App Connect Enterprise zCX

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App Connect Offering Management

IBM App Connect Enterprise for zCX on z/OS, Ongoing Innovation

The integration solution of choice for z/OS

MQ
CICS
IMS
WAS
DB2
Batch

Resilience

CICSRequest node for simple CICS program integration using 2 phase commit and Hipersockets

Support for Mirror txns, for QoS, task priorities and more

HTTP. Rest, MQ, Web Services

Co-location
Integrate z/OS sub-systems with ACE close to the source and target, IMS, DB2, CICS, MQ etc
Exploit event driven architectures by emitting data from CICS events & other z/OS systems formatted by ACE zCX collocated on z/OS

Cloud connectors

Integrate data from/to z/OS sub-systems with Cloud applications

Secure Callable integration flow capability across integration servers in different systems. Access to 100's of SaaS smart connectors enabling z/OS integration with Cloud solutions

Connect z/OS sub-systems with multi protocol support. Use ACE to connect, format & encode data from z/OS to Cloud based solutions such as analytics and any other SaaS solution

z/OS Container Extensions is an exciting new capability that is delivered as part of IBM z/OS

V2R4. It is designed to enable the ability to run almost any Docker container that can run on

Linux on IBM Z in a z/OS environment alongside existing z/OS applications and data without

a separate provisioned Linux server.

App Connect Enterprise is now available on an additional platform zCX.

Provides z/OS customers with the ability to deploy ACE integrations as micro-services on the z/OS operating environment.

Close proximity to z/OS sub-systems such as CICS, IMS, DB2, MQ, RACF and others.

Hyper-socket support across partitions, cross memory communications, no cabling.

zCX enables clients to deploy Linux on Z applications as Docker containers in a z/OS system
to directly support workloads that have an affinity to z/OS. This is done without the need to
provision a separate Linux server. At the same time, operational control is maintained within
z/OS and benefits of z/OS Qualities of Service (QoS) are retained.
Linux on Z applications can run on z/OS, so you are able to use existing z/OS operations staff
and reuse the existing z/OS environment.

z/OS Container Extensions (zCX)
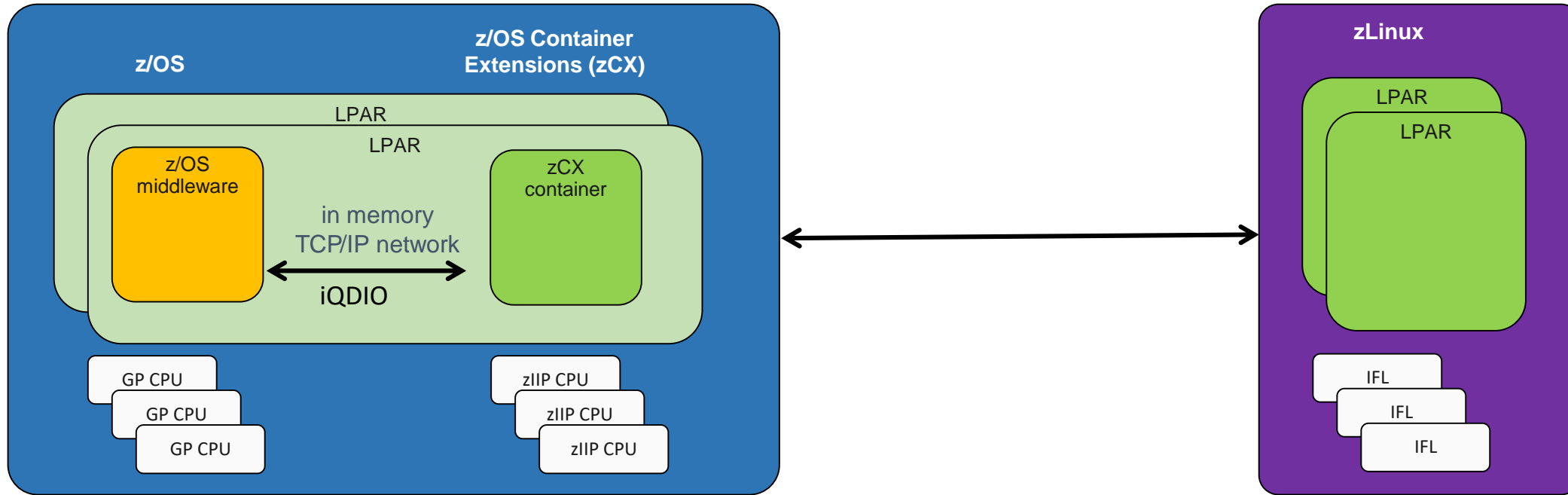
zCX Customer Value:

- ✓ Aligned to z/OS customer skills
- ✓ Deploy Linux on Z software components as Docker Containers in a z/OS system, in direct support of z/OS workloads
- ✓ Close co-location without requiring a separately provisioned Linux server
- ✓ While maintaining overall solution operational control within z/OS and with z/OS Qualities of Service
- ✓ Requires IBM z14 (or later) based server with z/OS 2.4

IBM Hybrid Cloud solutions:

- ✓ There is no need for a recompile to run on zCX, if a product runs on zLinux it will work in zCX (zLinux plans for Base Pak in 3Q)
- ✓ Enables customers to grow their workloads without GP/MLC overheads leaving capacity for core applications; CICS, IMS etc.
- ✓ Enables customers to consolidate workloads and remove server farms of x86

zCX Virtual Docker Server Instances

- **Multiple zCX instances can be deployed within a z/OS system:**
  - Isolation of applications (containers)
  - Different business/performance priorities (i.e. unique WLM service classes)
  - Capping of resources allocated for related workload (CPU, memory, disk, etc.)

