IMS Ecosystem: Beyond transaction manager, database and tools

Jim Porell
Rocket Software

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Session HG

DREAM BIG… MAKE IT HAPPEN

CUSTOMERS, IBMERS AND THE WORLD SHOULD SEE:

That the mainframe is already hybrid. It requires a System of Engagement (SoE)

User Interface: Mobile, PC, ATM, PoS, IoT, etc

That development within existing mainframe applications is desirable

Using consistent & open tools with other platforms

Exploiting SoE via APIs (avoiding wrappers & proxies)

That they can leverage the value of data management, virtualization and analytics

That they should breakdown organizational barriers to success

With a holistic view that improves DevOps, security, resilience, latency, and costs across all IT

…and this LEGACY POWERS LEGENDARY

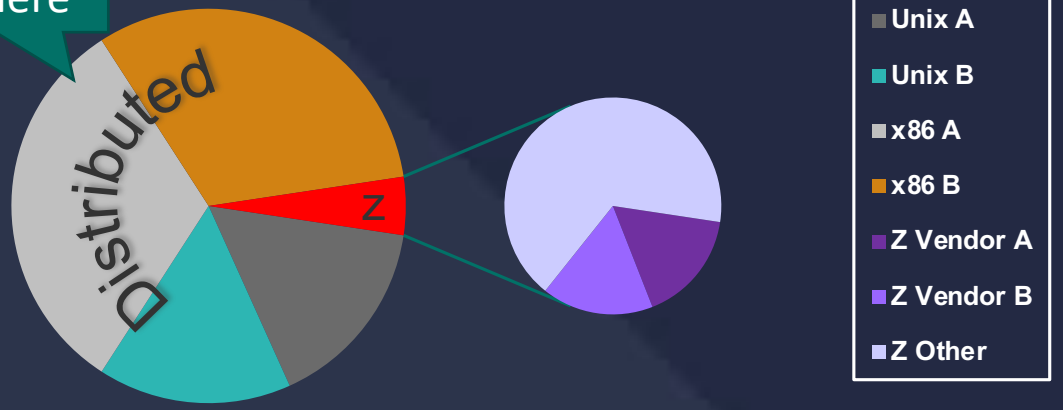
AGENDA

- Growth Objective Opportunities
- Pain Points
- Where Growth Can Come From
- Development Goals
- Virtualization and Visualization
- New Face of z/OS
- Analytics, AI and Operations
- Security
- Summary

HOW CAN GROWTH IN MAINFRAME MIPS BENEFIT A BUSINESS?

Shadow IT Lives here

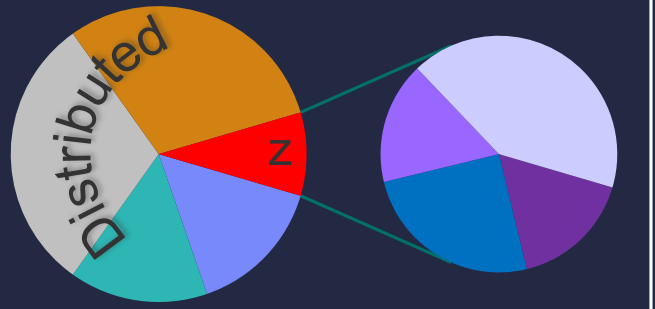
Mainframe Opportunities
Fill & Grow the Z Other Space

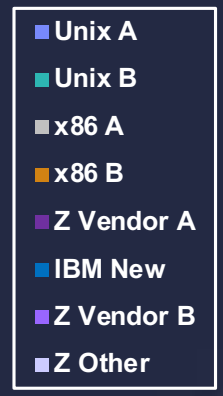


New Z revenue for most vendors comes from competitive replacements from other vendors. Net is same amount of spending on mainframes or slightly less. No impact on Distributed spending.

Shadow IT: Things that a business feels the mainframe may be incapable of doing.
Typically involves copies of data with modern applications and user interface

Goal: Grow Z HW MIPS
Grow Z SW MIPS
Grow ISV MIPS





- Improve Security and Resilience
- Improve Latency
- Reduce IT Complexity
- Provide Investment Protection for the Future
- Reduce Overall IT Spend

Spending comes through “hybrid capabilities”. Money is taken from the distributed side to lower the over all IT spend, while growing mainframe business.
Reduce Shadow IT

WHY DO HYBRID Z PROJECTS FAIL?

Mainframe IT in Charge

- “Old” skills reluctant to learn or make changes

Politics: Silo’ed Operations Models

- ”I’m in charge” and refuse to collaborate across silos

DevOps

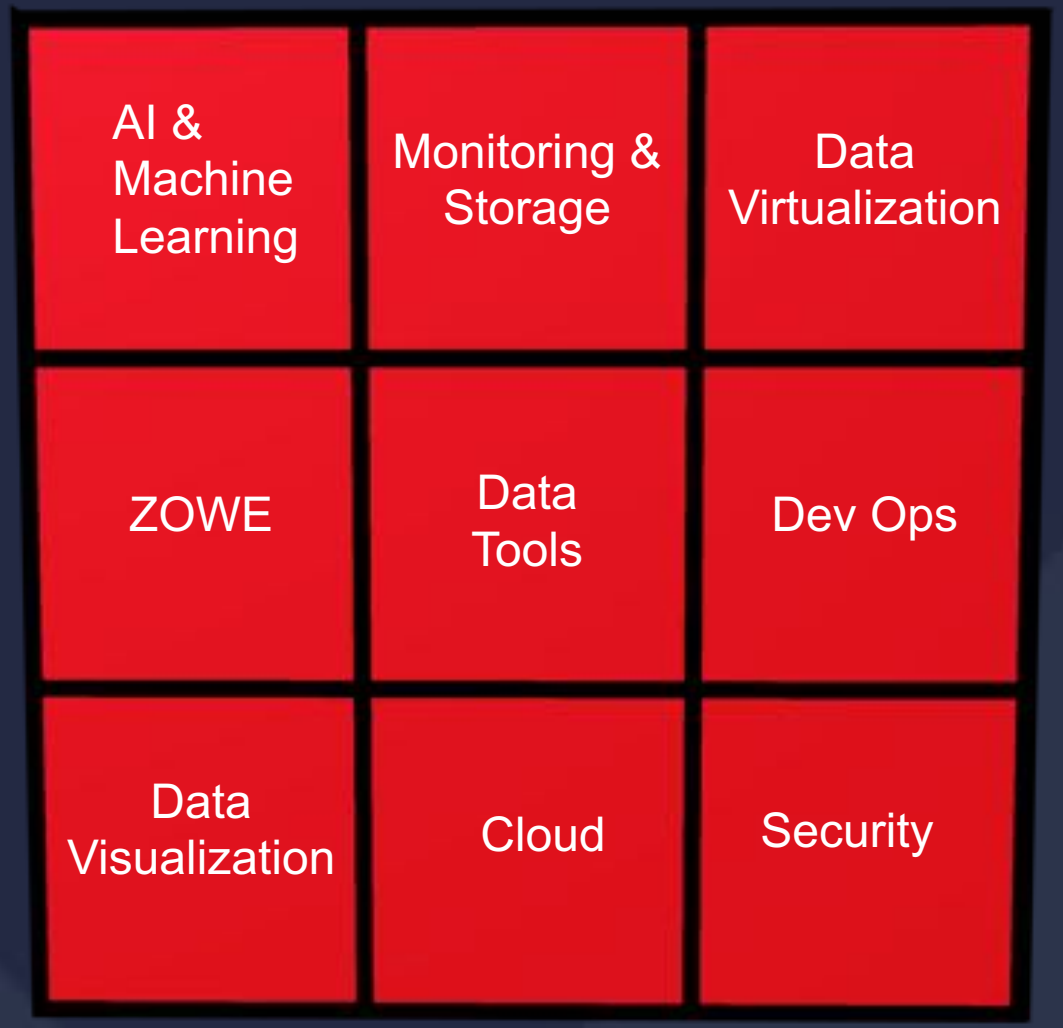
- No sandbox for creating/testing new hybrid apps
- Compare full price for mainframe software which is non-competitive with other development environments

GROWTH FOR MAINFRAME ENVIRONMENTS

- **Database Access**
  - API's for direct access to data
  - Improved ETL operations/alternatives
- **Transactional Access**
  - API's to existing transactions
  - Leverage other data within existing transactions
- **DevOps**
  - Integrating tools for full life cycle
  - Improved Price Sandbox
- **Analytics**
  - All data participates
  - Visualization is consistent
- **End User Interface**
  - Consistency across platforms
- **Operations**
  - Open Mainframe ZOWE lowers skills
  - Leverage mainframe to manage other systems and data types

ALL AREAS ARE RELATED – REGARDLESS OF CENTER SQUARE

- Need to relate each cube element to IBM key initiatives
  - Regardless of brand
- Need to express directions around all elements of the cube
- Applies to hybrid IT systems
- Includes other elements:
  - High Availability
  - System Latency
  - System Integrity
  - End user interface



