

How to Integrate Business Processes and Data Enforcing Industry Standards



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Two primary trends driving integration market



Integration being adopted in the line of business for Digital projects

According to Gartner* an on-premises application integration (ESP) suite is foundational to a hybrid integration platform. ... ESP suites are being combined with additional technologies to address new project types, such as implementing and managing APIs, implementing hybrid integration platforms, extending mobile app development platforms and mobile back-end-as-a-service offerings

* Gartner: Market Guide for On-Premises Application Integration Suites, Published: 22 March 2016, G00277987



Increasing need to integrate across a hybrid environments and cloud services



Business Challenges with today's IT

- **Challenged budgets, security threats, auditing, fewer resources, business process control, enforced rules**
- **Increasing demands**
 - New Applications must be delivered and adapted in days, not weeks and months
 - Integration & orchestration of Microservices and process flows
- **Organizational Concerns**
 - Applications and process flows are developed and deployed by non-IT teams
 - Points of control changing from application to business rules
 - Budgets shifting from IT to Business Units & Line of Business
- **Operational Complexity and analytics**
 - 24x7 operations with full customer visibility
 - Operational requirements for new short term actions
 - Analytics as part of business control



Digital transformation with reduced IT costs

- **Digital transformation**

- requires interfaces for digital businesses via standard APIs.

- **Enterprise Integration is a must have**

- especially to integrate existing Systems of Record
- integration of legacy systems in open standards

- **Many different endpoints**

- need flexible integration and orchestration using open standards
- conditional integration in a secure environment

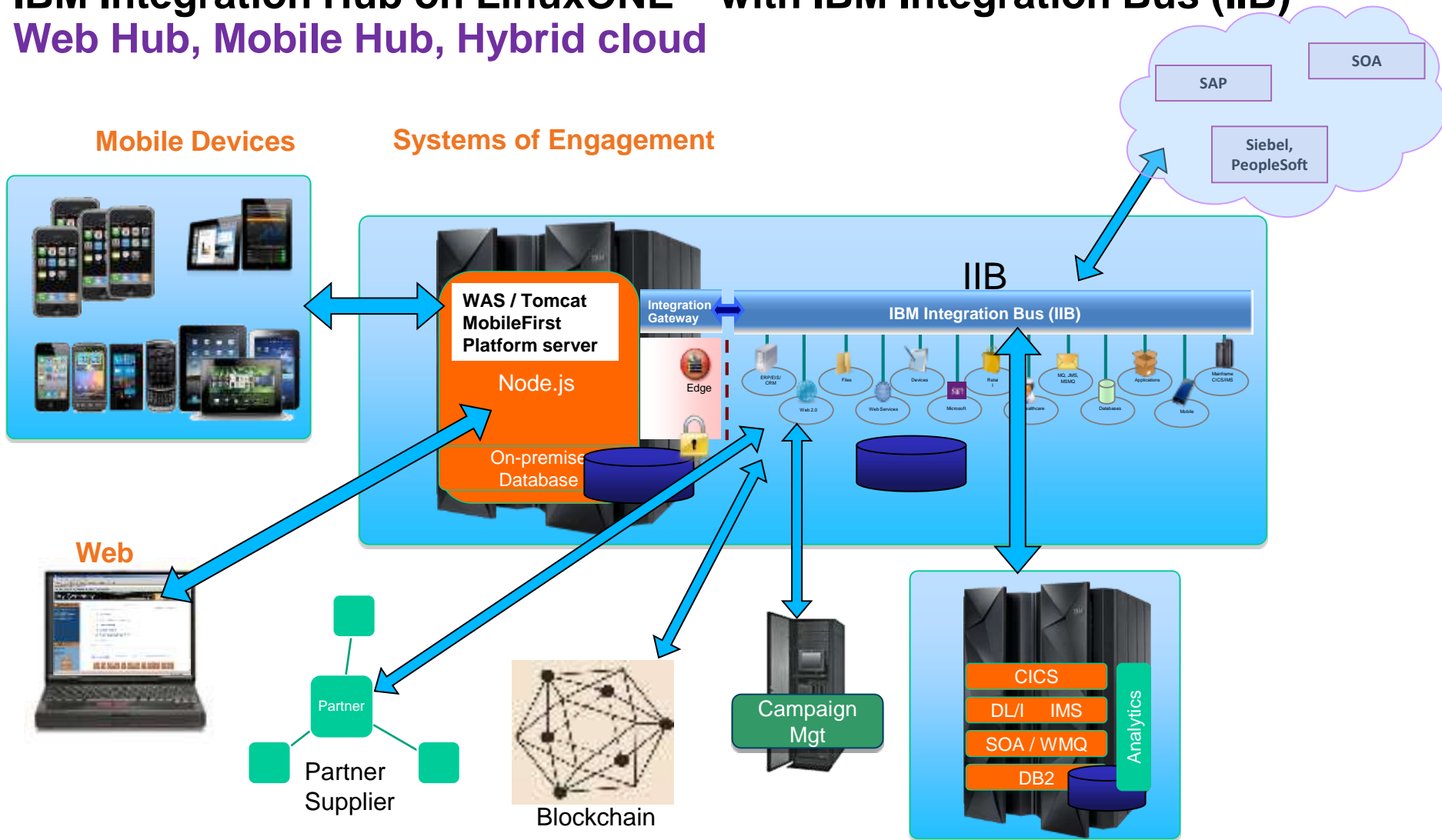
- **Need for a secure and scalable integration platform**

- without breaking existing architecture
- with proven security and secure scalability

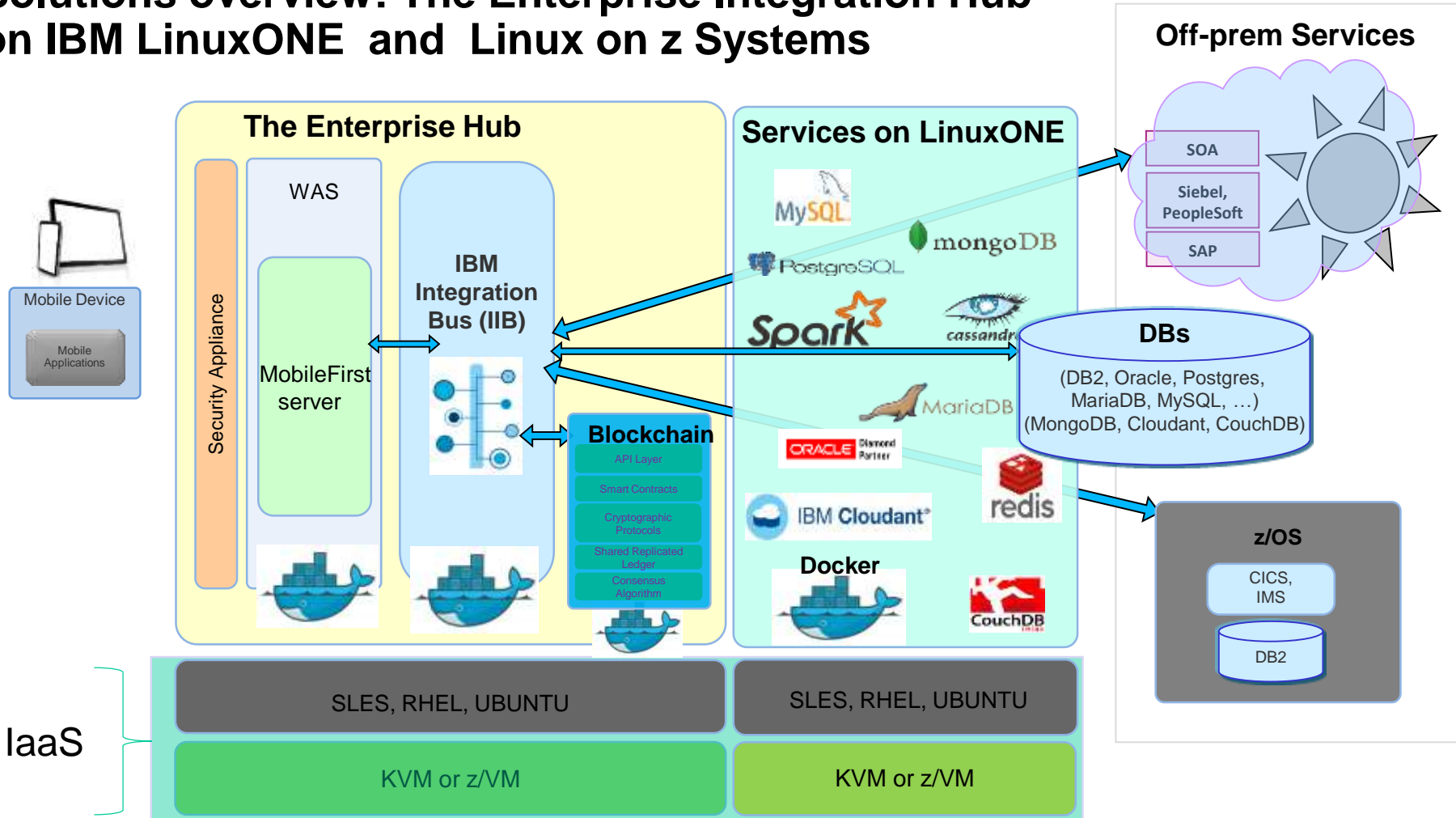


IBM Integration Hub on LinuxONE – with IBM Integration Bus (IIB)