- **Each zCX address space:**
  - Has specific assigned storage, network and memory resources
  - Shares CPU resources with other address spaces
    - Can influence resource access via configuration and WLM policy controls

- **A new Hypervisor built using existing z/OS capabilities**
  - The z/OS Dispatcher, WLM and VSM/RSM components manage access to CPU and memory
  - The zCX virtualization layer manages Storage, Network and Console access
    - Using dedicated resources
    - There is no communications across z/OS Linux virtualization layer instances

- **Integrated z/OS Capacity Provisioning and Management**
  - WLM, CPM, adding/removing CPU and Memory resources

Performance: zCX performance is **on par** with running the same applications on zLinux under zVM
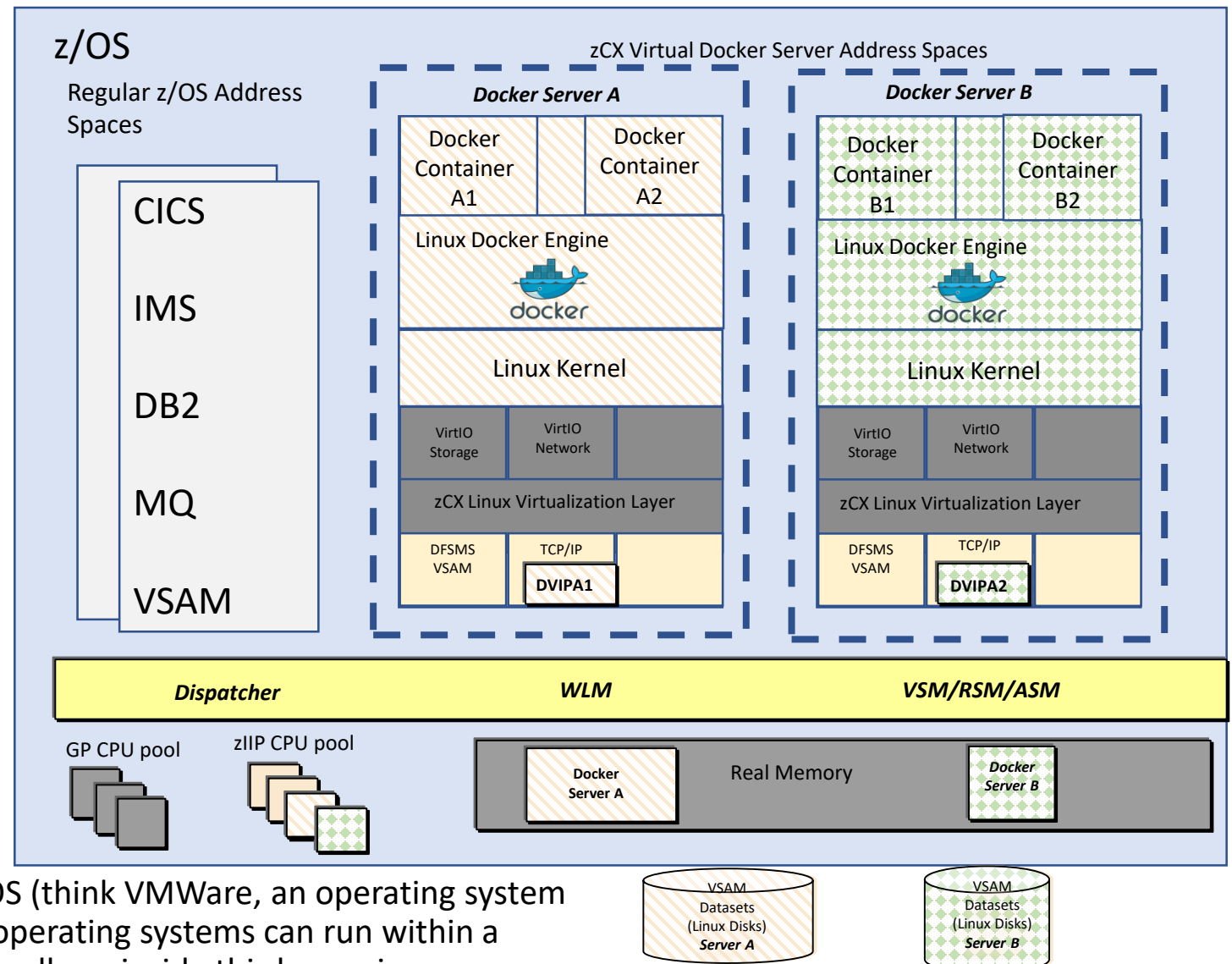
What is zCX: zCX is a type 2 hypervisor running under z/OS (think VMWare, an operating system running inside another operating system) in which Linux operating systems can run within a z/OS address space (process). Ubuntu, CoreOS, RHEL have all run inside this hypervisor, unchanged.

Integration Use Cases:

MQ

✓ **Aspera FASP.IO gateway to accelerate MQ workloads for long distance messaging**
- Gateway running in zCX plus MQ on z/OS running on same LPAR
- Included in zCX Redbook currently being developed (Chapter 3)

✓ **Managing large numbers of client applications accessing the mainframe**
- Use distributed MQ as a client concentrator to a z/OS queue manager (e.g. many MQ JMS apps deployed in cloud environments)
- Also covered in zCX Redbook (Chapter 4)

✓ **Reducing cost of cluster management on z/OS**
- Use MQ zCX as a cluster full repository to a z/OS only MQ cluster
- Separate full repository is best practice and CPU cost associated is now offloadable to zIIP

zCX Redbook:
http://www.redbooks.ibm.com/redpieces/pdfs/sg248471.pdf

ACE

✓ **ACE Container deployments**
- Run Integration Servers stand-alone in containers in zCX within z/OS in close proximity to other z/OS applications
Enable clients to perform CPU intensive transformation on zIIP processors
- Included in zCX Redbook (Chapter 2)

✓ **Host integration flows in close proximity to other z system applications**
- Exploit cross-memory networking from ACE zCX deployed message flows calling mainframe applications using HiperSockets
- Higher levels of security using hardware cypto cards

✓ **CI/CD integration on z/OS container deployments**
- Update and deploy new integration flows as micro-services using common CI/CD pipelines
- Move the same code from test to dev with simple CI/CD processes
- Highly suitable for integration and messages that change frequently

✓ **Common callable micro-services**
Create common callable services deployed as micro-services in containers from CICS, IMS. IIB z/OS and other z/OS subsystems in the same z/OS computing environment