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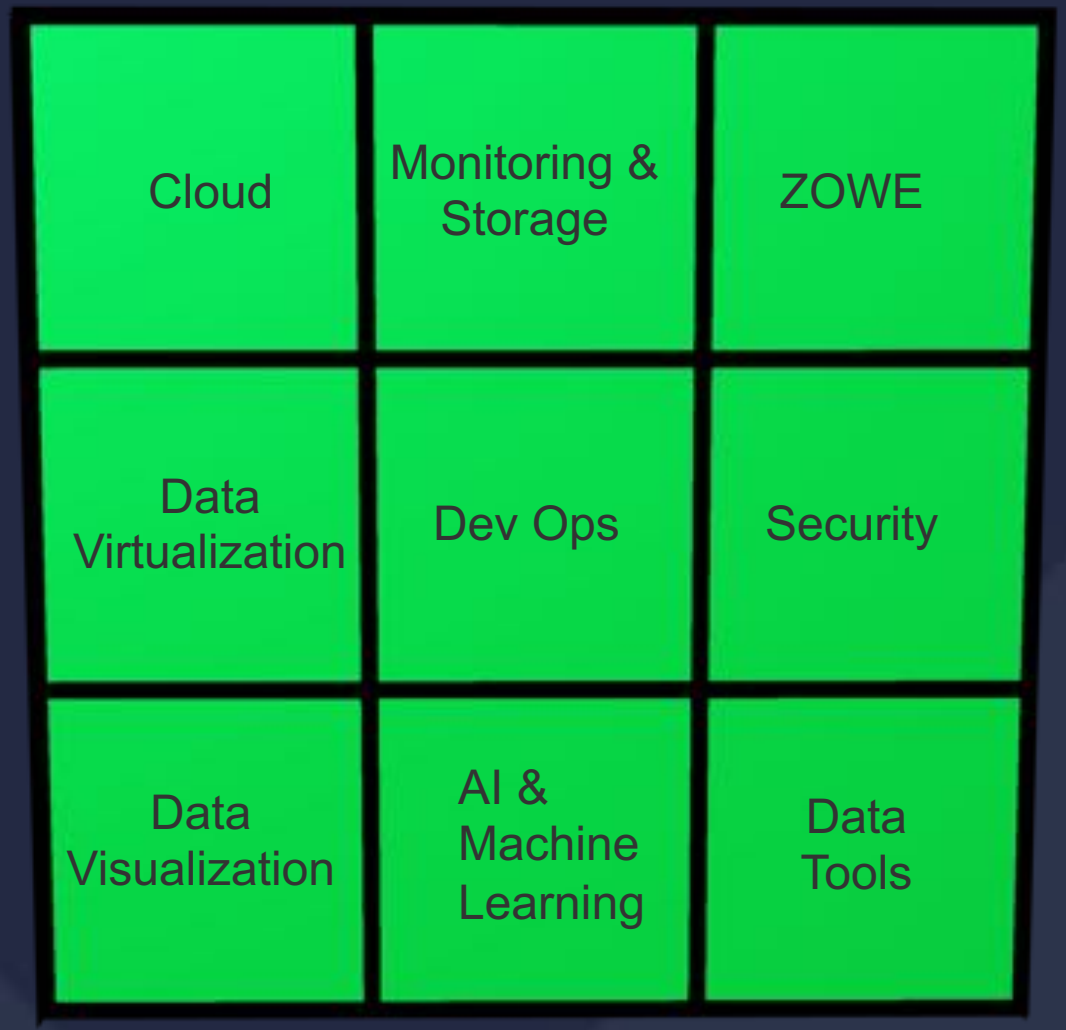

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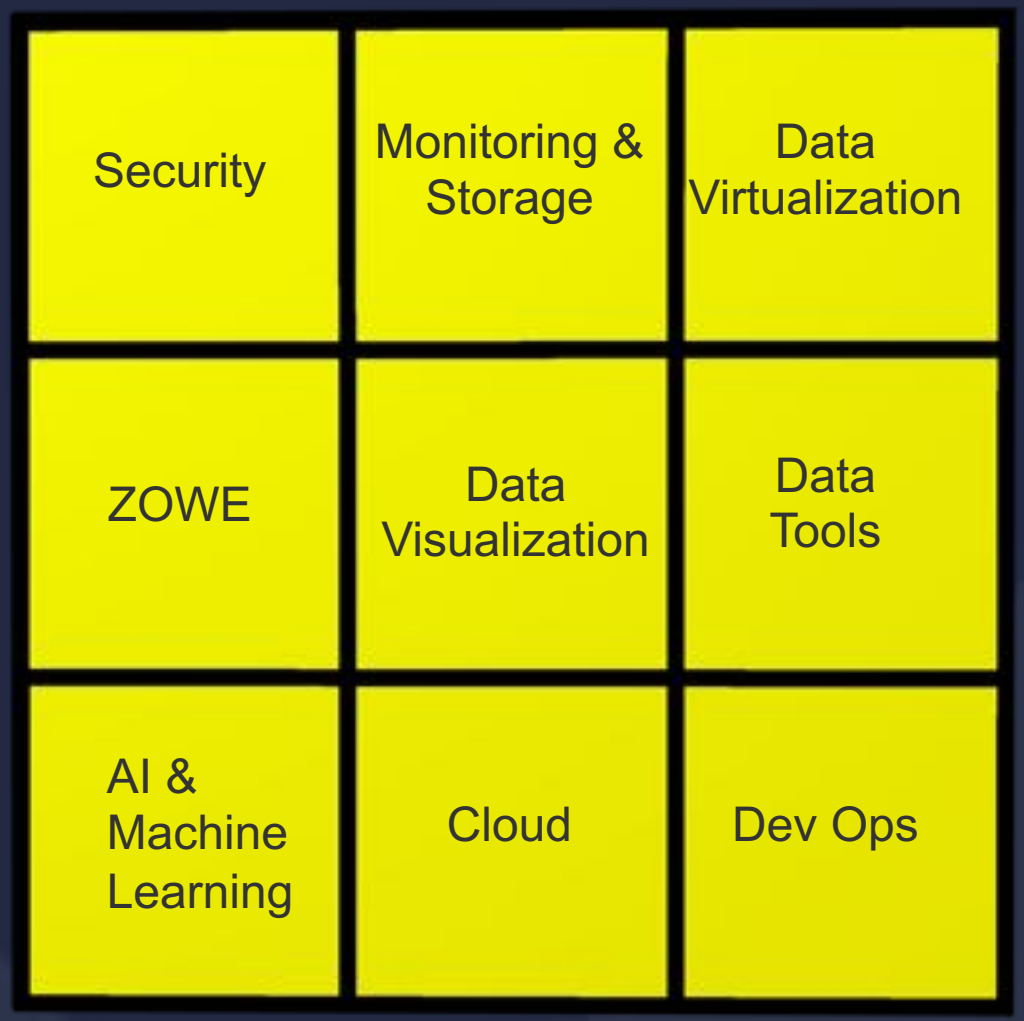


EXAMPLE OF THE BREADTH OF IMS ECOSYSTEM

Database Solution Packs
- Online reorg for FF DB
- Offline reorg for FF DB
- Fast Path databases

Performance Solution Pack
- Database
- Transaction Mgmt

Recovery Solution Pack
- Full Function databases
- Fast Path databases

Transaction Manager Solution Pack
- IMS HP Sysgen Tools
- IMS Configuration Manager
- IMS Sysplex Manager
- IMS Extended Terminal Option Support
- IMS Queue Control Facility
- IMS Connect Extensions

More Database Tools
- IMS Sequential Randomizer Generator
- IMS DEDB Fast Recovery

More Performance Tools
- IMS Network Compression Facility
- OMEGAMON for IMS
- Transaction Analysis Workbench

DevOps
- IMS Batch Terminal Simulator
- IMS Cloning Tool
- Infosphere Optim Test Data
- ADDI
- z/OS Debugger
- Open Development Tools

Cloud
- Cloud Tape Connector (e.g. Image Copies)
- DVM to push or pull data

Virtualization and Visualization
- Data Virtualization Manager for z/OS
- Query Monitor Facility for z/OS

Security
- Guardium S-TAP for IMS
- Guardium Data Encryption
- Multi-Factor Authentication
- SCRUB Utility

Analytics
- IBM Open Data Analytics for z/OS
- IDAA

System Management
- IMS Buffer Pool Analyzer
- IMS Program Restart Facility
- OMEGAMON for JVM

Administration
- IMS Administration Tool

Automation and Modernization

EXISTING CUSTOMER ENVIRONMENT

Problems:

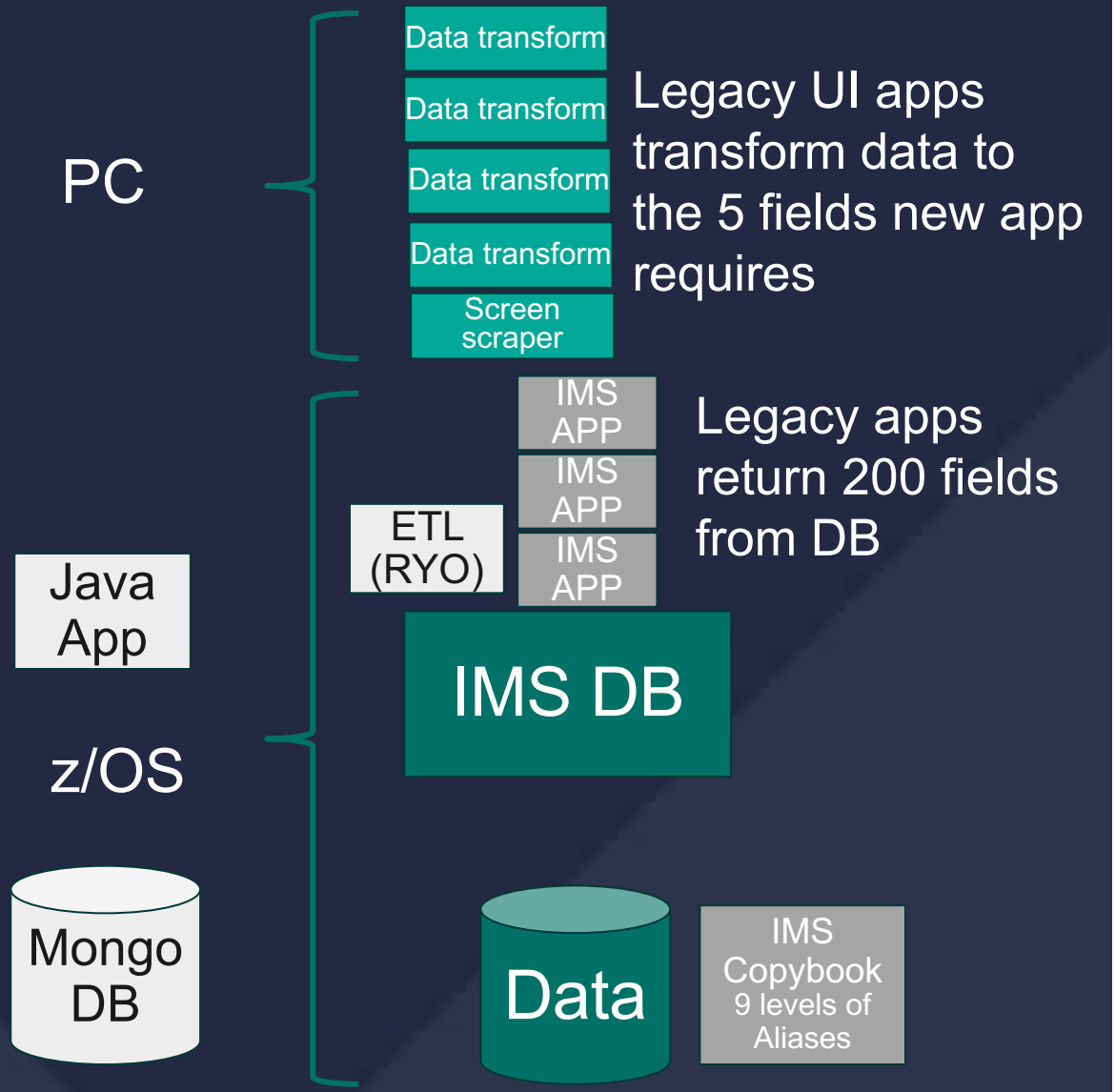
- Years of legacy IMS apps required to extract data
- Legacy screen scraper apps are 5 layers deep to break data down to consumable 5 fields needed
- Expensive MIPS consumed. Don't know if source is mobile transaction to drive lower pricing

