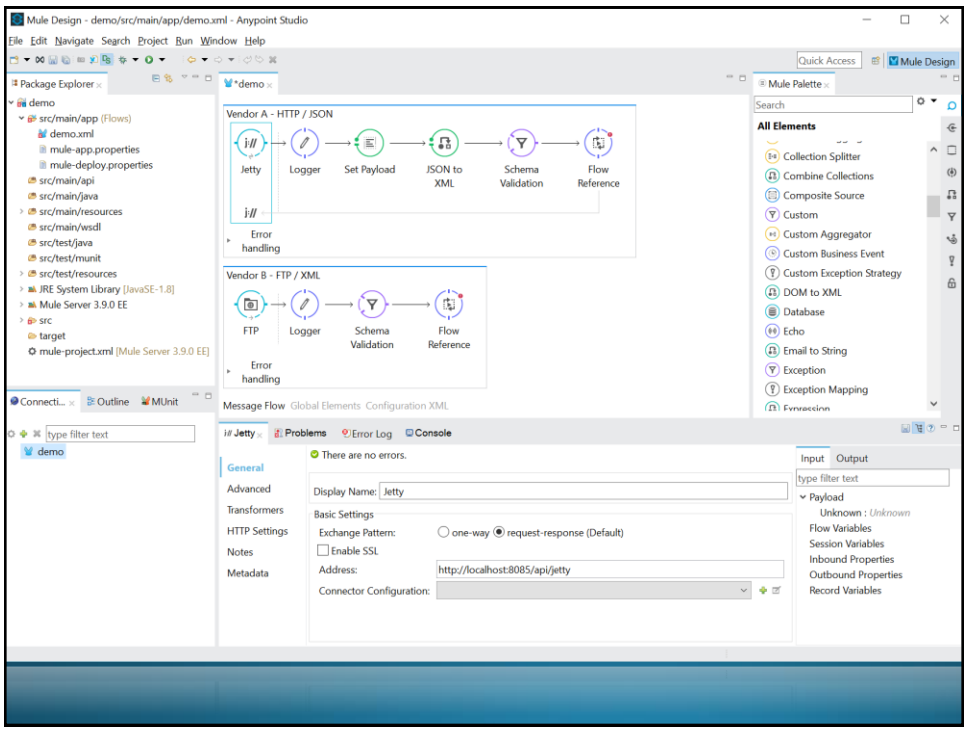

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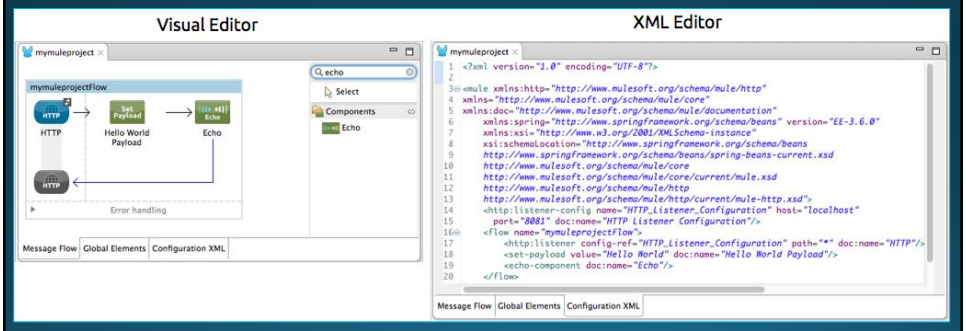
Anypoint Visual & XML Editor



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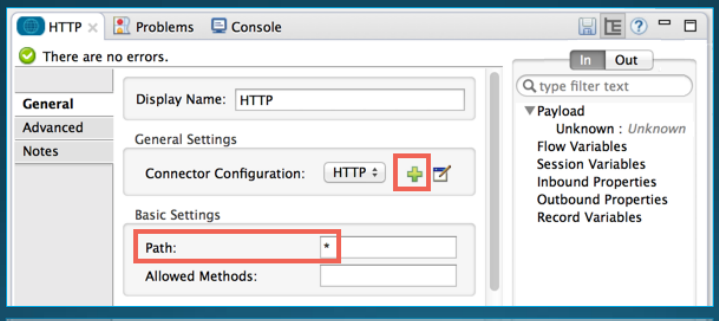
Anypoint *Connectors*