Achieve unparalleled performance on System Z & LinuxONE
Full range to suit every business size

ACE fully supported on z/Linux and LinuxONE offers unparallel Vertical Scaling, Workload consolidation, removes server farms and adds high levels of security

zCX Supported at ACE 11.0.0.8

    Containers on z/OS

        ACE enhancements Sept 18th 2020

            JCL to manage

            SMP/E install option

            ACE bip messages sent to the MVS console

            /p stop, /s start /f modify

            New redbook coming

        Value

        Integration close to z/OS sub-systems

        Security, consolidation, scale up

        In-Memory networking using high-speed TCP communications between partitions (Hiper-sockets, iQDIO)

        z/OS Workload manager policies

    Customers rely on z/OS and directions ahead

IIB 10.x (SoD)

- Let's make it easy for customers on Systems Z
- Deliver IIB 10.x on z/OS
- Update binaries and pre-req levels
- Extend support to 2030 and beyond
- Simple migration, less disruption

Small/Medium/Large
LinuxONE III

Small/Medium/Large
z15

The z15 single frame system requires 75 percent less floor space than x86 servers	1 trillion secure web transactions per day **2M+ containers tested**	190 configurable cores and up to 40 TB memory	Scale with up to 2.4M containers on a single system	Secure container / Kubernetes based solutions on IBM Z or LinuxONE private and hybrid clouds

ACE additional entitlements
For every VPC of ACE purchased, get 500K iPaaS flows per month to connect SaaS systems to your mainframes. Up to a maximum of 10M flow runs per month for free.

Docker on zCX vs distributed platforms

Sample JCL

- **BIPXBLD** - Sample job to build a Docker image to run an integration server..
- **BIPXCLIS** - Sample job to run the console listener program.
- **BIPXDBG** - Sample job to debug the integration server Docker container.
- **BIPXDLI** - Sample job to load a Docker image from a .tar archive on z/OS UNIX System Services.
- **BIPXDSP** - Sample job to run a Docker system purge to clear space on the zCX instance.
- **BIPXGET** - Sample job to copy or move a file from a running integration server Docker container to UNIX System Services.
- **BIPXIS** - Sample job to run an integration server in zCX and display its logs.
- **BIPXISCM** - Sample job to run an integration server runtime command.
- **BIPXISTP** - Sample job to stop the integration server or to stop and remove its container, or remove the container without stopping it.
- **BIPXPUT** - Sample job to copy a file from UNIX System Services to a running integration server Docker container.

- zCX docker images need to be built for s390x architecture
  - Most products already available
- With zCX operational control is maintained within z/OS and containers run with z/OS qualities of service e.g.
  - TCP/IP communication via high speed SAMEHOST networking to processes running on same LPAR
  - All the capabilities z/OS provides through VSAM and the TCP/IP stack to enable encryption, disaster recovery, and dynamic workload relocation available to zCX
  - Workloads in zCX can benefit from high availability and DR planning via features like IBM HyperSwap, storage replication, and IBM GDPS
  - zIIP eligible
  - No IFL like for zLinux
  - Removes x86 server farms

Integration vendors questions

Other Integration Vendors:

Other vendors may well be good at initial projects by focusing on simpler integration scenarios

A typical scenario may be integrating Web Services or JSON API's across HTTP with a data base, showing intuitive tools.

However they may struggle with:

Performance without a lot of additional servers and services

This matters for cost, management, flexibility, Hardware etc

Extend to more complex integration points

May not be able to extend, meaning additional product requirements

May need custom code, unproven, high risk, potential lock-in

Often coding vs configuration

May not have flexible deployment options

Cannot easily move from an On-prem to a Cloud or move to a container deployment

No flexibility of operating systems and hardware choices

No option for Hybrid integration

Initial Project costs

May look a cheaper solution but is it when S&S is added over a term, is it when extended to other projects

Reliance on 3rd party adapters

Is the integration solution reliant on additional adapters or other plug-in technology not owned or supported by the integration vendor. These can cause bottlenecks in performance, additional management & monitoring tools as well as delays in getting issues addressed.

Trusted partner in enterprise integration around the world and across all industries

~2000
customers in production

600+
Healthcare & Life Sciences companies

21	of the top 25 insurance companies		**50**	of the top 50 global banks
23	of the top 25 US Retailers		**20**	of top 20 global comm service providers
90%	of global credit card transactions		**80%**	of all worldwide airline reservations
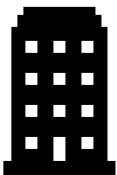
IBM ACE is optimized for multi/hybrid deployment

Run in any location or cloud, exactly as you need it

1. **Customer managed**
   Licenses from IBM can be installed in any environment of the customers' choosing

2. **Public Service**
   Multi-tenant, fully managed service (including hybrid license)

3. **Reserved Instance**
   Single tenant, fully managed service

4. **Red Hat OpenShift Kubernetes Services (ROKS) provided as a managed platform on all cloud vendors with simple container-based deployment**

5. **IBM Satellite**
   extends IBM Cloud services to other hybrid and multi-cloud locations delivered as a service from a single pane of glass controlled through the public cloud

On-premise, software

Run yourself in public or private clouds

Let IBM host for you

CP4i

AWS

Azure

IBM Cloud

IBM Cloud

RED HAT OPENSHIFT

docker kubernetes vm

Linux	AIX
Windows	zLinux
LinuxOne	zCX
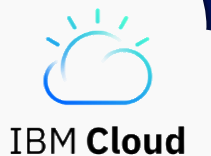
Built and Optimized - for Non-Intrusive Integration

Fastest Performing Integration Flow Engine	High-Performance optimized parsing and transformation technology	Built in Messaging Integration	Built in Accelerators
High Availability across processes, servers, systems and hardware Built-in optimized caching. Workload Management and Transaction Monitoring. No need for JEE infrastructure	Comprehensive mapping including high-performance graphical mapper. Graphical DFDL parser creation including interactive testing. C based parsers for high performance and memory optimisation	Includes IBM MQ Native JMS and Kafka / Event Streams Extensive Sync, Async and Transaction (XA) support. Queues, Topics, Events, Streams. MQTT and IoT. Plus all of the out of the box protocol support by configuration, high performance parsing	Patterns, Templates and over 70 Samples and Tutorials Wizard-driven pattern integration generation. Optimized integration language (ESQL) Multi-Language Support e.g. Java, C, .net.. DFDL Optimized Parsing and OffLine Interactive Data testing DB Schema discovery

More details on performance improvement reports

ACE zCX

zCX supported from ACE Fixpack 8.