Net:

Complex System of Record & Engagement

Initial proposed solution:

- ETL data off mainframe to Mongo
- Run Java apps for read only data
- Prototype shows very efficient
- Concern that R/W will be more difficult to manage with legacy data.



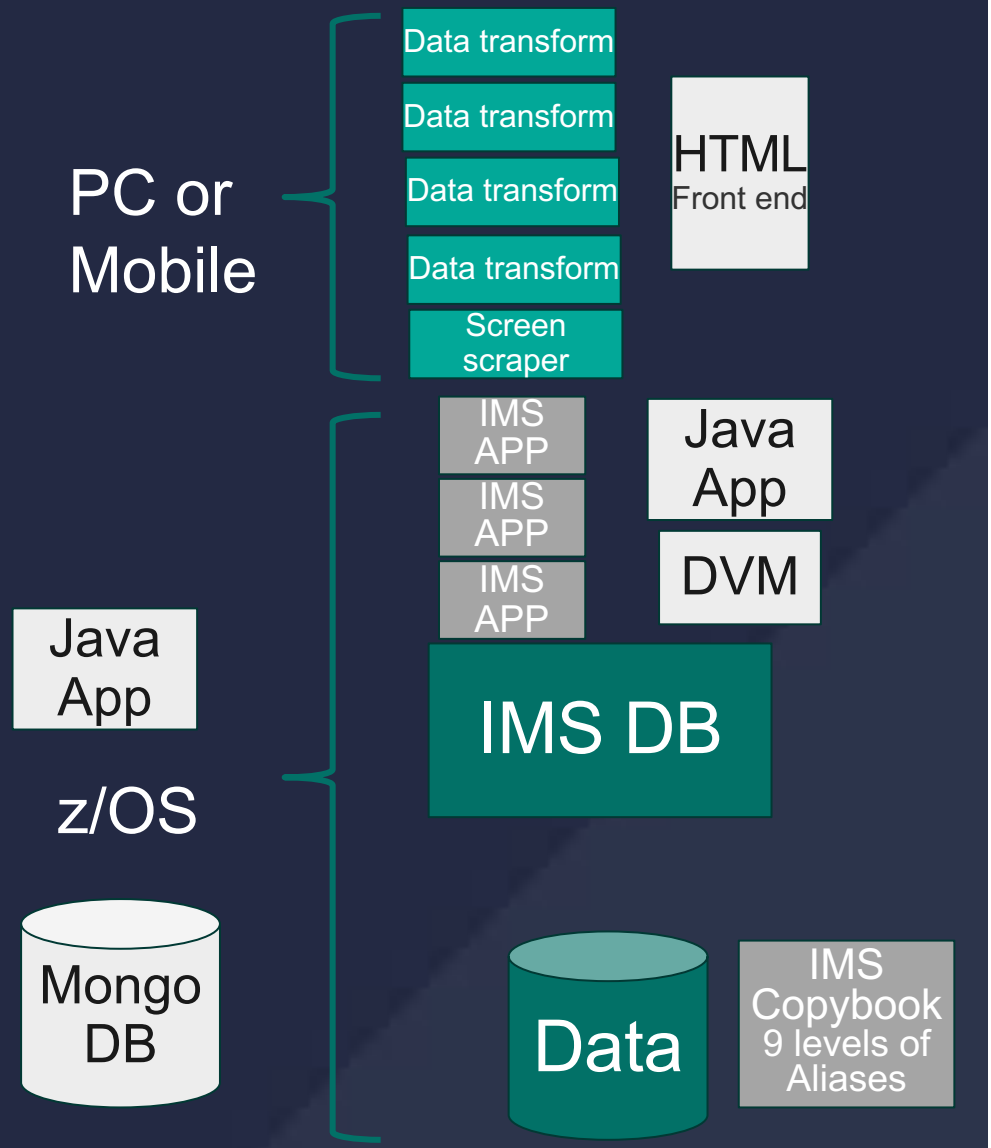
PROPOSAL

Solution:

- Leverage **Data Virtualization Manager** to provide new Data Model
- Leverage **Java** on z/OS and **z/OS Connect** to present new API for desired fields
- Build new Systems of Engagement apps off that model
- Extract data to Mongo on mainframe or off platform via DVM
  - Eliminate need for RYO ETL
  - Can handle R/W scenarios out of the box

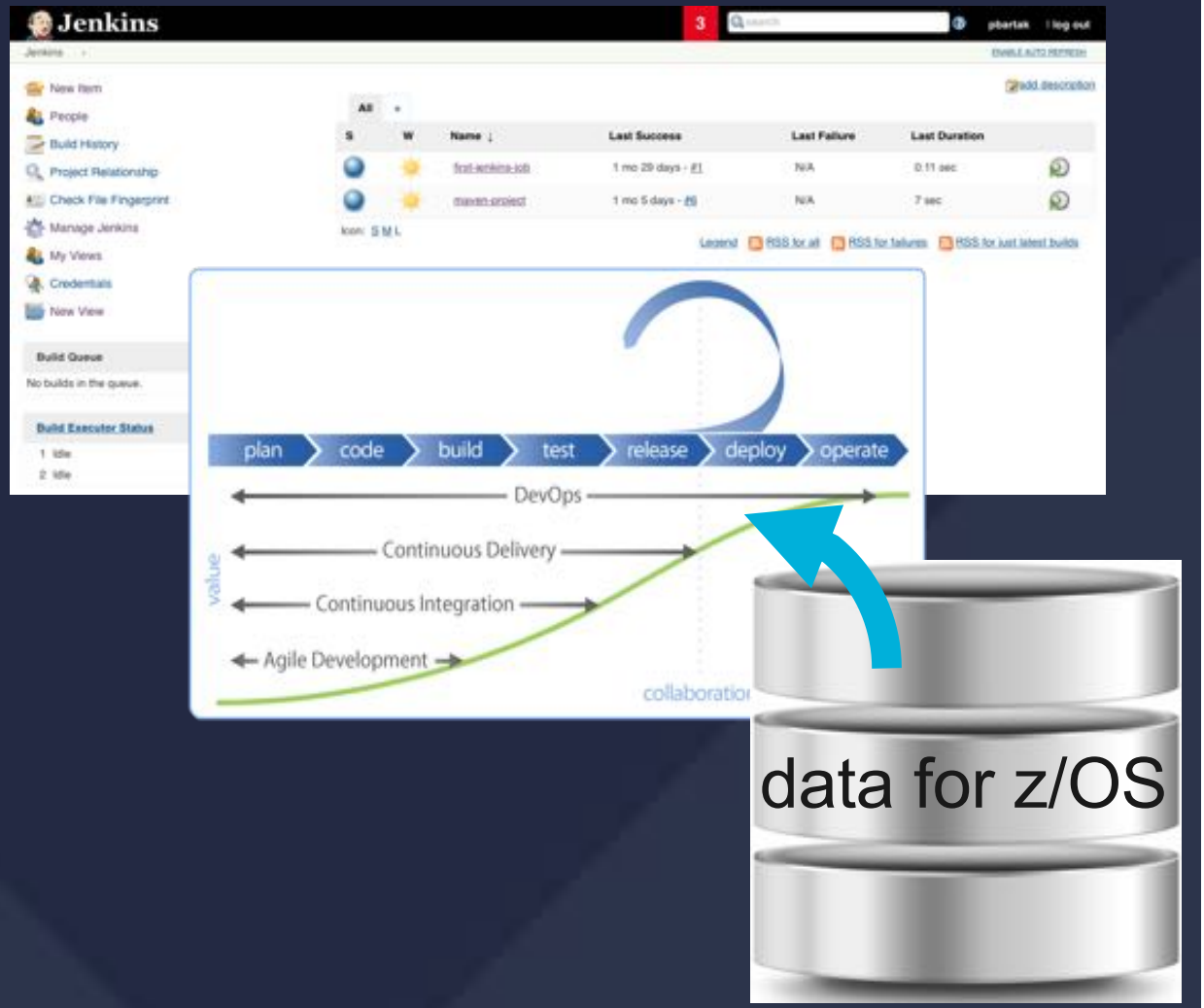
Benefits:

- **Faster time to deploy** System of Engagement apps
- Modern programming environment
- Legacy can transition over time, as desired
- Well defined architecture in place
- **Reduced cost** via zIIP and Mobile pricing

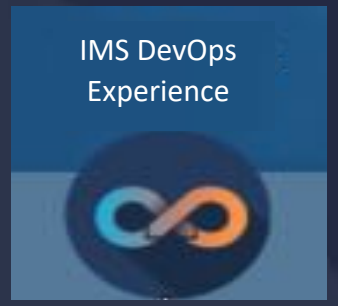


HOW WILL IMS, CICS & DB2 FOR Z/OS FIT IN DEVOPS?