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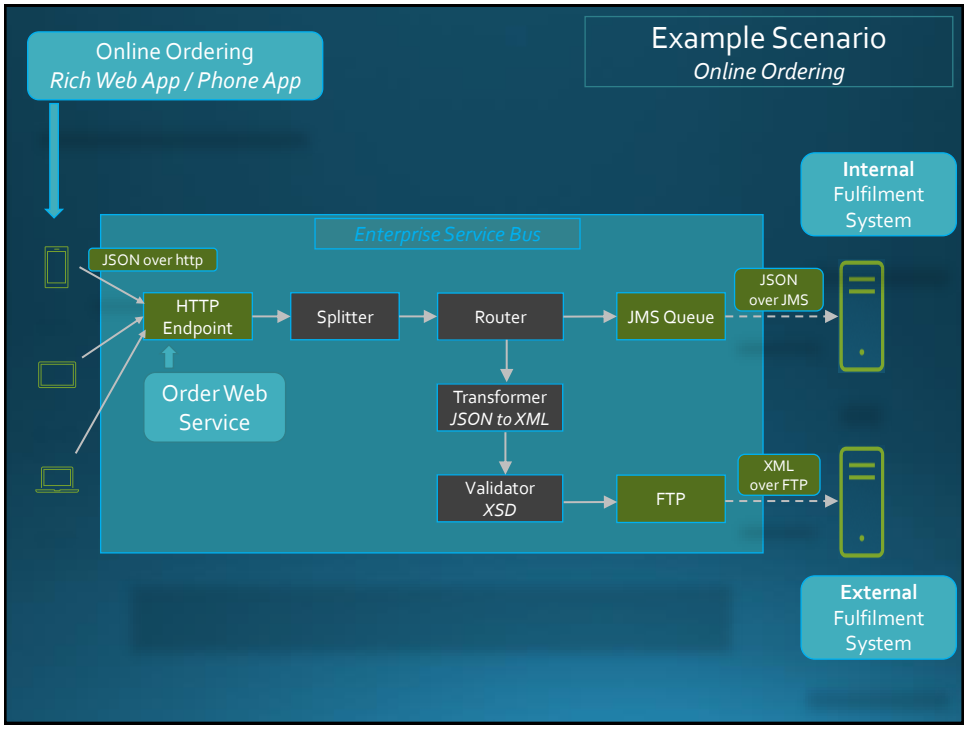
Online Ordering
Rich Web App / Phone App
Example Scenario
Online Ordering
Internal
Fulfilment
System
Enterprise Service Bus
JSON over http
HTTP
Endpoint
Splitter
Router
JMS Queue
JSON
over JMS
Order Web
Service
Transformer
JSON to XML
Validator
XSD
FTP
XML
over FTP
External
Fulfilment
System