Key zCX use cases from an ACE perspective:

✓ **ACE Container deployments**
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✓ **Common callable micro-services**
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IBM z/OS Container Extensions (zCX) use cases

http://www.redbooks.ibm.com/redpieces/pdfs/sg248471.pdf

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For every VPC of ACE purchased, entitlement to 500K iPaaS flows per month to connect SaaS systems to your mainframes. Up to a maximum of 10M flow runs per month for no extra licence cost

IBM Confidential

Connectivity & Transformations Powering the Innovations in an Enterprise

Content Services Platform
Box
IBM FileNet
MS SharePoint
CMIS
MS One Drive
Confluence
Dropbox
Google Drive
Google Sheets
Salesforce Files
Salesforce Libraries
WordPress

Cloud Storage
Amazon S3
IBM Cloud Object Store

Technology Endpoints
HTTP
SOAP
LDAP
MS Active Directory
Website Crawler
SFTP
Open API
IBM Maximo
Siemens Teamcenter

Cognitive & AI
IBM Weather Data
IBM Watson Language Translator
IBM Watson Discovery
IBM Watson Natural Language Classifier
IBM Watson Tone Analyzer
IBM Watson Visual Recognition

Databases
IBM Db2
Oracle DB
MS SQL Server
My SQL
IBM Cloudant
Redis

Human Capital Management
Workday
Kronos
NetSuite Suitepeople HCM
Peoplesoft
IBM Cloudant
Redis

Customer Relations Management
Salesforce
MS Dynamics 365 for Sales
Sugar CRM
NetSuite CRM
Oracle Sales Cloud
Zoho CRM
Insightly
Intactt
HubSpot
Infusionsoft
Apttus

IT Service Management & Project Management
Service Now
Salesforce Service Cloud
Jira
Oracle Service Cloud
Zendesk
Fresh desk
Act-on
Asana
Trello

IBM Food Trust

Enterprise Resource Planning
SAP
Workday
NetSuite ERP
Coupa
Zuora

Banking & Finance
MS Dynamics F&O
NetSuite Finance
Yapily
QuickBooks Online
SAP Concur
Stripe

Enterprise Messaging
IBM MQ
Kafka
Amazon SQS
Amazon SNS

E-Commerce
Shopify
Magento
Big Commerce
SAP Commerce Cloud
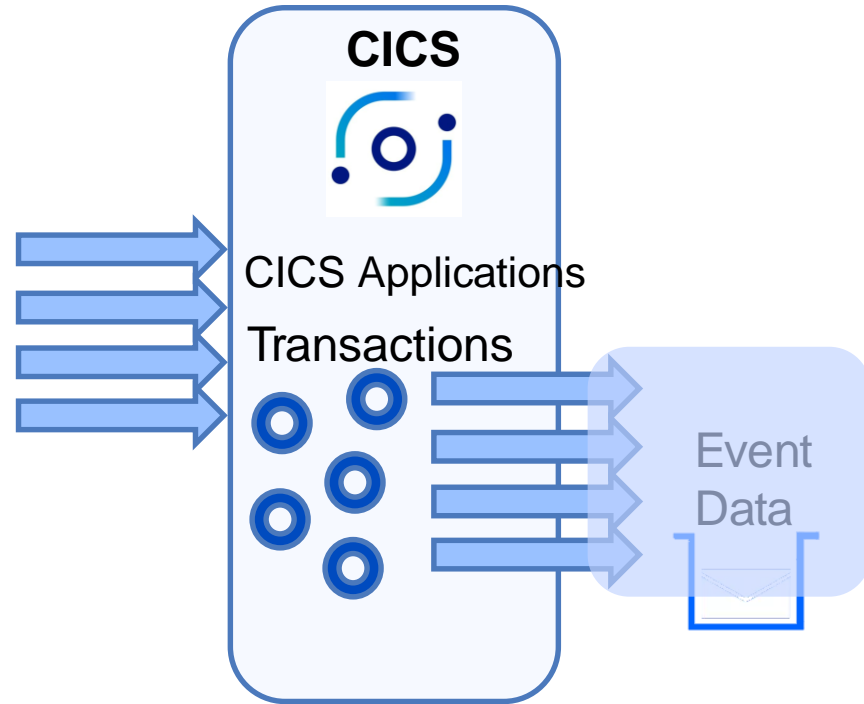Salesforce Commerce Cloud

Marketing
Marketo
Google Analytics
Salesforce Marketing Cloud
Salesforce Pardot
Eventbrite
Infusionsoft
Mailchimp
Wufoo
Acoustic Campaign