- Allow IMS, CICS & Db2 for z/OS to participate in existing DevOps pipelines
- Manage application infrastructure as **code**
  - E.g. IMS DBDs, PSBs
- **Self service** provisioning and deployment of IMS, CICS & Db2 objects and data for application developers
- Upstream and downstream portions of DevOps
- **Controls** to enable and enforce conventions, limits, and approvals for deployment
- UI and REST API support to fit into existing DevOps tooling and pipeline
- Will require use of database catalogs
- **Looking for Sponsor Users now**



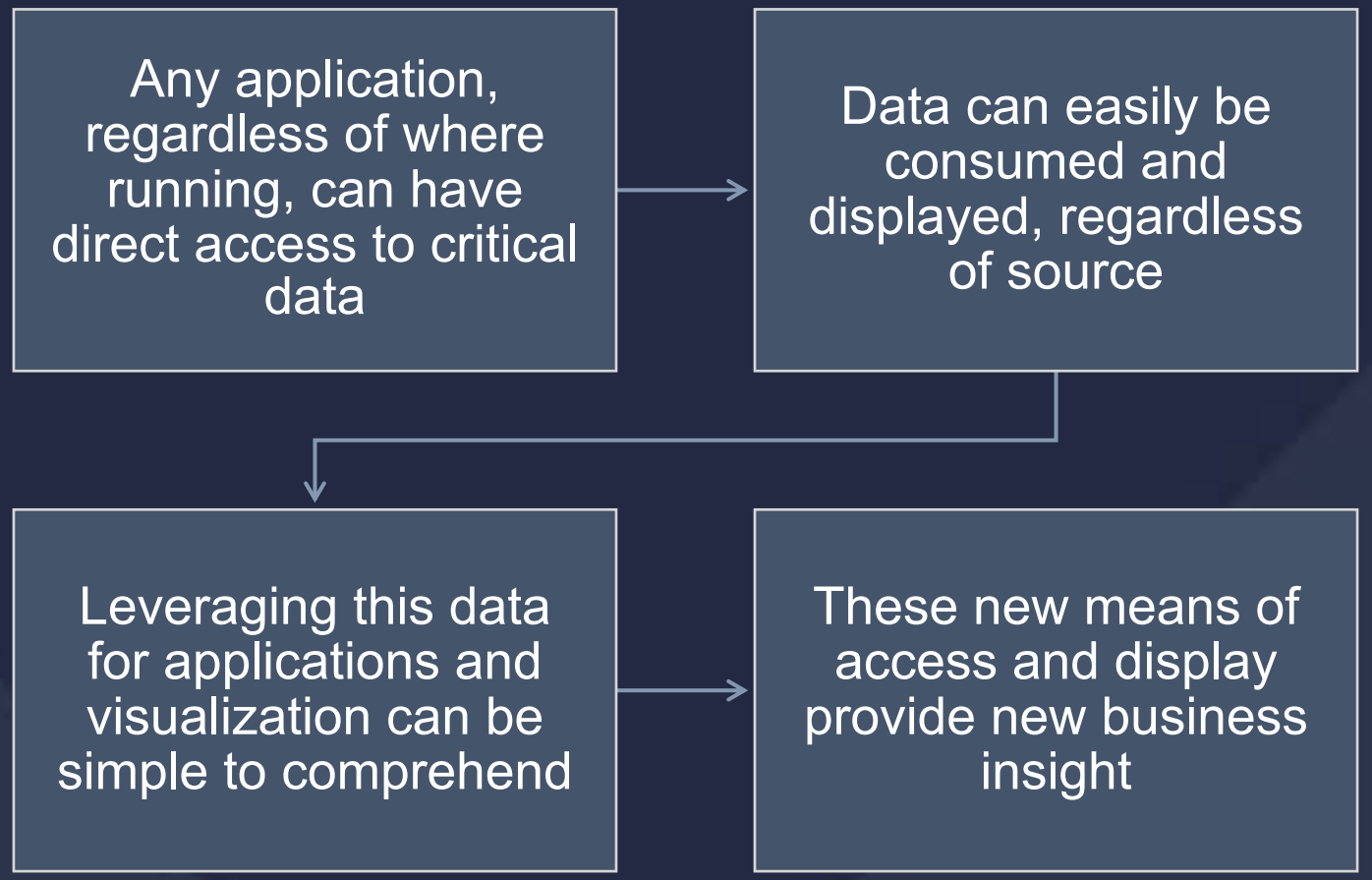
IBM IMS DEVOPS EXPERIENCE



- Where IMS meets DevOps
- Enabling self-service, on demand test environments create, modify, destroy
- IMS metadata Database-as-a-Service
- Database-as-code, versioned source code management of ‘DDL’
- Site rules, Limits, & Environment control to manage this dynamic environment
- User interface and API support
- Ready to be integrated into your DevOps pipeline via samples / REST

DREAM BIG… MAKE IT HAPPEN

ALL DATA CAN BE VIRTUALIZED AND VISUALIZED



WHO USES DATA AND HOW?

- Set-up batch applications
- Make approved data accessible to the business
- Federate data from multiple sources
- Define security and data governance

DBAs / System Programmers

- Gather, collect and understand data and data structures
- Architect and prepare data
- Serve data via API to data scientists
- Provide datasets for organization

Data Engineers

- Perform ad-hoc analyses to fulfill management requests
- Create reports for distribution to end users
- Develop robust dashboards and interactive applications for information consumers and various departments

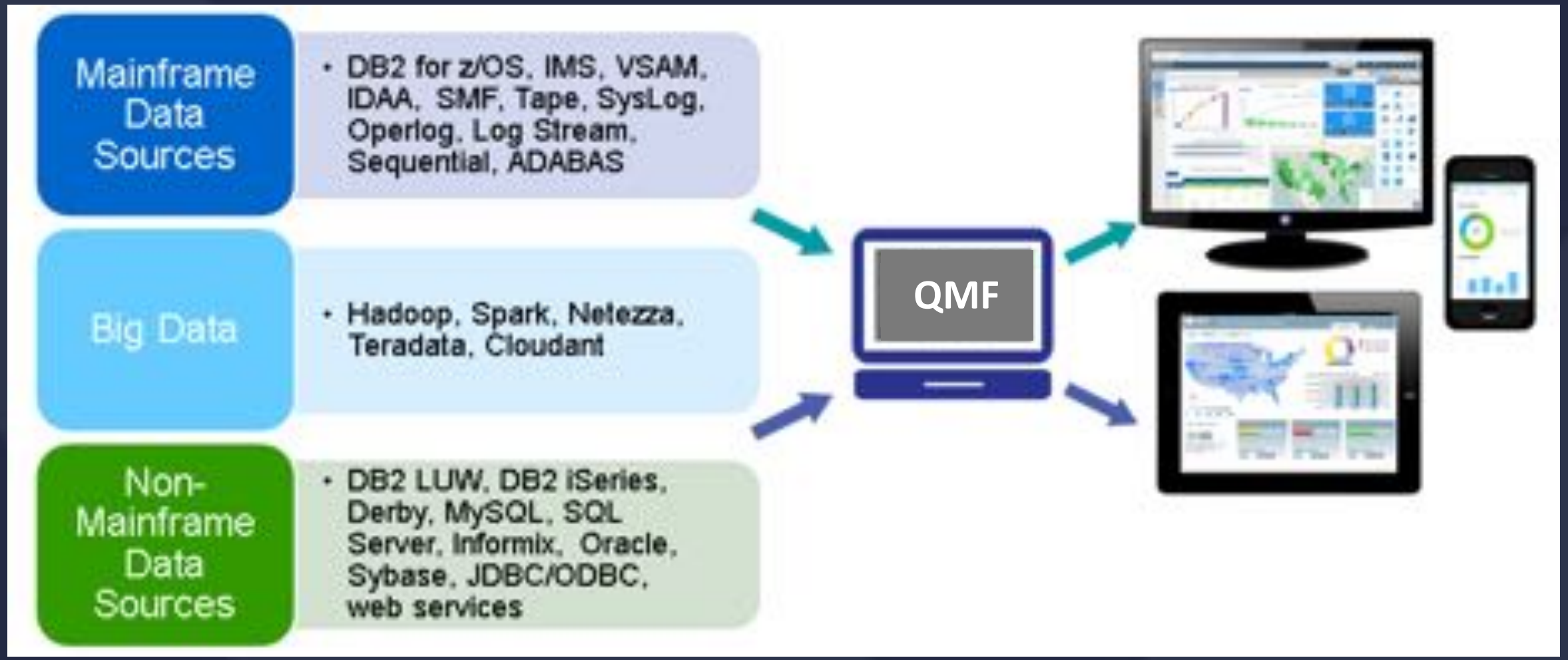
Data Analysts / App Developers / Data Scientists

- Access pre-built reports and dashboards for decision-making
- Create their own dashboards via web and mobile devices
- Align with colleagues through real-time collaboration on KPIs

Business Users / Information Consumers

Less users ⟷ More users

WHAT DATA CAN QMF ACCESS?