Web Hub, Mobile Hub, Hybrid cloud



Solutions overview: The Enterprise Integration Hub on IBM LinuxONE and Linux on z Systems



IBM Integration Bus can help you simplify the connectivity between your IT assets, including legacy apps, packaged apps and web services, without requiring coding changes. It provides content and context based routing that helps you manage and simplify business-critical processes. It enables you to integrate Open Source technologies and Hybrid cloud with most of your existing IT assets quickly, simply and at a low cost.



Summary: Benefits from IBM Integration Bus (IIB)

- Flexible integration with Web, Mobile, Cloud, Analytics and IT services
- Standard Interfaces and Open source based Integration APIs for Microservices
- Intelligent transformation and content based routing
- Universal Integration with high scalability and security incl. workflow & workload mgmt. with Auditing

Deployable full active/active

No charge for developers

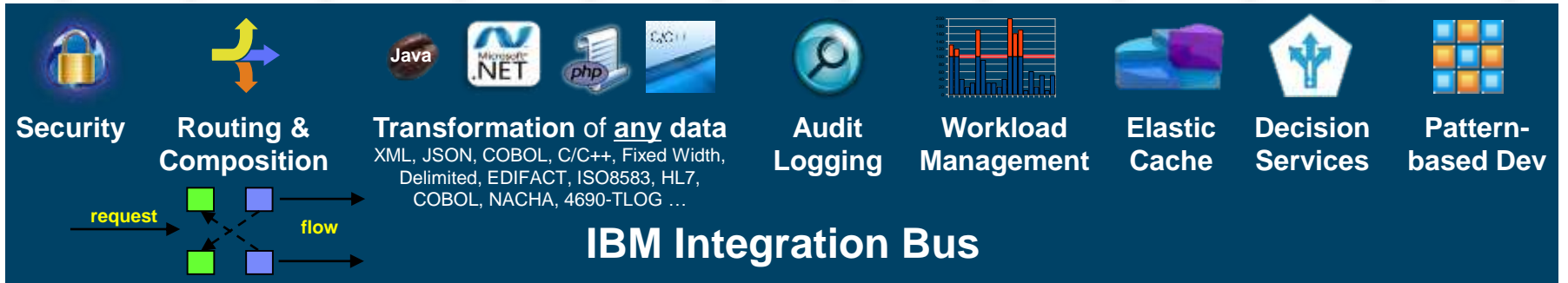
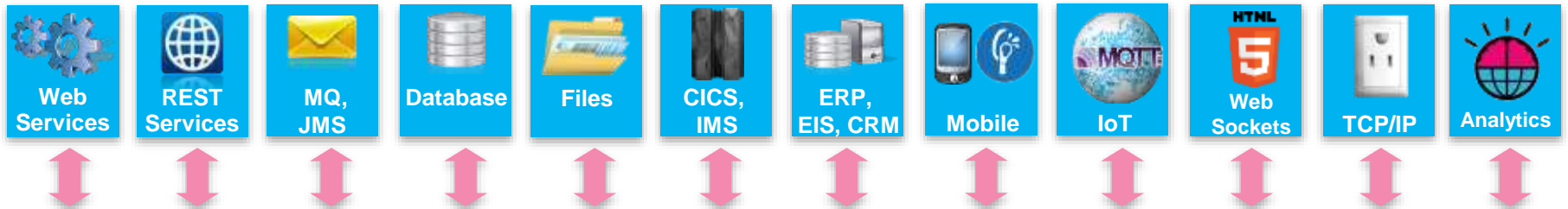
Streamlined to ESB use case

Scalable in Docker Containers

HTML5 web admin/monitoring

High scale MQ events/messaging

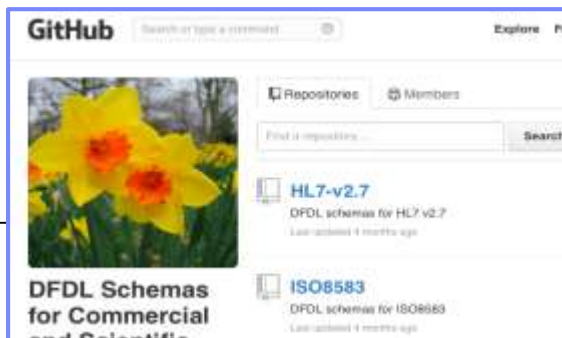
<http://www-03.ibm.com/software/products/en/ibm-integration-bus>



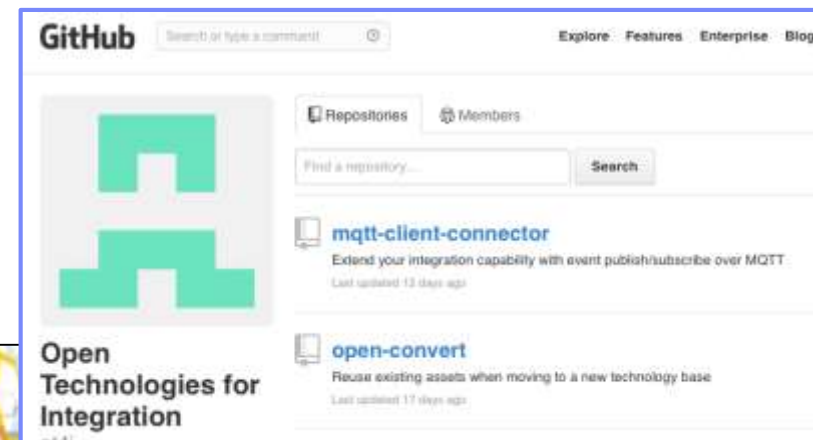
IBM LinuxONE or Linux on z Systems

Open technologies with IBM Integration Bus (IIB)

- New IIB initiative to develop **integration components as open source**
 - Part of continuing tradition of IIB supporting open standards
 - **Source freely available on popular Github website under flexible Eclipse Public License**
 - Community contributions (including modifications) actively encouraged!
 - Fully supported technologies delivered into IIB as appropriate
 - IBM Integration Bus provides services that help you define and implement a RESTful service based on an existing **Swagger** document.
- Varied initial contributions targeting transferrable, embeddable assets
 - MQTT Client connectors
 - Easy-to-use inbound and output connectors to MQTT servers
 - Uses open framework for platform-independent connectors
 - DFDL Schemas for popular industry formats (Data Format Description Language)
 - E.g. HL7, ISO8583, IBM4690-TLOG, NACHA, PCAP, EDIFACT
 - **Chef cookbooks** for simplified IIB provisioning
 - Customizable scripts allows building of complete IIB environments
 - Tools for easier conversion between integration products
 - Initially targeting WESB to IIB
 - Source for common integration patterns (e.g. event filter)



<https://github.com/ot4i>



IBM Integration Industry Packs

<http://www-03.ibm.com/software/products/en/ibm-integration-bus>

- Each pack is a separately purchased, fully supported software product, built on IBM Integration Bus: Healthcare, Retail, Manufacturing
- Provide industry-specific development accelerators for common industry integration problems
- Provide industry specific pricing e.g. store, factory and hospital per bed deployments

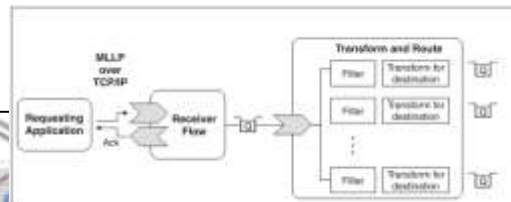


Industry Connectors & data formats

-  Association for Retail Technology Standards (ARTS)
-  TLOG (PoS Transactions)
-  Proprietary Medical Devices
-  OPC (industrial & Manufacturing)
-  Health Level 7
-  Digital Imaging and Communication in Medicine (DICOM)