Collaboration & Communication
MS Exchange
MS Office 365
Domino
Cisco WebEx Teams
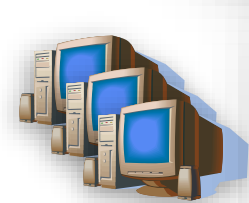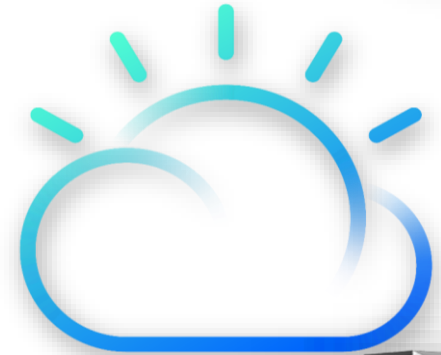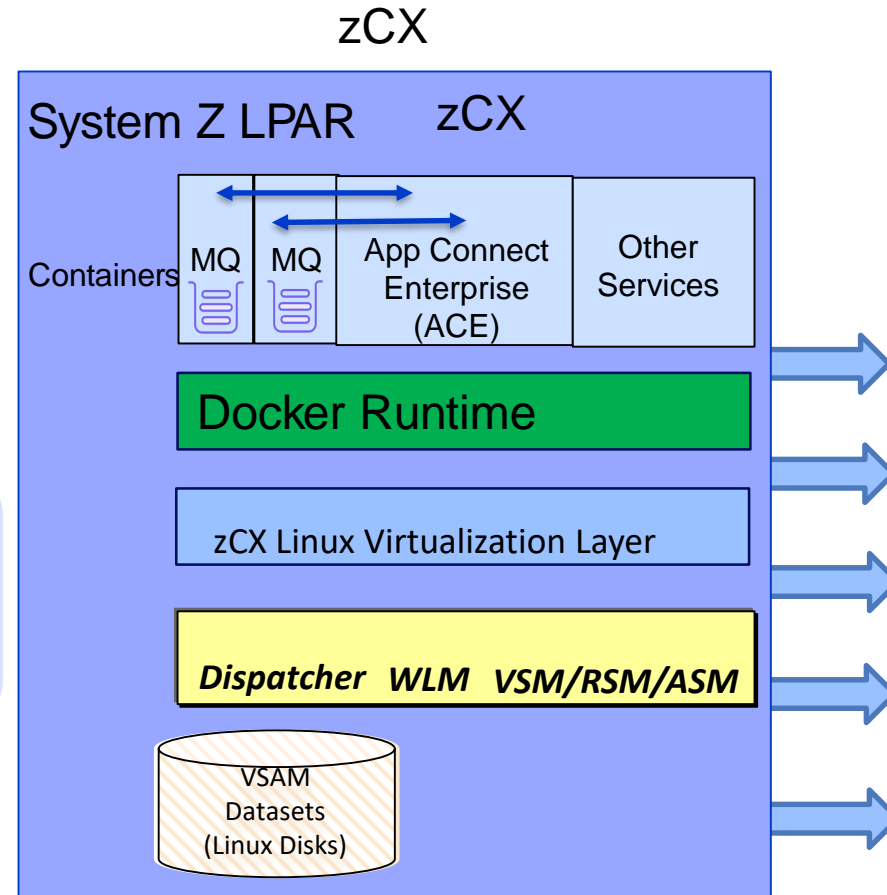Slack
Gmail
Twilio, Twitter
Email

What are Events

A call to a help desk
A sale is made
A pin number is changed
A delivery is made
An inquiry is made on a product
A customer's address is changed
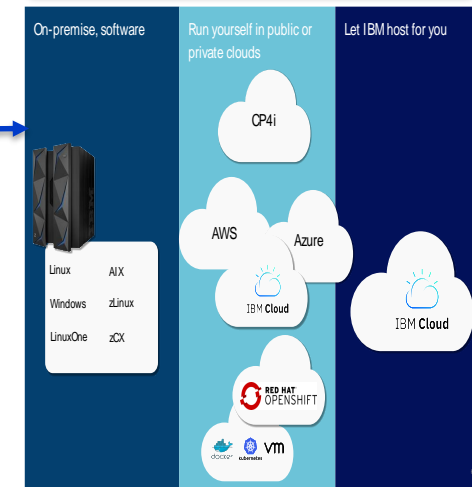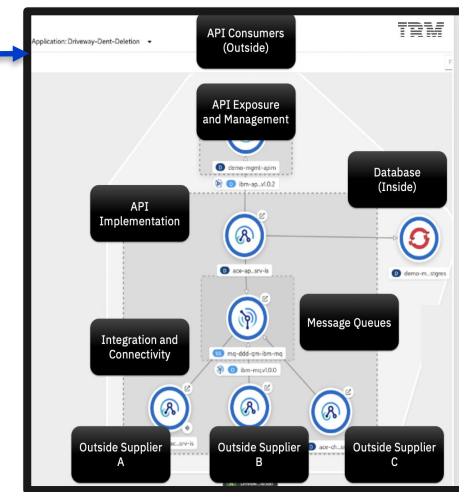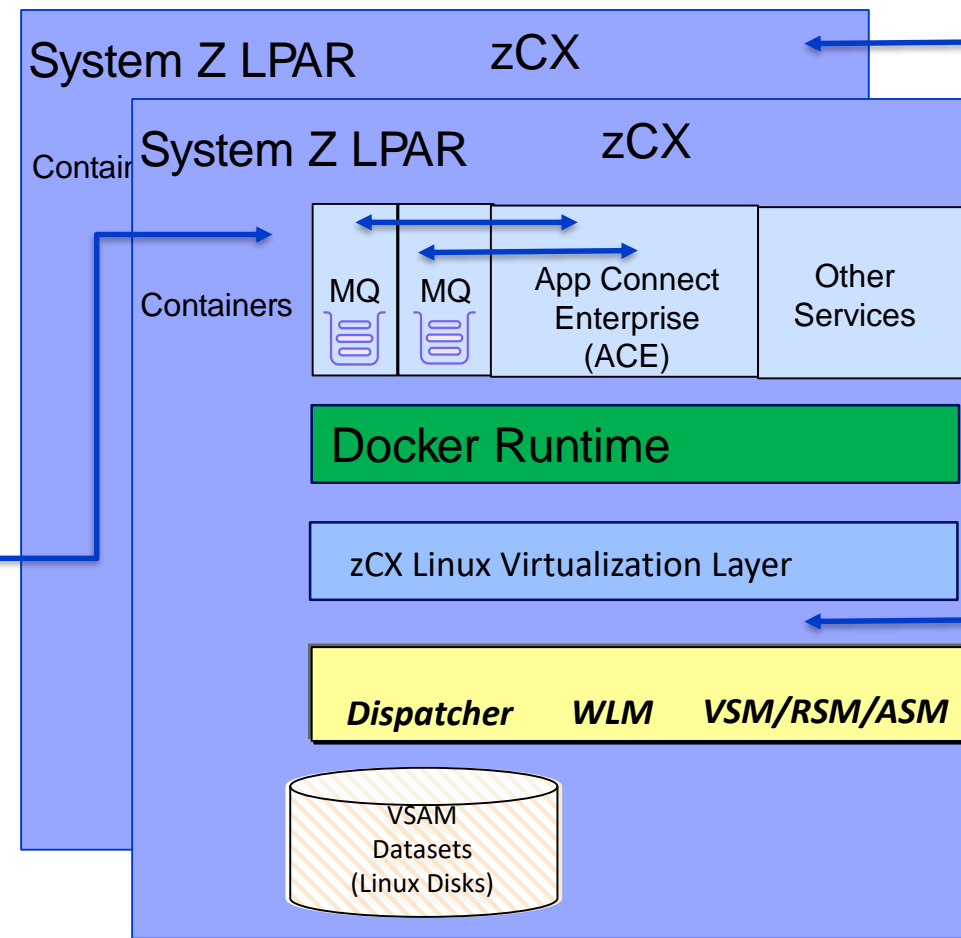*An ATM event happens*
Almost anything