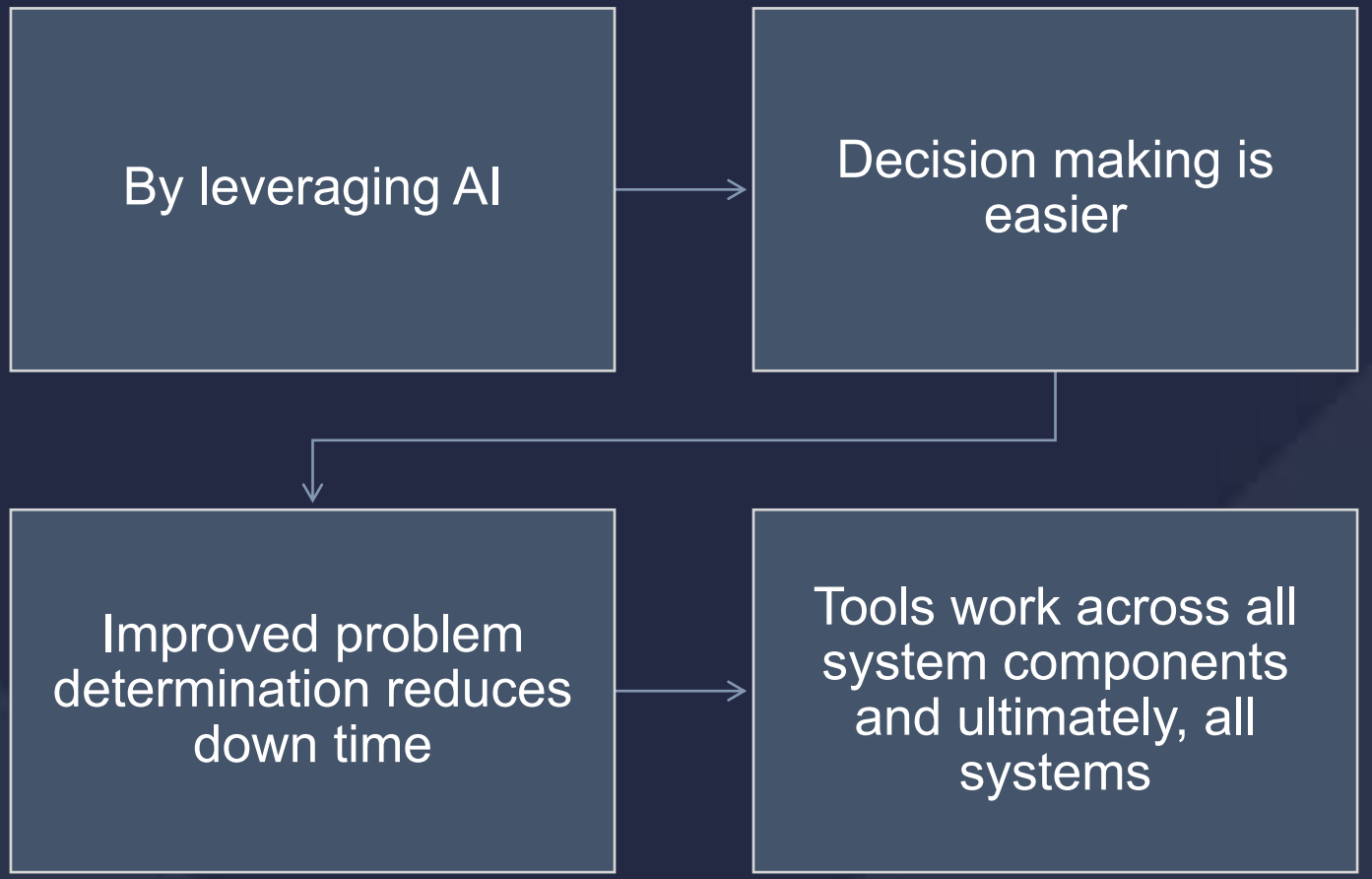


VISUALIZATIONS TAILORED FOR TARGETED USERS

Any dashboard or report can include data from **multiple, disparate sources** – whether relational, non-relational, mainframe, off mainframe, structured or unstructured

DREAM BIG… MAKE IT HAPPEN

IT OPERATIONS WILL IMPROVE WITH NEW INSIGHT



CHALLENGES IN PERFORMANCE AND PROBLEM ANALYSIS

What are my busiest databases?

Which IMS databases are my BMPs using?

What is CPU time per checkpoint interval?

What updates to DB2 did my IMS transaction do?

How can I trace Program Switching flow?

There are Tools to help!

How long are my transactions taking to syncpoint?

What is causing the delays in syncpoint processing?

Which transactions are using the most time?

How can I make the log available to others by removing sensitive data?

How can I measure transaction response time?

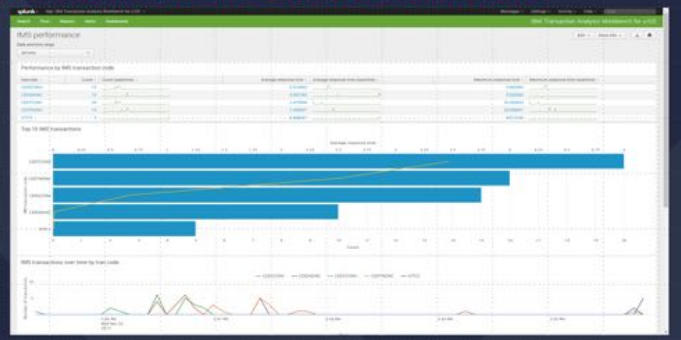
How can I identify resources (transactions, programs, and databases) that are no longer being used?

How can I use IMS system checkpoint records to identify unused resources?

MODERN PERFORMANCE ANALYSIS

Combinations of Legacy and Open Source will have business value	
IBM	**Open**
IMS, CICS and Db2 Tools	Splunk
Transaction Analysis Workbench	Elastic (ELK stack – Elasticsearch, Logstash, Kibana)
OMEGAMON	Hadoop
Working across system middleware provides the greatest insight	

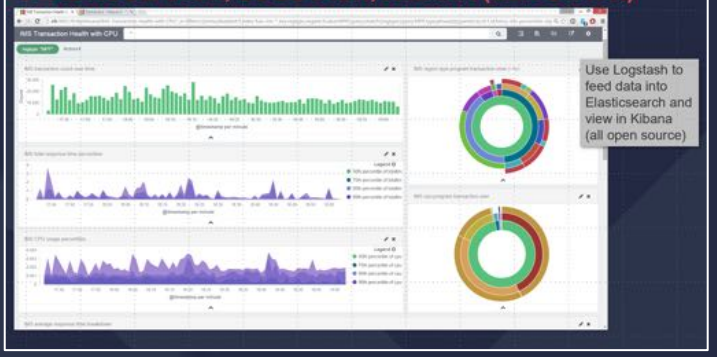
SPLUNK: IMS AND IMS CONNECT DASHBOARD



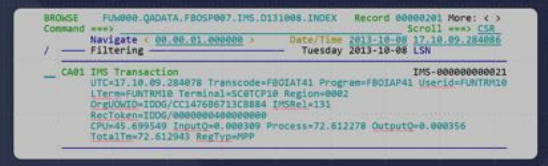
TRANSACTION ANALYSIS WORKBENCH:
BROAD, DEEP COVERAGE ACROSS LOG SOURCES

IMS	CICS	Db2	MQ, WAS	z/OS
IMS log and trace	CMF performance class (SMF 110)	Db2 log	MQ log extract	SMF
IMS monitor	CICS trace (DFHAUXT or GTF)	Db2 accounting	MQ statistics (SMF 115-1, -2)	OPERLOG
CQS log stream	VSAM forward recovery and autojournaling log streams	Db2 performance trace (IFCIDs)	MQ accounting (SMF 116)	z/OS Connect (SMF 120-11)
IMS Connect event data (collected by IMS Connect Extensions)		Near Term History (collected by OMEGAMON XE for Db2)	WAS request activity performance statistics (SMF 120-9)	
OMEGAMON ATF	All supported log types can be treated and processed in a consistent way: format, interpret, relate, select, reduce, ETL			
IRLM long lock detection (SMF 79-15)				

ELASTICSEARCH, LOGSTASH, KIBANA (ELK STACK)



IMS TRANSACTION INDEX RECORD –
IMS PA, IMS PI, AND TAW



IMS x'CA01' index records

- Created by IMS Performance Analyzer
- Contain all the performance metrics of an IMS Transaction in one record
- Use as input for Transit Reports in IMS Performance Analyzer or as a Tracking Index in IMS Problem Investigator

IMS AND DB2 DATABASE TOOLS

- Full set of tools for maintaining and managing IMS and Db2 databases
- High Performance tools
  - Significantly **better performance** than native utilities
  - **Reduced** system **resource utilization –** saving MIPS is even more important with **Tailored Fit Pricing**
- Sensors, policies, and automation
  - Move toward **smarter**, self-managing **systems**
- You focus on growing your business
  - Less time on day-to-day maintenance

Automation:

- ➢ Automate database maintenance
- ➢ Set it and forget it

Improve productivity

Conditional Reorganization:

- ✓ Tools gather the data
- ✓ You set the schedule
- ✓ You define the policies/criteria
- ✓ Tools decide if reorg will run

Save on system resources

GUI TOOLS MAKE THINGS SIMPLER

IMS Enterprise Suite
Explorer for Development *(Eclipse)*

IBM Management Console for IMS
(Web browser) aka Admin Console; Web UI

Visualize IMS database structure as defined by DBD source
- Change IMS Database and Program Definition source
- Graphically access IMS data using SQL

View your mainframe datasets
- Submit JCL and inspect output in JES

Extension of the tool for transaction access
- Generate and deploy mobile services as Mobile services

Provides a single, holistic easy-to-use web browser-based interface
- Consolidates information from various tools giving a more complete picture of IMS
- Leverages the latest web technologies for a richer user experience
- Access from anywhere via the Internet using standard web browsers
- Integrates a context sensitive help system

Extends integration to IMS Tools

IMS ADMINISTRATION TOOL

SQL interface to access IMS data

- Enter and execute ad-hoc SQL commands
- Review the **output**
- **ISPUFI**

Submit IMS commands

- **Submit** Type-1 and Type-2 commands
- Review **responses**
- **Store** commands if a system is unavailable and **automatically** issue them upon IMS restart