Integration Patterns

- ▶ Commerce Webservice Information
- ▶ Sterling HTTP Information
- ▶ Sterling Order Queue
- ▶ Sterling Response Queue
- ▶ Heartbeat configuration
- ▶ Journaling



Domain specific Operational Views



Compliance

- Meet enterprise, industry, and regulatory requirements easily, especially as those requirements evolve.
- A middleware implementation should assist with auditing and other compliance objectives to provide a consistent interface for all applications.
- Filter information flow (enforce API compliance)

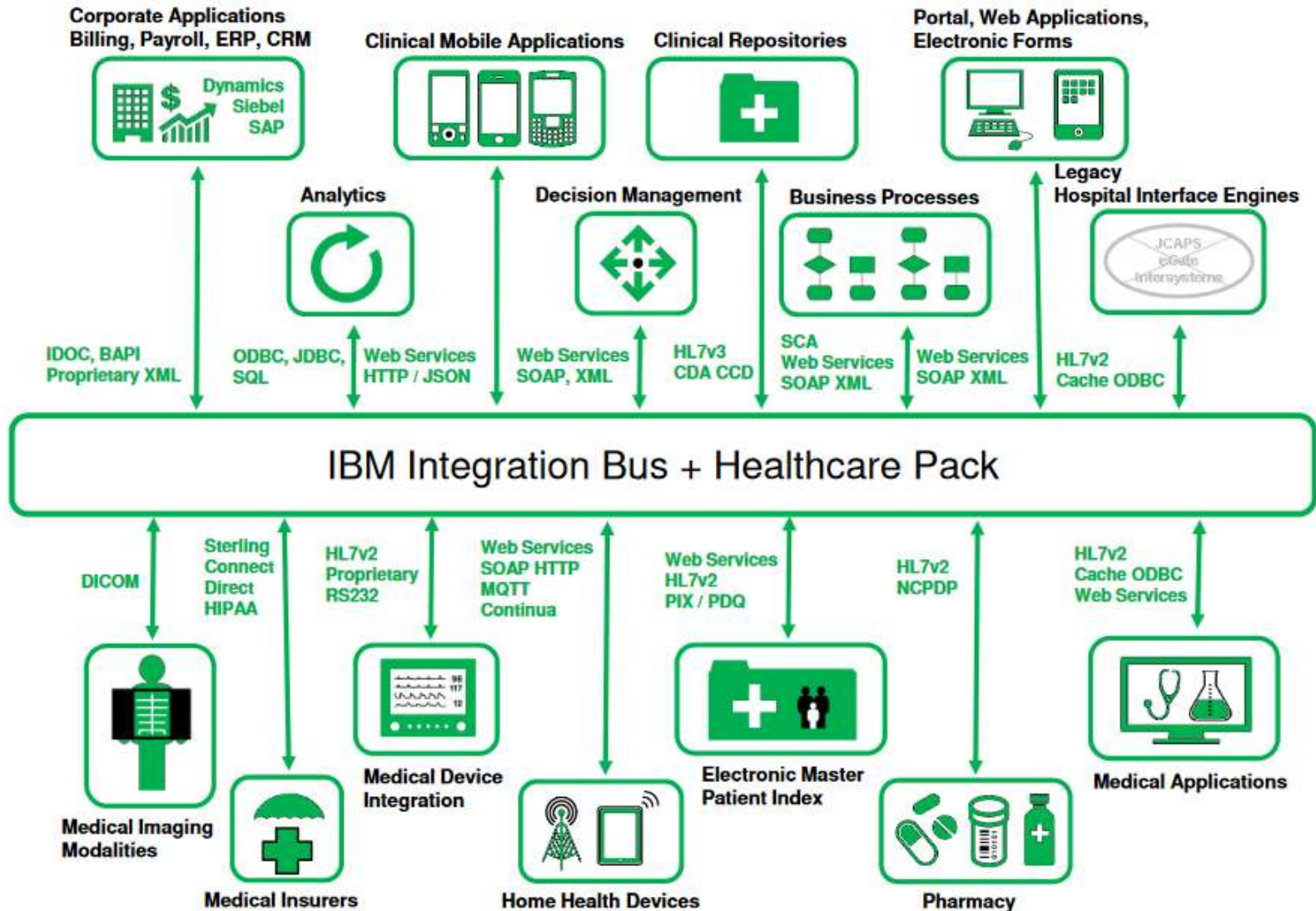


Integration in a Digital Hospital

- Integrates HL7 v2.x based clinical repositories & applications
 - Production ready patterns handle HL7 v2.x
- MLLP messages, supporting common scenarios such as segment filtering, sequencing with customization
- Patterns and connectors for building remote patient monitoring solutions
- Integrates DICOM based PACS & modalities
- Processes HL7 v3 CDA/CCD documents
- Direct connectivity to medical devices
 - monitors, infusion pumps
- Pattern-based development tooling
 - fast integration without detailed knowledge of integration technologies
- Healthcare-oriented operational views
 - Single point of visibility and control
- Regulated in US as FDA Cat 1 Medical Information Management System

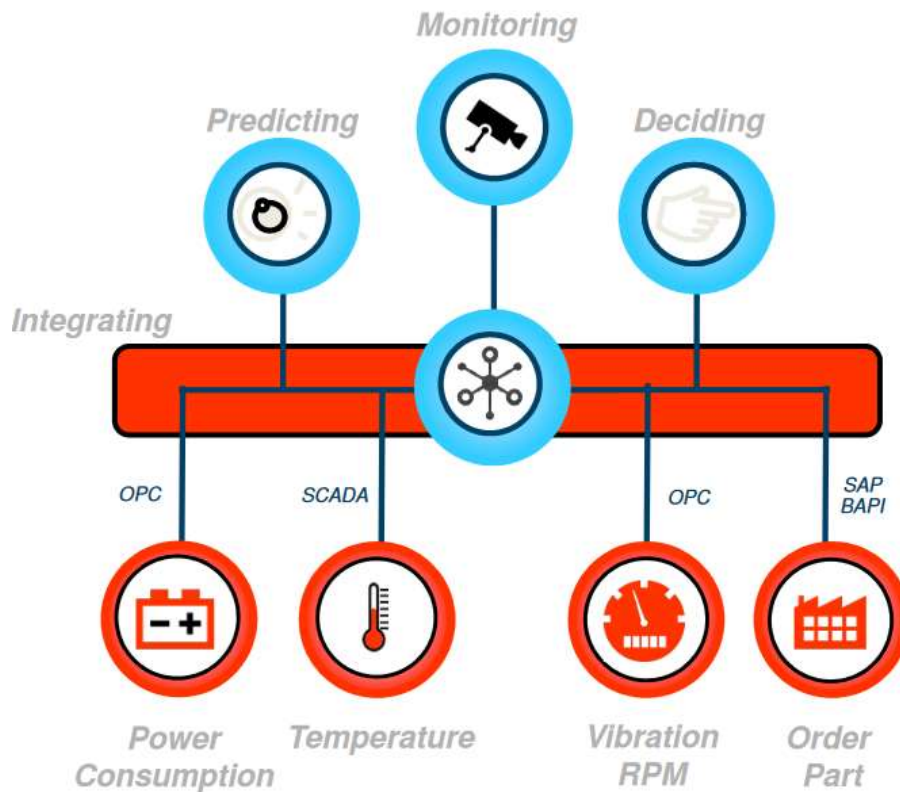


Integration in a Digital Hospital



Integration in a Manufacturing Landscape

The goal: Industrial Process Control



The Open Platform Communication (OPC) Foundation is a non-profit organization that maintains specifications on behalf of the industry.

Total OPC market has 2,500+ vendors, providing 15,000+ OPC enabled products.