Security
Scale
Reliability
Agility
Transactions

Events scenario

zCX

CICS

CICS Applications

Transactions

Event Data

System Z LPAR   zCX

Containers | MQ | MQ | App Connect Enterprise (ACE) | Other Services

Docker Runtime

zCX Linux Virtualization Layer

Dispatcher   WLM   VSM/RSM/ASM

VSAM Datasets (Linux Disks)

End to End Events

System Z LPAR

System Z LPAR   zCX

System Z LPAR   zCX

Containers

| MQ | MQ | App Connect Enterprise (ACE) | Other Services |

Docker Runtime

zCX Linux Virtualization Layer

Dispatcher   WLM   VSM/RSM/ASM

VSAM Datasets (Linux Disks)

MQz

CICS dynamically generates events with little to no overhead. Non-intrusive if EXEC CICS interface used.
If not then can insert SIGNAL EVENT a minor intrusion.
Pushed to MQz for high speed secure asynchronous deposit of data.
MQ on zCX used as a channel for draining the queue, ACE zCX reads the queue data, formats the data for the destination system
Persisted and encrypted for no data loss and secure end to end

Use custom written app:
Could increase MIPS causing costs of 3rd party s/w to increase. Hard to maintain, reliant on developers.

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New records created in Salesforce and need to update CICS via an MQ queue or CICS node using custom formats

iPaaS/CP4i
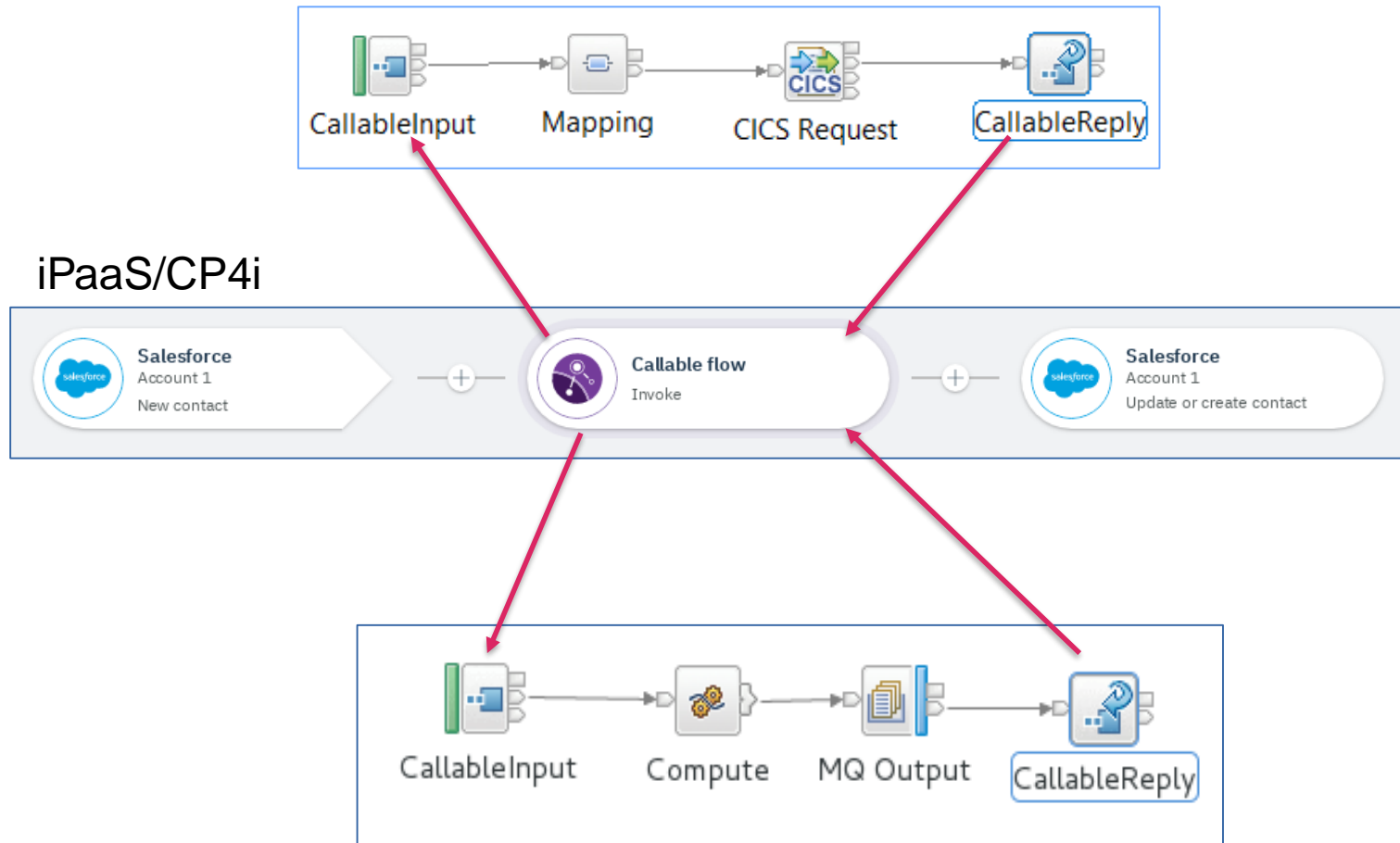
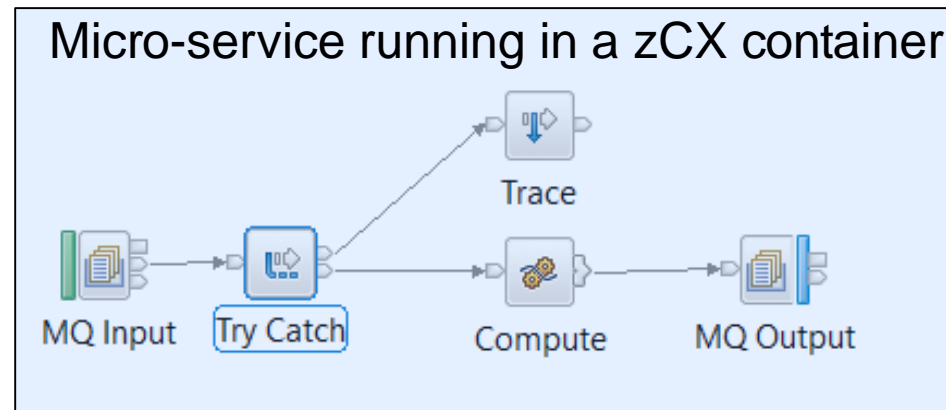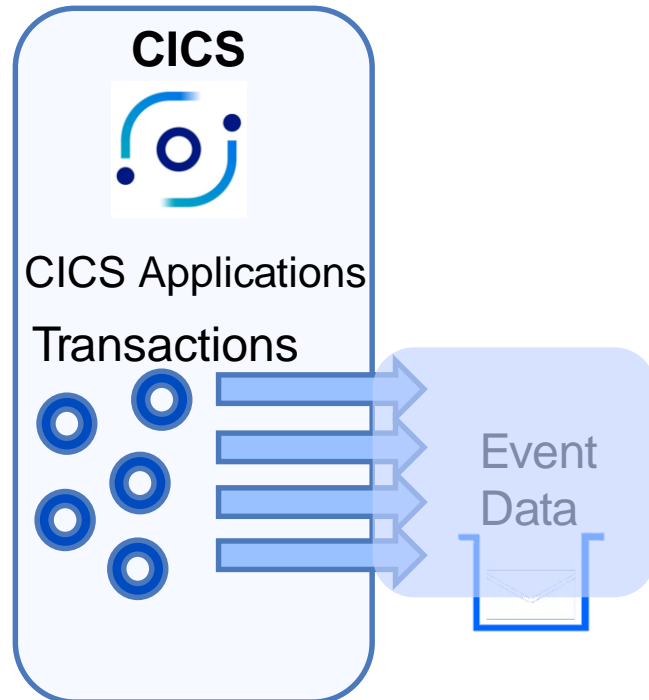2 types of integration flows can be used to integrate Salesforce with CICS, one requires MQ one doesn't.