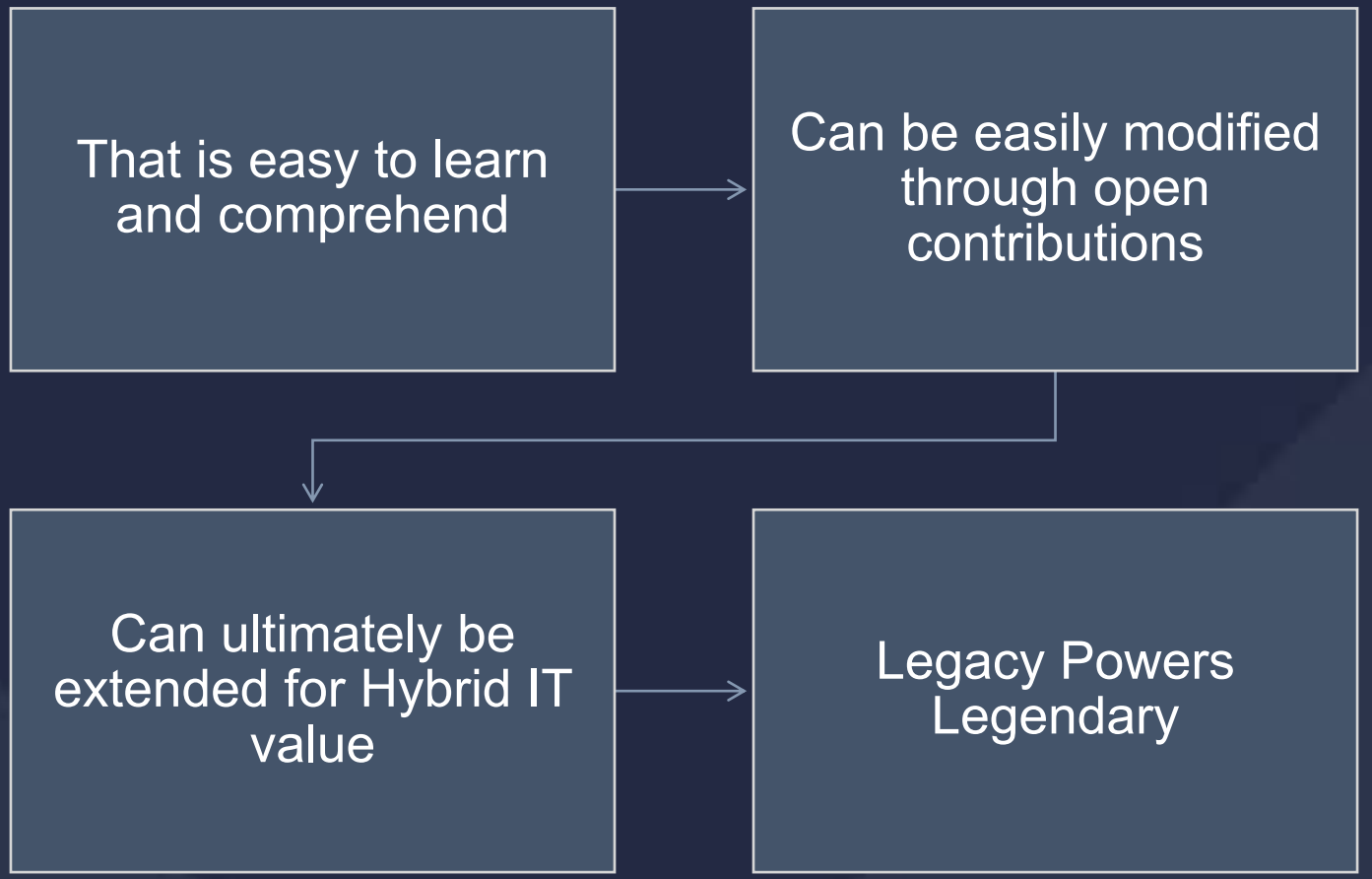
Comprehensive event recording

- Complete **log** of all DBA functions and commands
- **Browse and search** capabilities

All functions available via **Web UI** (Management Console)**, ISPF,** or batch

DREAM BIG… MAKE IT HAPPEN

THERE IS THE NEW FACE OF Z/OS



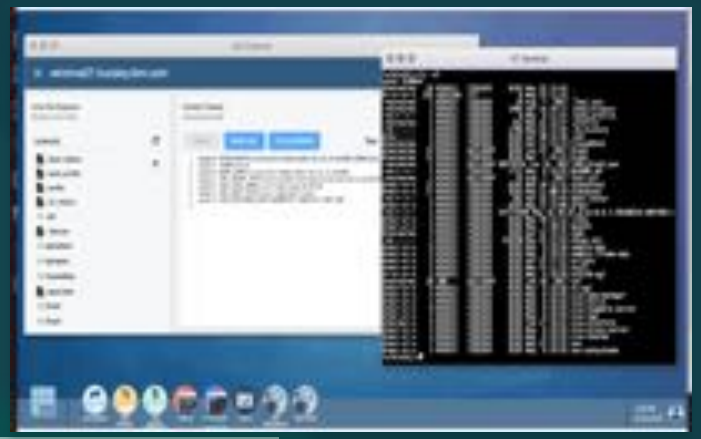
WHAT IS ZOWE

Zowe V1.4.0 GA August 2019

OPEN MAINFRAME PROJECT

The modern mainframe experience is lightweight and open with ...

CLI



Web UI

APIs

1 Zowe reduces the time to on-board new developers and system programmers working on the Mainframe.

2 Zowe makes interacting with the mainframe feel like any modern cloud or desktop platform.

3 Zowe improves responsiveness to Line of Business requests and time to market by simplifying tasks and interactions.

Founding Members

IBM ca technologies Rocket

Zowe

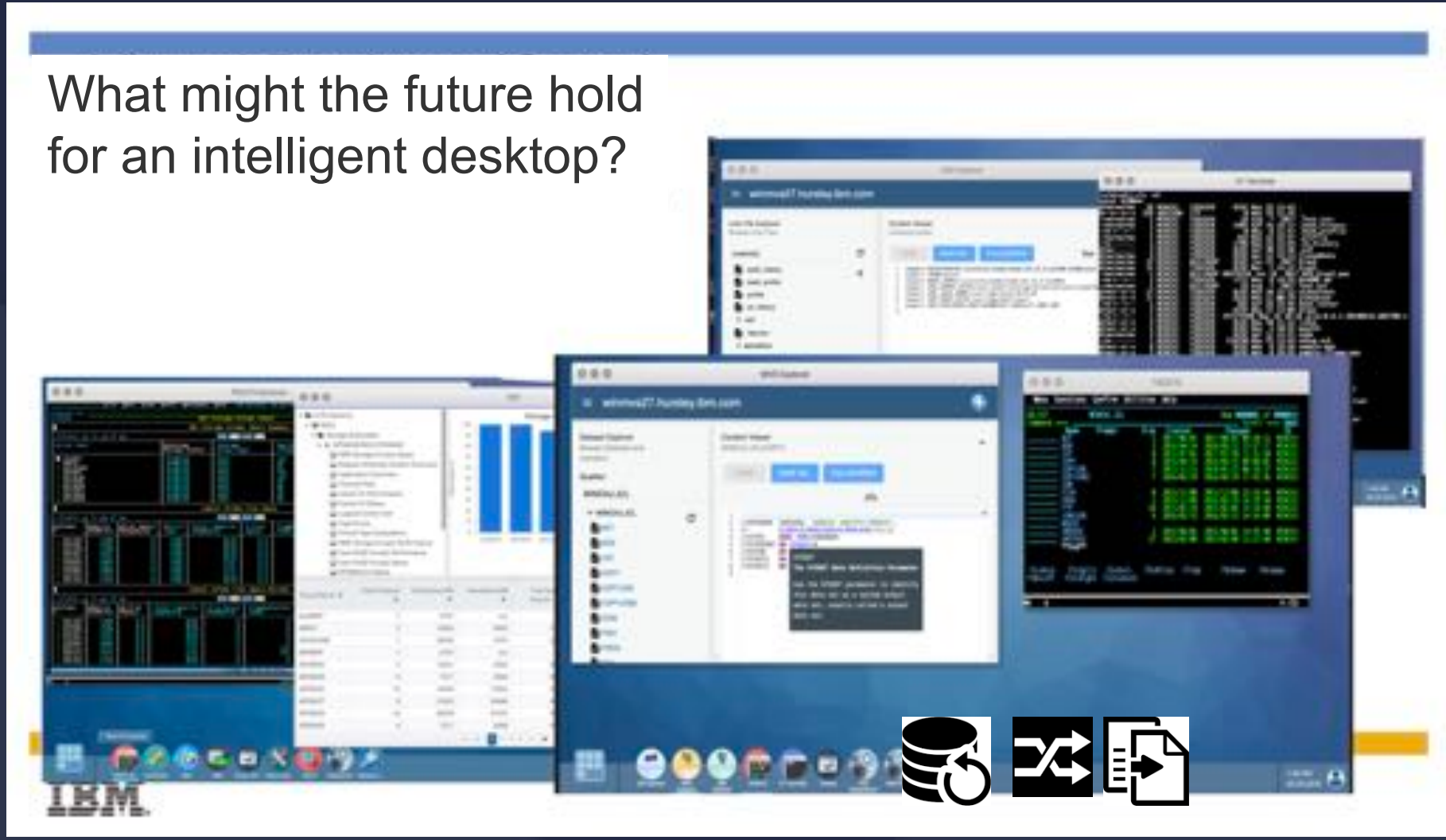
http://zowe.org

EVOLUTION OF THE Z/OS USER INTERFACE → ZOWE

New Experiences:

- DevOps
- Operations
- Performance

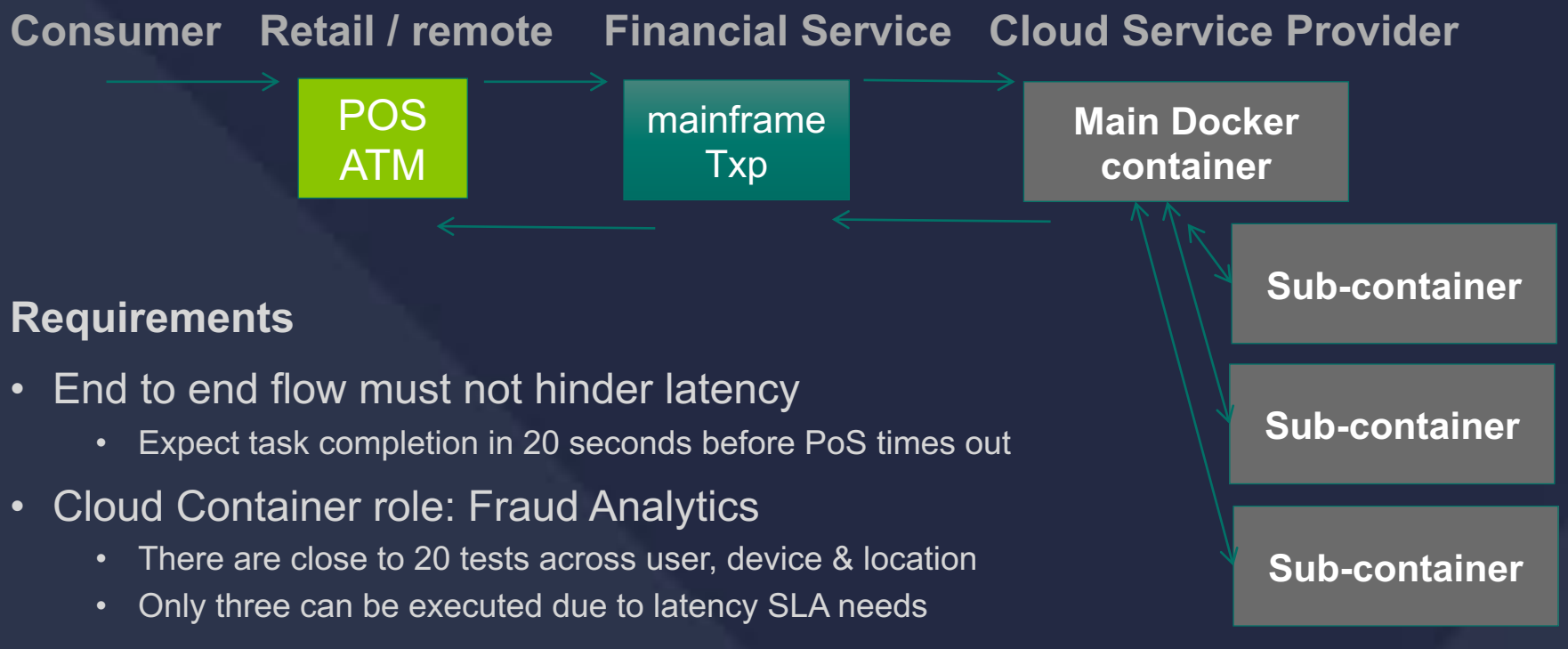
Why not go to any data source on any platform?



ACCESSING CONTAINERS FROM THE MAINFRAME

PUBLIC OR PRIVATE X86 CLOUD IMPLEMENTATION

One Retail bank plans 1 million clients leveraging Cloud Containers



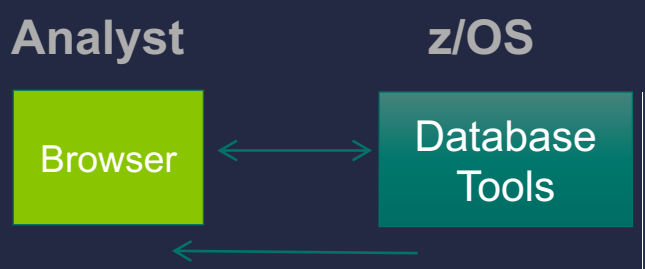
Requirements

- End to end flow must not hinder latency
  - Expect task completion in 20 seconds before PoS times out
- Cloud Container role: Fraud Analytics
  - There are close to 20 tests across user, device & location
  - Only three can be executed due to latency SLA needs

Up to 56 containers

Phased production roll out begun

LET'S REVISIT MODERN PERFORMANCE ANALYSIS



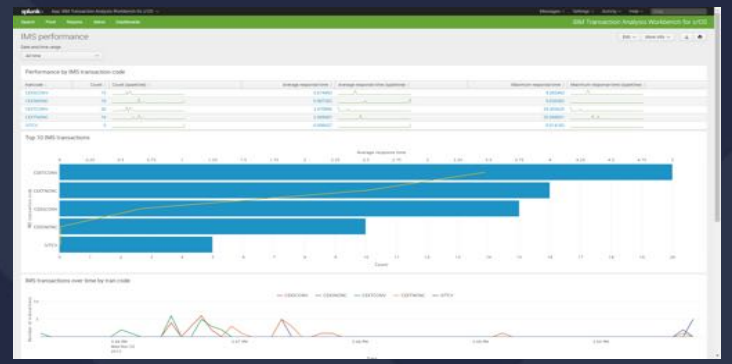
"Cloud Native" Containers

There is no reason that the modern presentation tools can't be ZCX containers running within z/OS and displaying in a web page.

- That webpage could be part of ZOWE

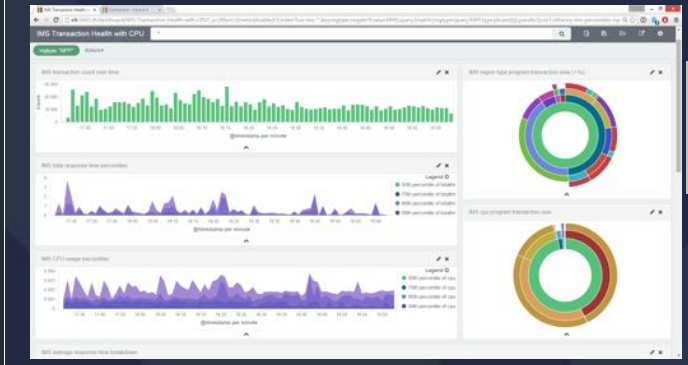
This approach could simplify deployment of new capabilities without asking permission of another org to put the servers up in a cloud or x86 server

SPLUNK: IMS AND CONNECT COMBINED DASHBOARD



2019 IMS Wildfire Workshop

ELASTICSEARCH, LOGSTASH, KIBANA (ELK STACK)

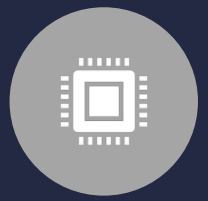


We use Logstash to feed data into Elasticsearch and view in Kibana (all open source)

2019 IMS Wildfire Workshop

WHY LEVERAGE THE IBM MAINFRAME FOR CLOUD NATIVE CONTAINERS?

Cloud: Each of the analytic functions occur as virtual image within same server



Latency: Hardware memory used rather than network to dispatch functions, saving time

Scale: CPU utilization enables 10,000's of simultaneous transactions

Disaster Recovery and hot standby servers: part of mainframe architecture and reduced pricing terms and conditions

Transaction Programs: When called from z/OS, proximity to containers will reduce latency and allow additional analytics

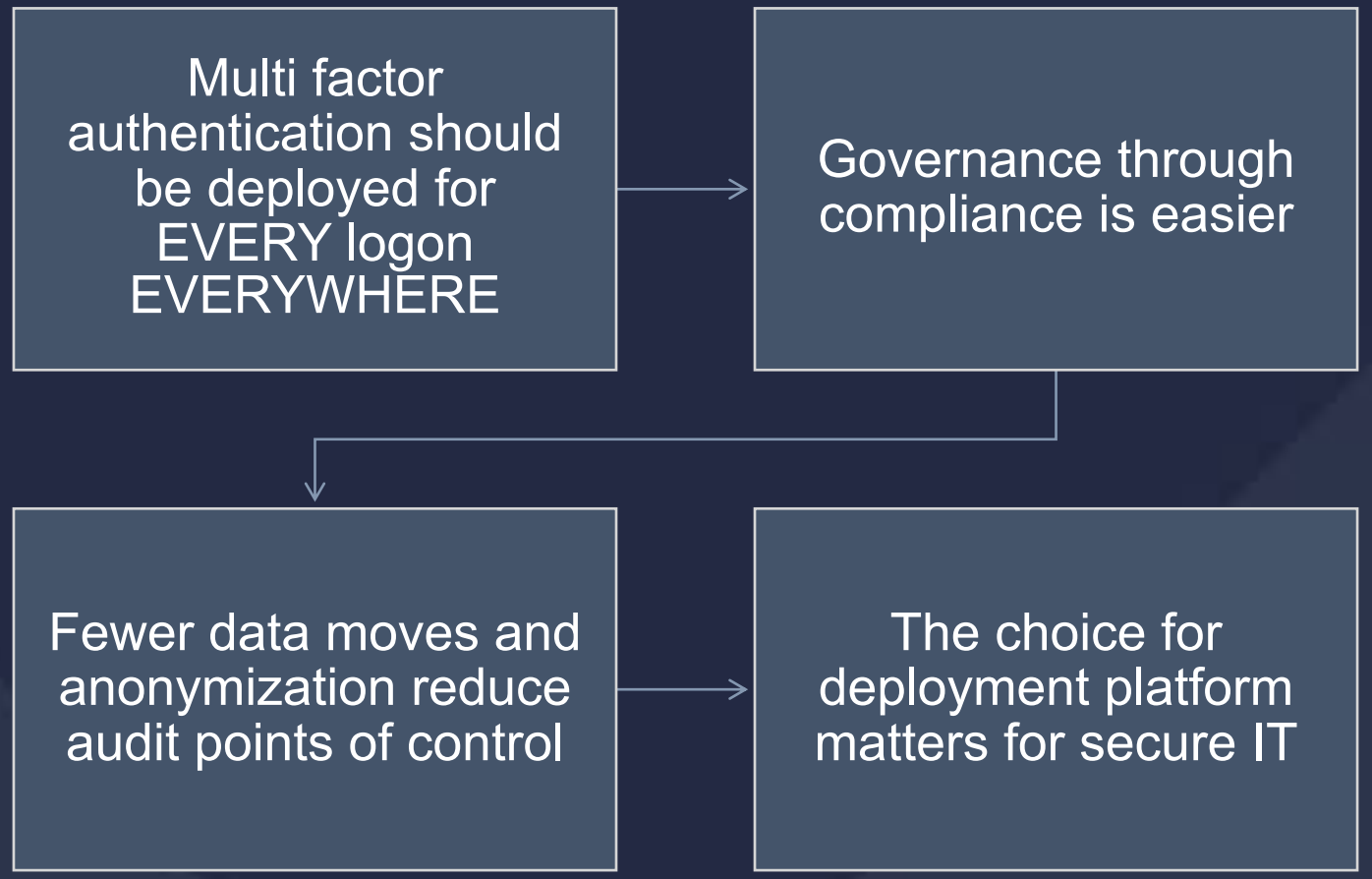
Improved Analytics: Mainframe architecture enables near real-time analytics while sharing transactional data