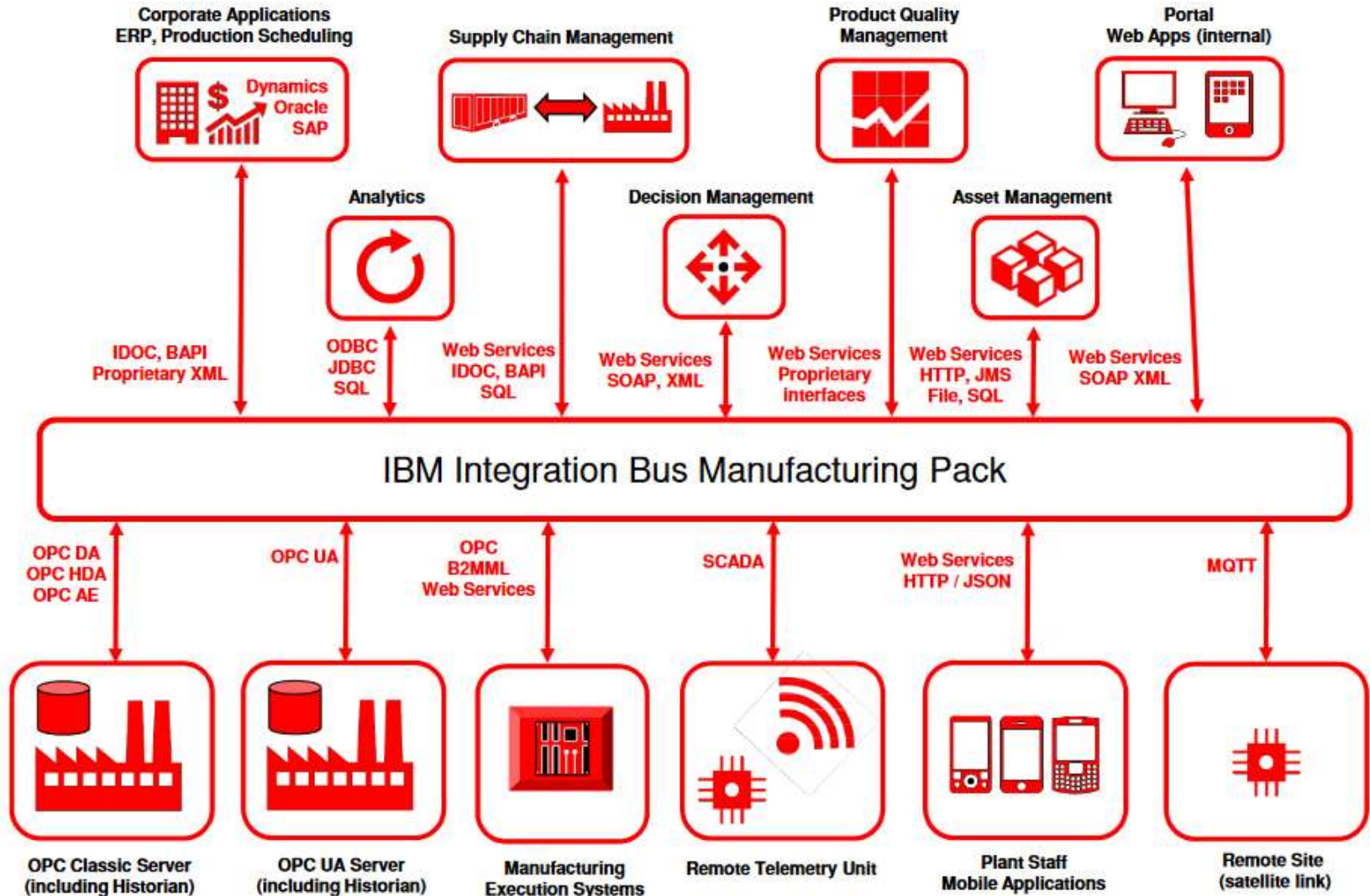
Specifications exist for:

OPC Data Access

OPC Historical Data Access

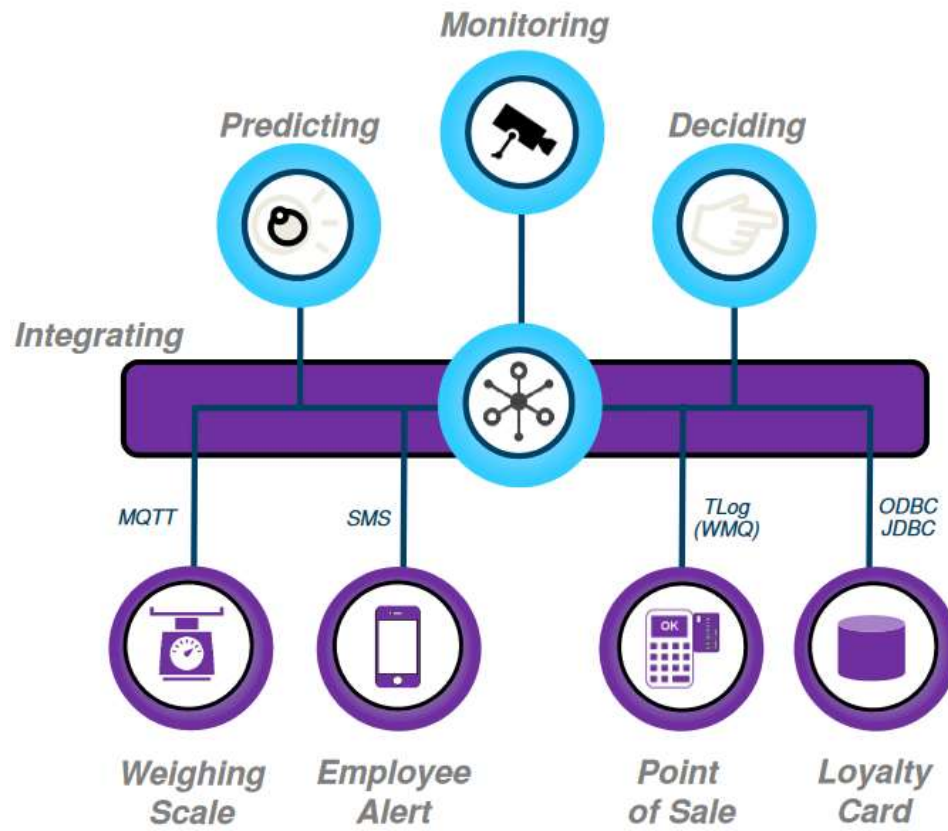
OPC Alarms and events

Integration in a Manufacturing Landscape

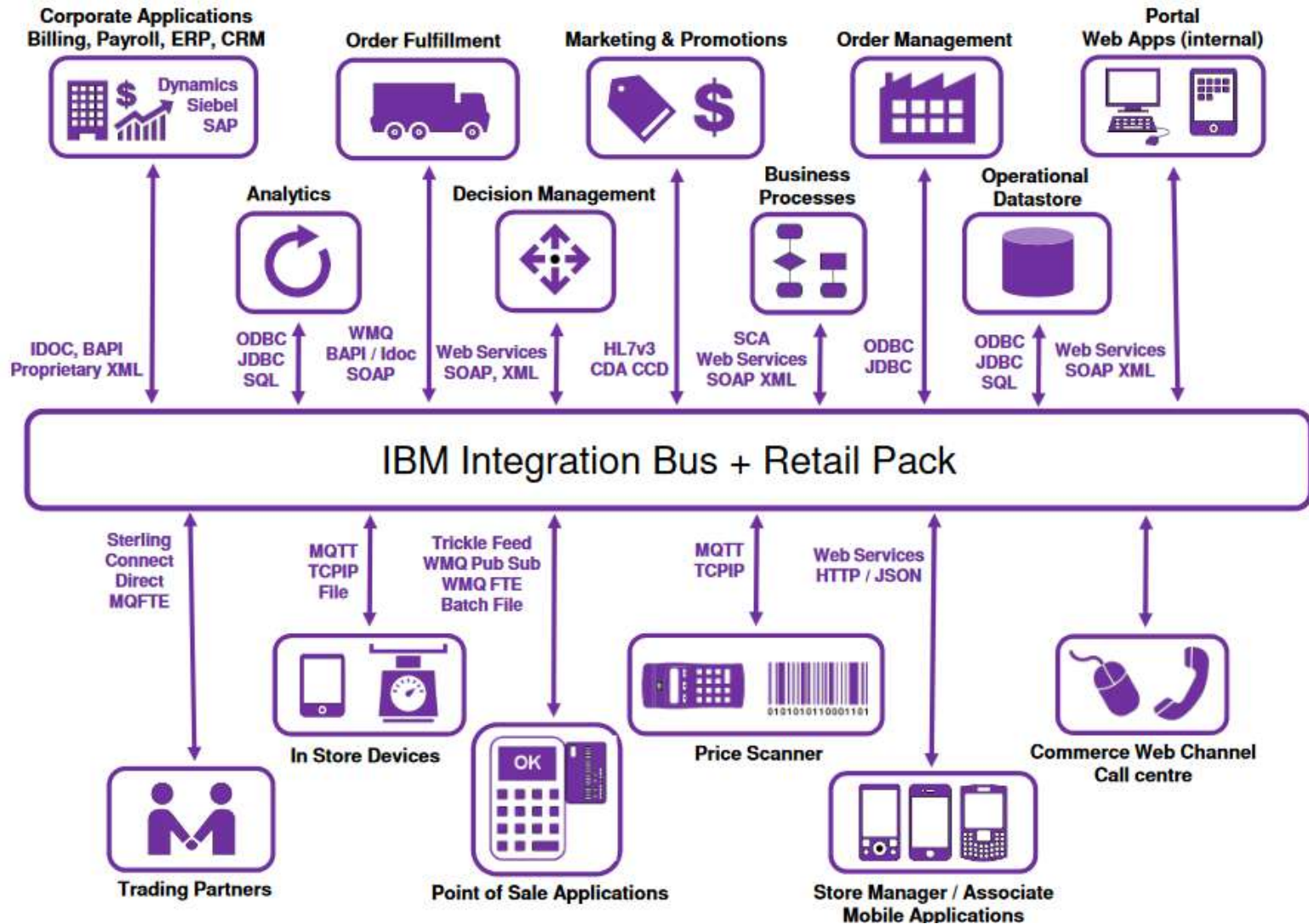


Integration in Retail industry

Targeted Analytics in Real-time



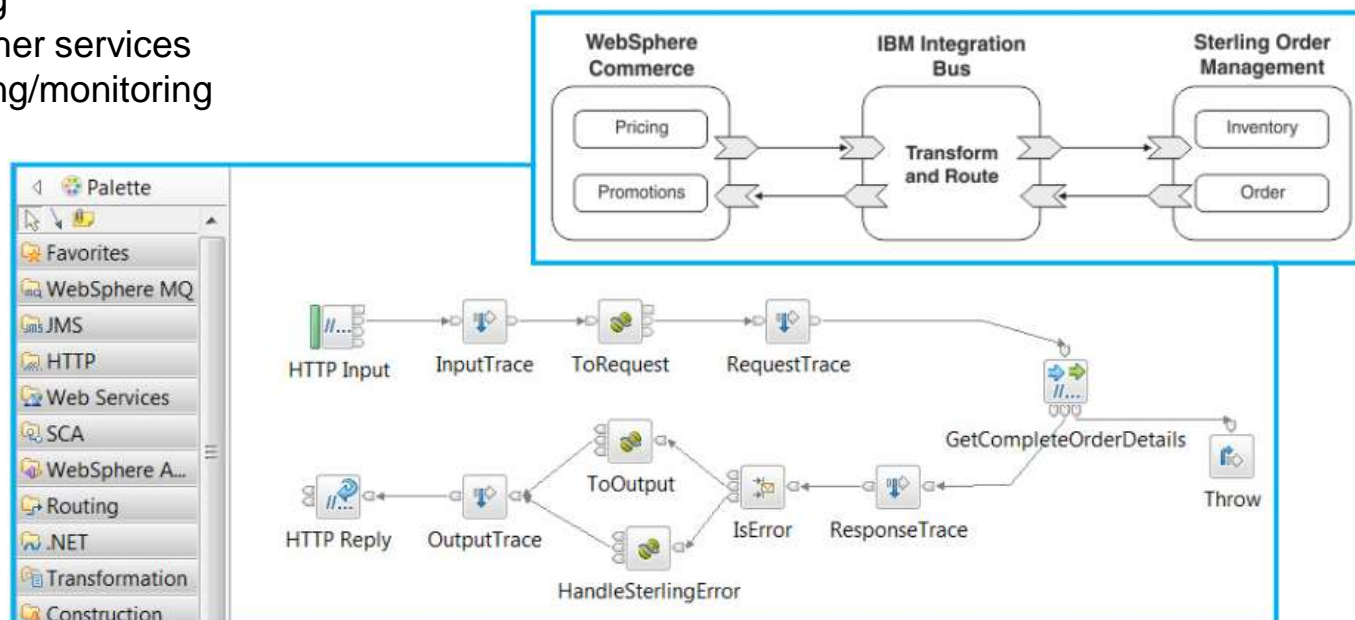
Integration in Retail industry



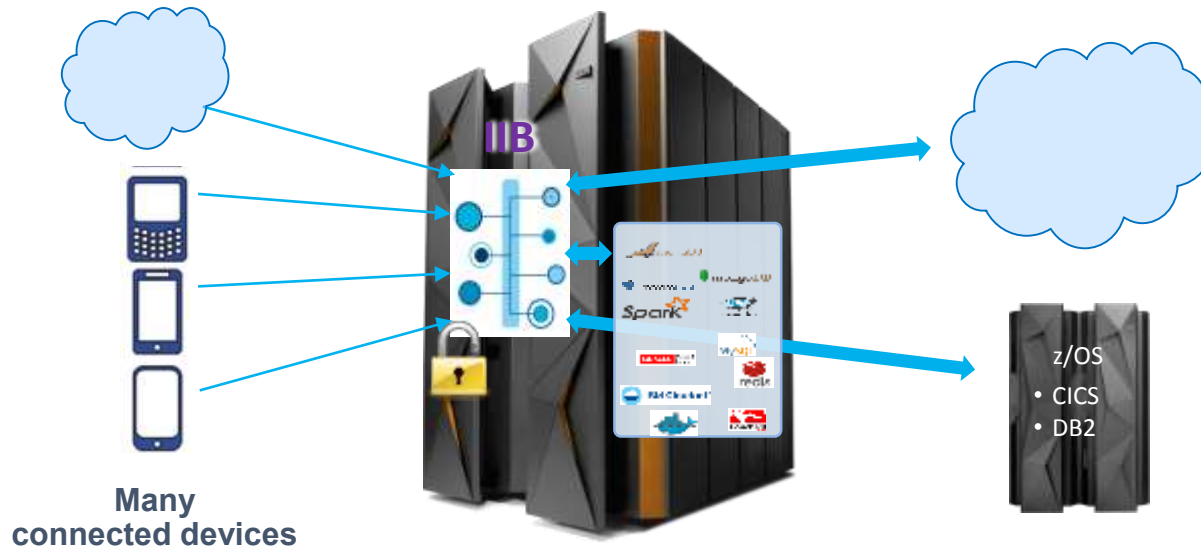
Integration in Retail industry

Example - getCompleteOrderDetails

- Container types:
 - Applications – self contained implementations
 - Services – based off WSDL – specialised applications with an interface and structure
 - Libraries – common utility code or resources
- Message Flows:
 - Data in (e.g. from Commerce), transformation, data out (e.g. to Sterling)
 - Error handling
 - Callouts to other services
 - Logging/tracing/monitoring



Enterprise Integration Hub with IIB



Challenges

- “How do we get information from everywhere, understand it, and act?”
 - development of solutions for end-users, partners, employees
 - industry specific issues: healthcare, energy and utilities, distribution, transport, gaming, etc.

Solution

- **Use IIB for standards based services integration**
 - embeddable, low bandwidth cost, flexible, multi protocol switching, context based routing
- **Use of cross-platform development environments**
 - patterns for existing back-end services
 - CHEF patterns integration
 - runs in Docker containers

Why LinuxONE / z Systems

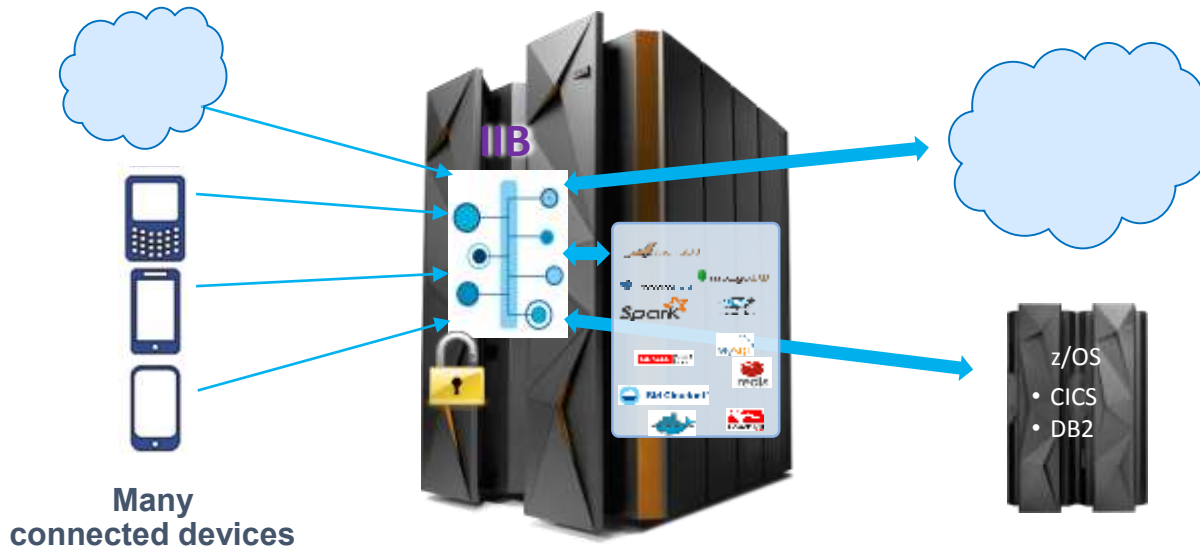
Avoiding typical challenges with services integration