1. Salesforce passes messages from Salesforce to ACE, appropriate formatting of the data in ACE, ACE then calls CICS via the ACE supplied CICS node & sends the data to CICS.

2. Salesforce passes messages from Salesforce to ACE, appropriate formatting of the data in ACE, ACE then sends to MQ either via MQ server channels or via MQ Client channels. CICS consumes the data via the CICS MQ "adapter".

Note: *There are other options such as using Web Services or REST API's both into CICS from ACE*
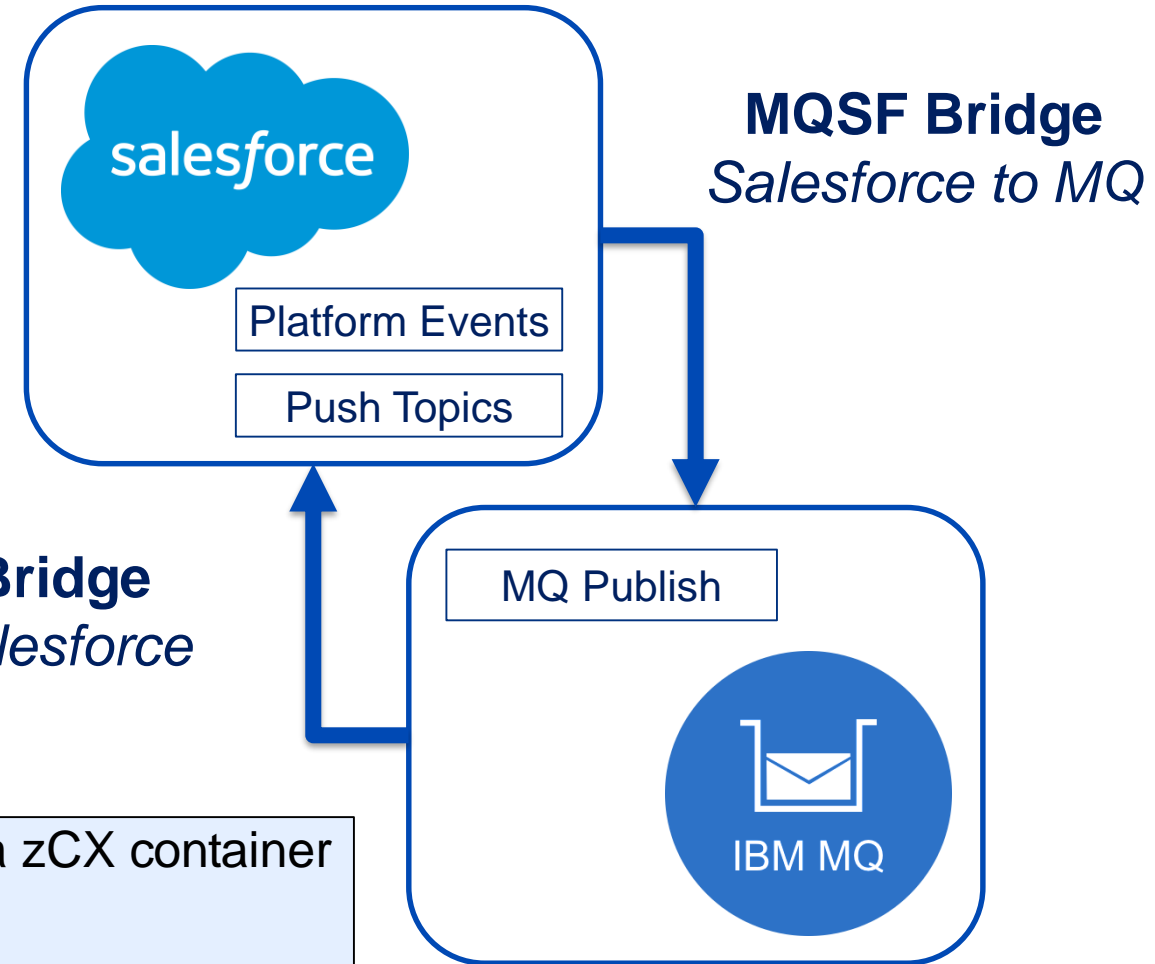
Using Streaming events with MQSF