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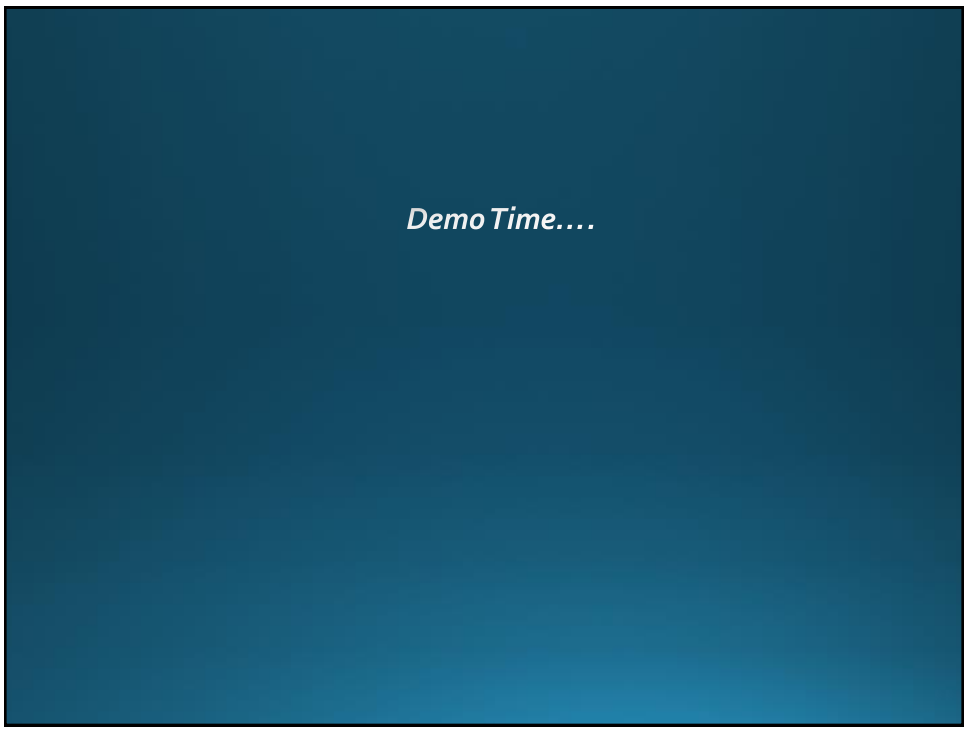
Demo Time....

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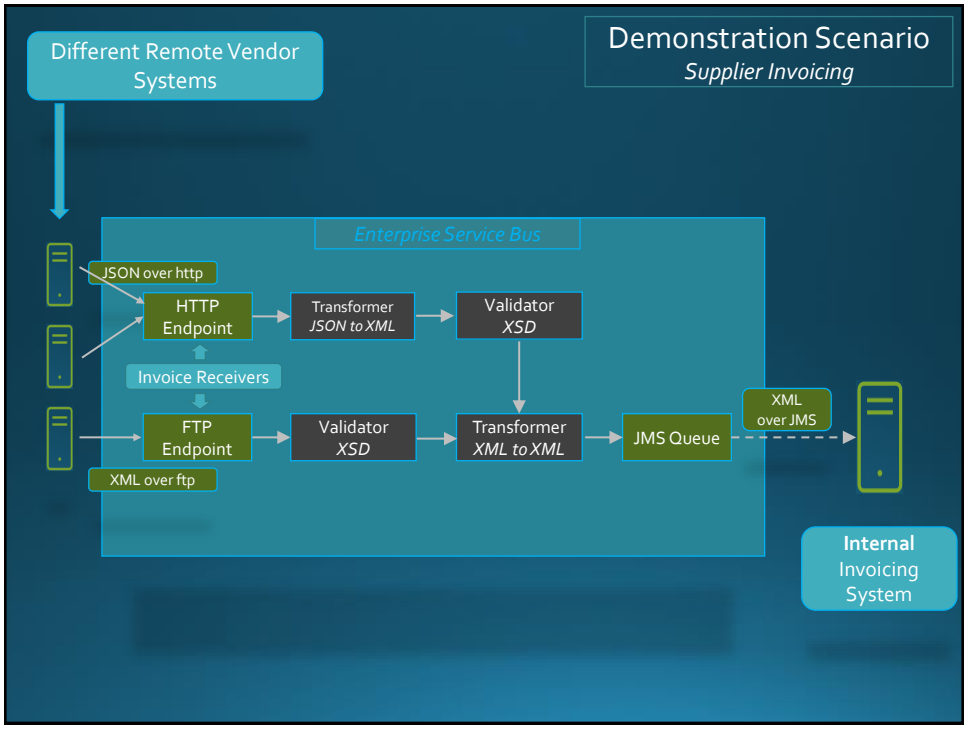
Different Remote Vendor Systems
Demonstration Scenario
Supplier Invoicing
Enterprise Service Bus
JSON over http
HTTP Endpoint
Transformer JSON to XML
Validator XSD
Invoice Receivers
FTP Endpoint
Validator XSD
Transformer XML to XML
JMS Queue
XML over JMS
XML over ftp
Internal Invoicing System

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