- **Range of devices: one instance for single point of control and integration**
- **Pace of Innovation: simplification and devOps**
- **Security: single point of control for access security**
- **Back-end integration: flexible, co-location, orchestration**
- **Scale and latency: Docker, virtualization, I/O bandwidth, internal network (Hipersockets)**

Used SW:

- IBM Integration Bus (IIB)

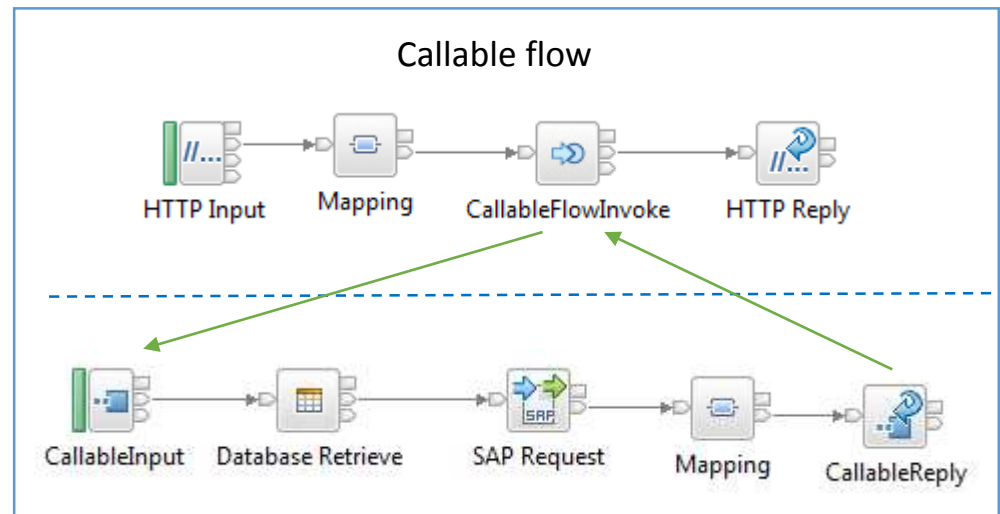
Conditional Enterprise Integration with IIB



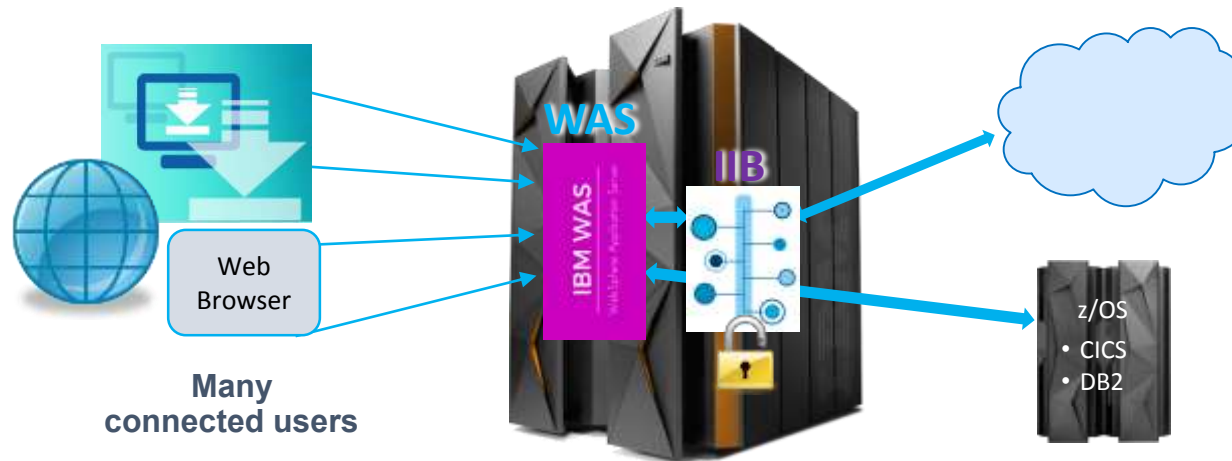
Flow control and callable flows

Control every call with context decision

- **Decision control:** richest type and control can be automated, workload management
- **Security:** can be integrated with LinuxONE and the Enterprise security, Auditing
- **Back-end integration:** flexible, conditional orchestration of different calls
- **Enforce enterprise standards** using Data Format Description Language (i.e EDIFACT,...)
- **Scale and latency:** Docker, virtualization, I/O bandwidth, internal network (Hipersockets)



Web Integration Hub



Challenges

- “How do we access all enterprise information and applications from the Web?”
 - unpredictable spikes of web request numbers
 - standard access to enterprise information from a centralized web access point
 - personalized access for end-users, partners, employees

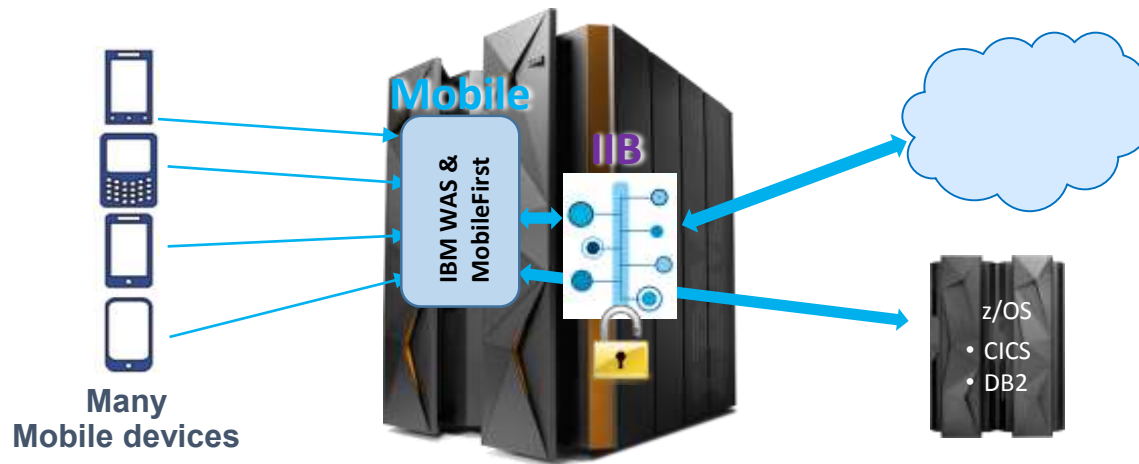
Used SW:

- IBM WebSphere Application Server (WAS)
- IBM Integration Bus (IIB)

Solution

- **Web to standards based services integration**
 - from Web browser to multiple endpoints
 - flexible, multi protocol switching, context based routing
- **Use of IBM Integration Bus capabilities**
 - patterns for existing back-end services
 - flexible integration and routing
 - secured web to cloud integration
 - scalable in containers

Mobile Integration Hub

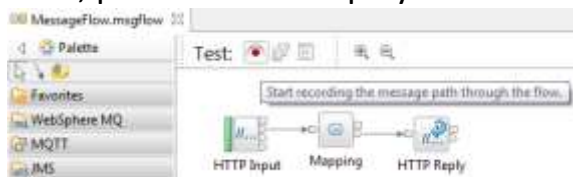


Challenges

- “How do we access all enterprise information and applications from Mobile devices ?”
 - unpredictable spikes of requests from Mobile users
 - easy & standard integration to enterprise information from a centralized Mobile and Integration access point
 - central control of Mobile devices and mobile Apps on all platforms (iOS, Android, Windows Phone, Blackberry)
 - personalized end-to-end secured access for end-users, partners and employees