IBM MQ Provides bi directional bridge capability to connect your MQ applications

- Directly connects to Salesforce Streaming API

- Subscribes and publishes on Salesforce Push Topics and Platform Events

- Maps events to MQ topic structure

salesforce

Platform Events

Push Topics

MQSF Bridge
Salesforce to MQ

MQSF Bridge
MQ to Salesforce

MQ Publish

IBM MQ

CICS

CICS Applications

Transactions

Event Data

Micro-service running in a zCX container

Trace

MQ Input   Try Catch   Compute   MQ Output

Understanding unique characteristics of an integration application
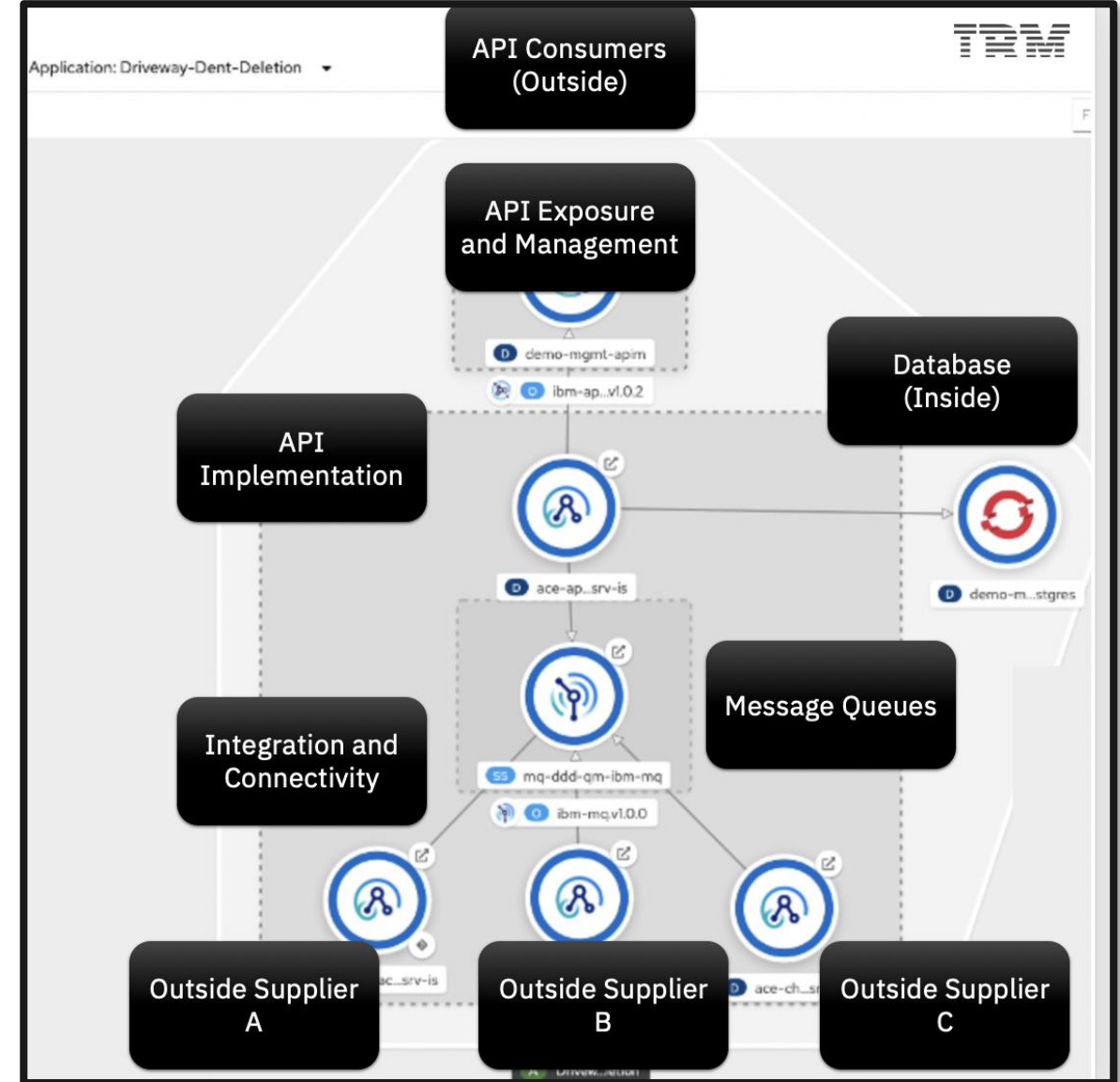
How the IIB / ACE architecture has evolved to embrace containers

BAR — Flow

Admin Web UI

HTTP Listener

Node

Process Supervision

Internal Cfg Store — Configurable Service

Physical/ Virtual Machine

v10

UNZIP and GO !

BAR — Flow | Policy

Admin Web UI

HTTP Listener

Public Cfg Store — Flow | Policy

Container

v11

BAR — Flow | Policy

Admin Web UI

Node

Process Supervision

Physical/ Virtual Machine

Public Cfg Store — Flow | Policy