Solution

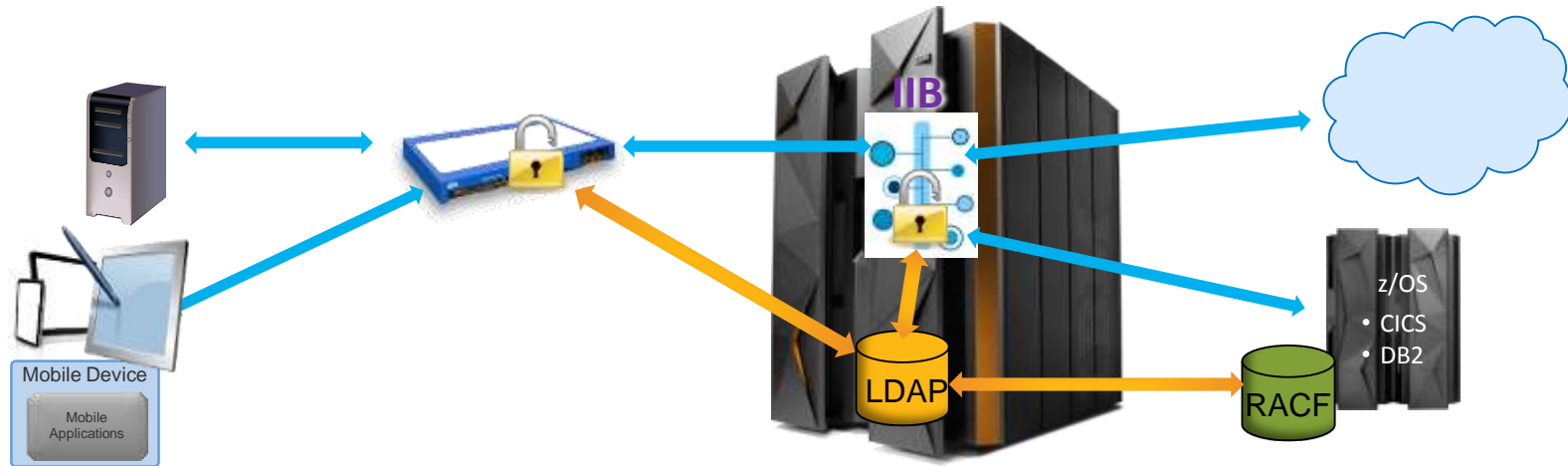
- **IBM MobileFirst Platform Foundation**
 - easy development for all Mobile Platforms with secured back-end integration via IIB
 - high scalability and central control of Mobile devices and Mobile Apps
- **Use of IBM Integration Bus capabilities**
 - patterns for existing back-end services
 - for flexible integration and routing
 - secured Mobile to cloud integration
 - scalable in Docker containers



Used SW:

- Webphere Application Server (WAS)
- IBM MobileFirst server
- IBM Integration Bus (IIB)

Security policy enforcement for IBM Enterprise Integration Hub



Solution

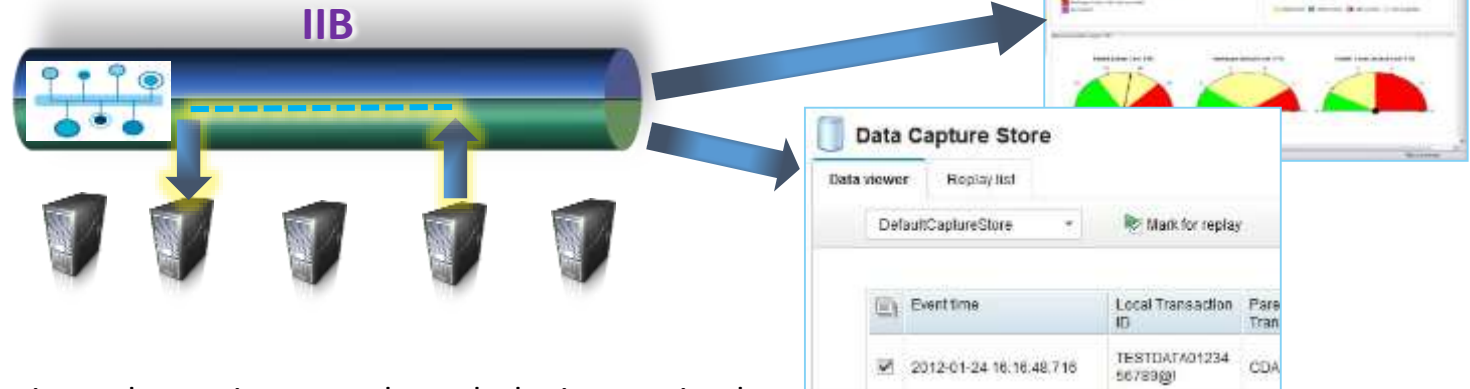
- **Perform security policy enforcement either at security gateway or on request at IIB**
 - Gateway uses strengths of security hardened DMZ appliance
 - Consider whether all endpoints inside the IIB are “trusted”

Used SW:

- IBM Integration Bus (IIB)
- IBM DataPower
- API Connect (with DataPower)
- IBM Security Access Manager (ISAM)
- IBM MessageSight

- **Common usage patterns cast integration technology as a convenient Policy Enforcement Point**
 - **Extract security token from input data**
 - UserID/Password, X.509, SAML, Kerberos, LTPA, OAuth 2.0, RACF pass ticket, etc.
 - **Authorize and authenticate identity through Policy Decision Point (PDP)**
 - LDAP, MS Active Directory, Tivoli Federated Identity Manager, WS-Trust, z/OS SAF, RACF, etc.
- **Conditionally map identities between security domains**

Gaining insight from in-flight business data with IIB



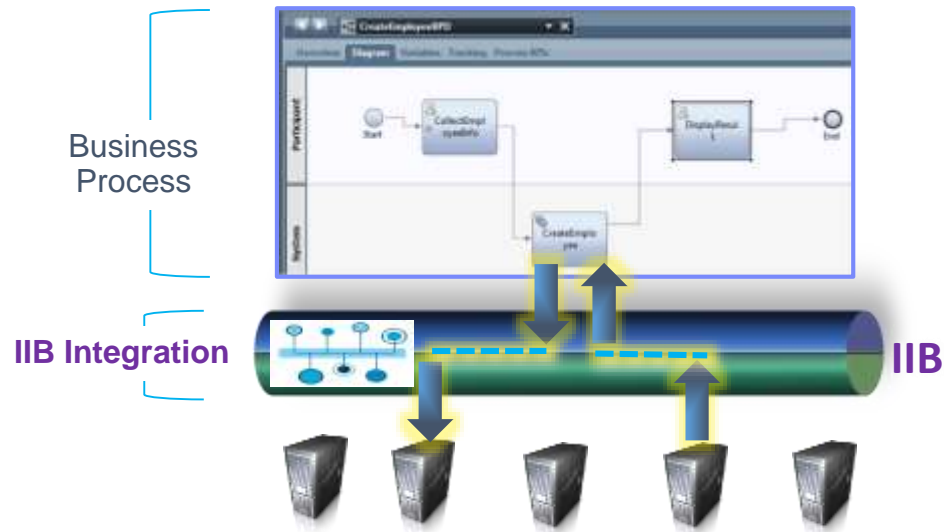
- Make best use of business data as it passes through the integration layer!
 - Typically enabled operationally on the integration server to ensure maximum coverage
 - LinuxONE – integration of Open source data sources and transactional SoR
- Business monitoring
 - Extract important data elements into business monitoring tools to drive KPIs etc.
 - Enable a “system of awareness” across all connected systems
- Audit
 - Extract message payloads to prove delivery or receipt of business information
 - Query stored data based on business relevant fields, e.g. by transaction ID
- Record and replay
 - Replay stored data through the integration server, or direct to back-end systems
 - Enables load and regression testing, and production recovery scenarios
 - Distinguish between successful and failed events, and treat accordingly



Used SW:

- IBM Integration Bus (IIB)

Business Process integration with IIB



- Simplify Business Process Management (BPM) by abstracting business process from integration concerns
 - Business process focuses on the WHAT - and integration on the HOW and WHERE
- Common Usage Patterns
 - Bottoms-up: Integration engine enables business process starting points. Identify event and initiate business process
 - Tops-down: Integration engine receives service request and routes, re-formats, interacts with provider
 - Content and context based routing and integration

Used SW:

- IBM Integration Bus (IIB)

Define and act upon **business rules** with IIB

- Combine integration with Business Rules Management System (BRMS)
 - Adapt faster to ongoing change requirements
 - Reduce load on IT development
- BRMS augments integration engine
 - Augment and transform messages based on business decisions
 - Specify dynamic routing in intuitive business terms
 - Provide business level validation rules for messages
- Integration engine augments BRMS
 - Enrich decision requests with additional data prior to invoking decision
 - Transform Decision requests from multiple sources to a common format to invoke common decision services
 - Enable virtualization of decision services

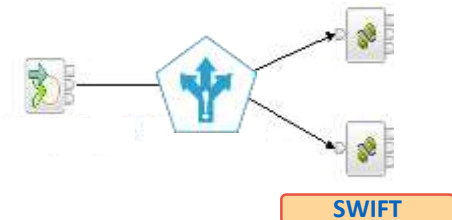
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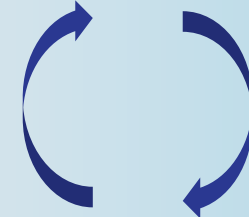
Smart Routing Scenario:

Least Cost Routing for Finance Payments

Integration Flow



Answer:
STET

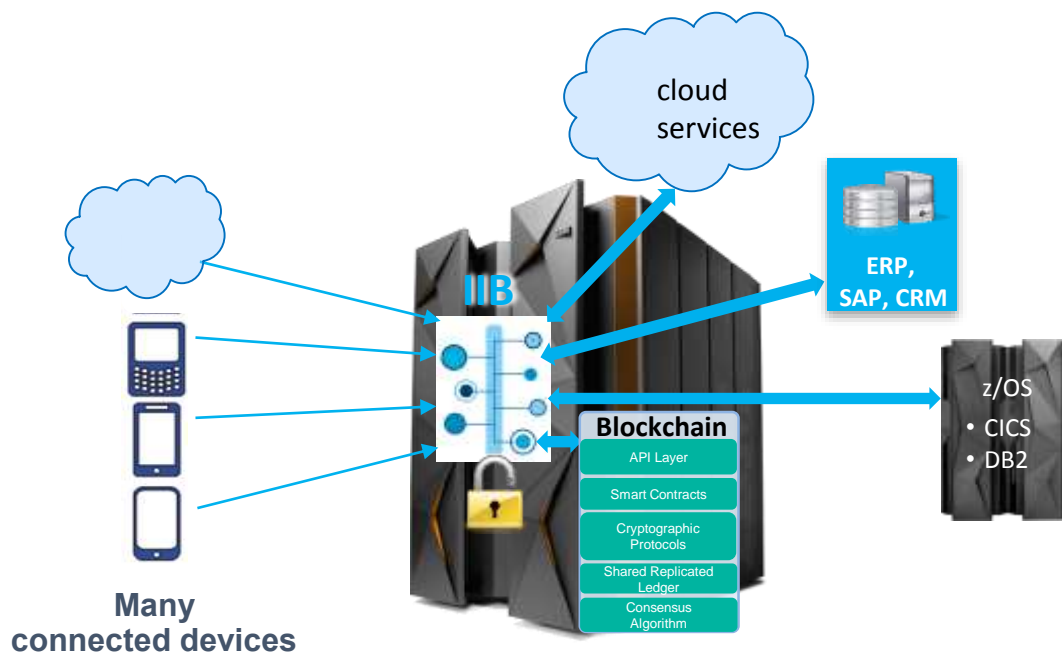


Question:
Least cost
routing?

Business Rules

```
if all of the following conditions are true :  
  - the currency of 'the transaction' is "EUR"  
  - the receiver country of 'the transaction' is "FR"  
then  
  set the CSM of 'the transaction' to "STET";  
  set the priority of 'the transaction' to 0.15;
```

Blockchain Integration Hub with IIB



Challenges

- “How do we integrate Blockchain with ANY System of Record or transactional workloads?”
 - development of solutions for end-users, partners, employees
 - selectively attach transactional workload to different Blockchains
 - securely, audit proof integration and flexibility

Solution

- **Use IIB for standards based Blockchain integration**
 - embeddable, low bandwidth cost, flexible, multi protocol switching, context based routing to different blockchains
- **Use of cross-platform development environments**
 - patterns for existing back-end services
 - flexible integration in Blockchain SSC
 - runs in Docker containers

Used SW:

- IBM Integration Bus (IIB)
- Blockchain fabric

Why LinuxONE / z Systems

Avoiding typical challenges with services integration

- **Range of devices: one instance for single point of control and integration**
- **Pace of Innovation: simplification and devOps**
- **Security: single point of control for end-to-end integration**
- **Back-end integration: flexible, co-location, orchestration, workflow for selective integration**
- **Scale and latency: docker, virtualization, I/O bandwidth, internal network (Hipersockets)**

Summary: The Enterprise Hub on LinuxONE & Linux on z Systems

1. Integration with Core Systems on LinuxONE / z Systems

- Standardize and automate processes
- Integrate & route anything to anything
- Eliminate costly and inefficient point-to-point integration
- Significant cost reductions and efficiency improvements with DevOps

2. Hybrid cloud integration for LinuxONE / z Systems

- Large scalability and proven reliability
- High variety of adapters and protocols – flexibility to connect different IT environments
- Optimize & simplify the IT securely
- Pattern-based development enables to integrate with different cloud services

3. Microservices IIB

- Easily expose REST APIs for seamless integration between your back-end and front-end systems and Microservices to create a new personal, engaging experience
- Fully supports Mobile, IoT, context routing
- Industry patterns for rapid development

4. Protecting dynamic container workloads

- Achieve greater insight over the in-flight data in your business, integrate Open Source
- Integrate with business rules engines to route events based on switches as they occur
- IIB is a secure scalable integration software
- Runs in Docker Containers

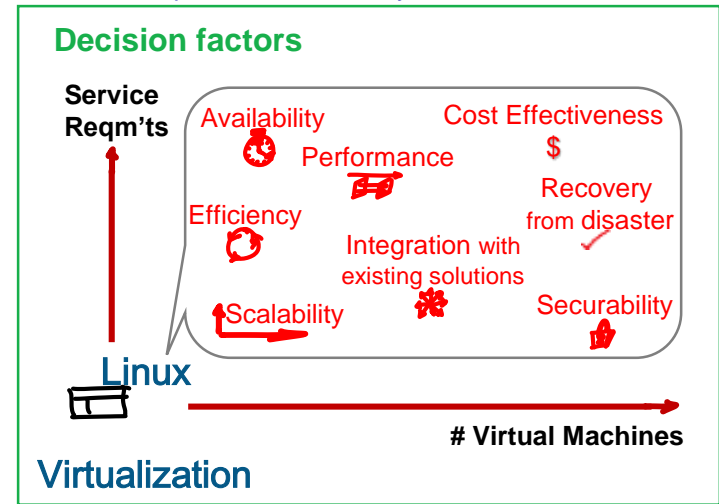


Benefits from LinuxONE & z Systems

- **Operational IT Efficiency**, based on non-disruptive scalability, flexible resource/workload mgmt. and system performance
- **Quality of Service for Resiliency > Availability > Business Continuity**, based on highly securable environment, unparalleled availability with resource sharing
- **Co-location**, providing high performance (cross-memory data transfer) and efficiency, centralized mgmt., all-encompassing DR
- **Economic Advantages**, based on savings for the operation, software licenses, security and DR setup, and energy & floor space

<http://www.ibm.com/systems/z/os/linux>

<http://www.ibm.com/systems/linuxone/>



Error Prevention, Detection, Correction & Recovery



Integrated system design

Security Capabilities

Data Encryption

Security integrated across the

Consistent, based

“Built in”

Secured by design

Security at every level

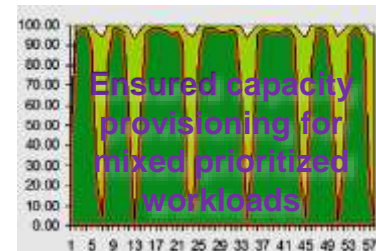
Auditing

Network Security

Spare Core “turned on” without interruption

Multi-dimensional growth & scalability options

Activate capacity on demand



The **Integration Hub** for the **enterprise** requires special capabilities in regard to seamless and non-disruptive scalability, availability and business continuity, cost and operational efficiency.

IBM LinuxONE Community Cloud

<https://developer.ibm.com/linuxone/>

GOAL: Give developers, ISVs and students remote access to LinuxONE & IBM z

ISVs

- ◆ Available for ISV through PartnerWorld
- ◆ Hosted by IBM in Dallas, Boeblingen and Beijing
- ◆ Port, test, benchmark key applications
- ◆ Available Now

Students & Developers

- ◆ Free access to Developers, Students, and Entrepreneurs
- ◆ Hosted by Partnership Universities: Syracuse, Marist and others
- ◆ Get a LinuxONE virtual machine in minutes
- ◆ Available November 2015

Clients

- ◆ Remote access environment free of charge for limited time
- ◆ Client Sandbox for Proof of Concept work to verify and test new apps and try new technologies
- ◆ Available Now

Open Access
**COMMUNITY
CLOUD**

The Open Mainframe Project



<http://www.zdnet.com/article/ibm-and-friends-commit-to-linux-on-the-mainframe/>

Blockchain cloud on IBM LinuxONE



<http://www-03.ibm.com/systems/linuxone/solutions/blockchain-technology.html>



Questions?



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