Security: The mainframes built in HSM, Digital Certificate processing and encryption on each core reduces overall operational risk

TCO: Cloud deployment on System z will be less expensive compared to Public Cloud

DREAM BIG… MAKE IT HAPPEN

IT OPERATIONS SHOULD BE SECURE END TO END



SECURITY CHALLENGES SPECIFIC TO THE MAINFRAME

Rising costs

Mainframe security administration is typically a manual operation and relies upon old and poorly-documented scripts; highly-skilled mainframe administration resources are limited

Ensuring compliance

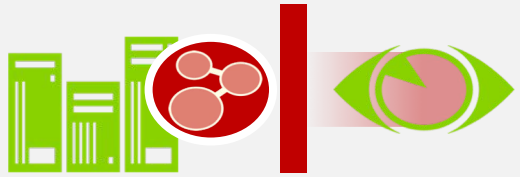
Compliance verification is a manual task with alerts coming only AFTER a problem has occurred, *if at all!*

Increasing complexity

The mainframe is an integral component of many large business services, making managing security threats extremely complex creating a higher risk to the business

Lack of visibility

Mainframe processes, procedures, and reports are often siloed from the rest of the organization



TARGET USER PERSONAS FOR MFA

- **Employees that work with personally identifiable info**
- Human Resources
- Healthcare workers
- Law Clerks
- DMV Clerks

- **Employees that have authority over managing money**
- Brokers, Traders, Analysts
- Tellers
- Payroll
- Credit Card Processing

- **Users that have knowledge of Corporate Intellectual Property**
- Executives
- Engineers

- **Business Partners that access YOUR data**
- Agents – Travel, Insurance
- Contract organization – Outsourcers

- **Users managing key IT assets**
- Systems Programmers
- Security Administrators
- Database Admins, Developers

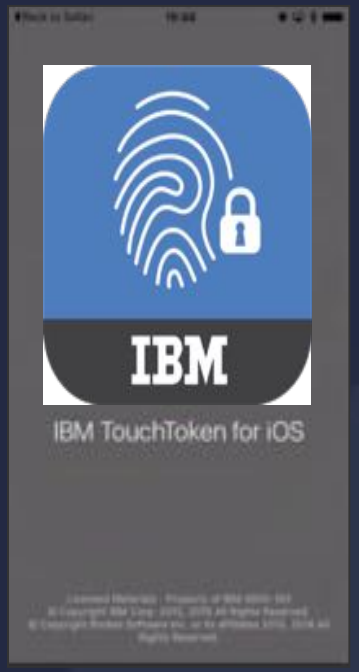
Target personas for IBM MFA include anyone with access to data a client would *not want released to the public*

MULTIFACTOR AUTHENTICATION

SOMETHING THAT YOU KNOW
- Usernames and passwords
- PIN Code

SOMETHING THAT YOU HAVE
- ID Badge
- One time passwords
  - Time-based

SOMETHING THAT YOU ARE
- Biometrics



HOW FAR WILL YOU GO TO PROTECT DATA?

- Guardium STAP installed for audit
- Breach discovered, use the audit records
- Nothing conclusive found
- Were all records collected? Has data been copied?
- What should be done for next time?

Production Database

Guardium STAP

Test Database

Gu No Audit TAP?

Development Database

Gu No Audit STAP?

Business Intelligence Database

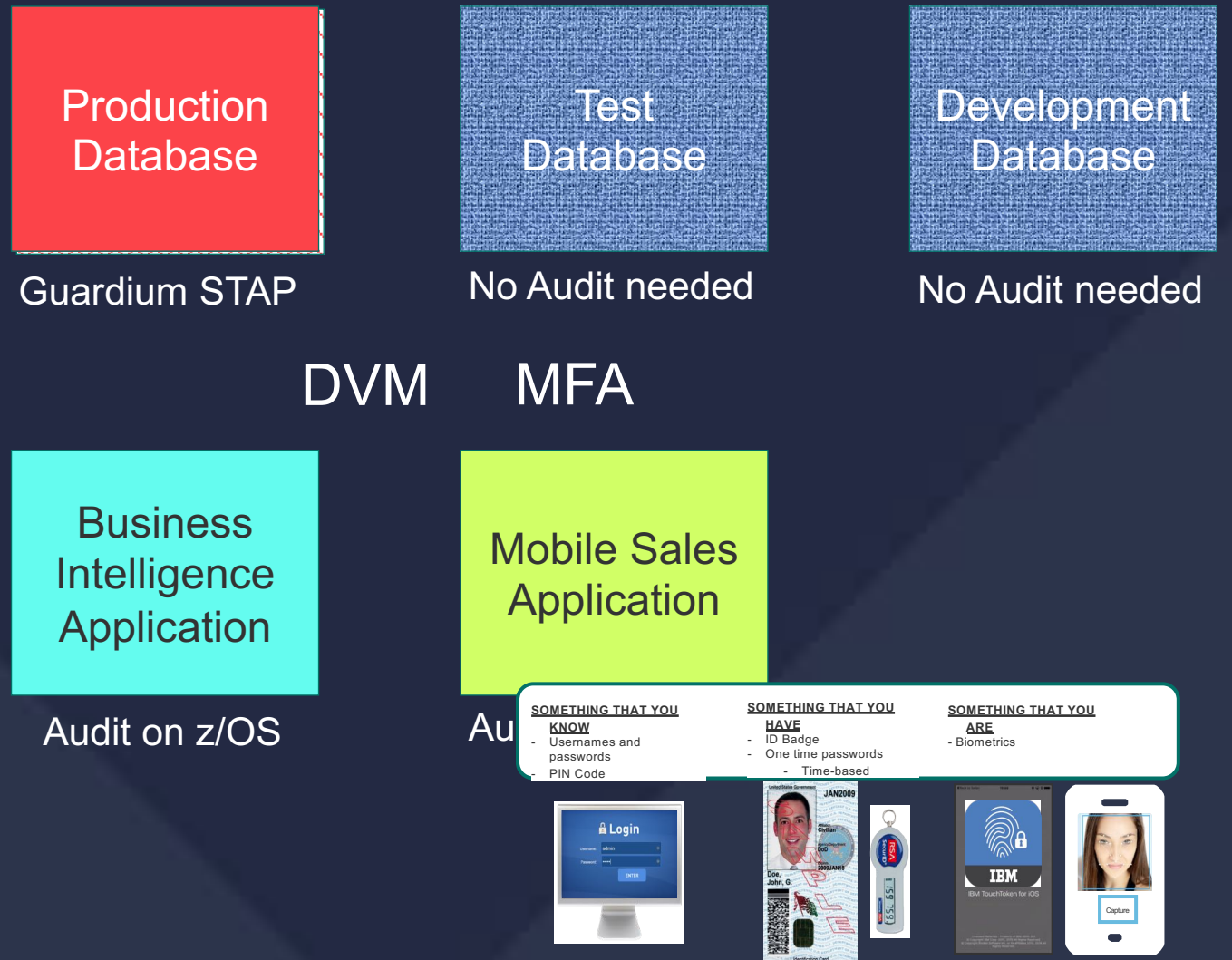
Gu No Audit STAP?

Mobile Sales Database

Gu No Audit STAP?

A BETTER APPROACH TO PROTECT & MANAGE DATA

- Use IMS and Db2 Cloning tools with anonymization or Optim Data Masking
  - Data modified. No need to audit
- Leverage DVM to access Data in real time
  - Applications access data now, not servers
  - Audit is done at base data
- Use MFA to authenticate to all systems
- Encrypt source data
- **Result: Fewer audit control points, improved security, lower operations cost**



EXAMPLE OF THE BREADTH OF IMS ECOSYSTEM

Database Solution Packs
- Online reorg for FF DB
- Offline reorg for FF DB
- Fast Path databases

Performance Solution Pack
- Database
- Transaction Mgmt

Recovery Solution Pack
- Full Function databases
- Fast Path databases

Transaction Manager Solution Pack
- IMS HP Sysgen Tools
- IMS Configuration Manager
- IMS Sysplex Manager
- IMS Extended Terminal Option Support
- IMS Queue Control Facility
- IMS Connect Extensions

More Database Tools
- IMS Sequential Randomizer Generator
- IMS DEDB Fast Recovery

More Performance Tools
- IMS Network Compression Facility
- OMEGAMON for IMS
- Transaction Analysis Workbench

DevOps
- IMS Batch Terminal Simulator
- IMS Cloning Tool
- Infosphere Optim Test Data
- ADDI
- z/OS Debugger
- Open Development Tools

Cloud
- Cloud Tape Connector (e.g. Image Copies)
- DVM to push or pull data

Virtualization and Visualization
- Data Virtualization Manager for z/OS
- Query Monitor Facility for z/OS

Security
- Guardium S-TAP for IMS
- Guardium Data Encryption
- Multi-Factor Authentication
- SCRUB Utility

Analytics
- IBM Open Data Analytics for z/OS
- IDAA

System Management
- IMS Buffer Pool Analyzer
- IMS Program Restart Facility
- OMEGAMON for JVM

Administration
- IMS Administration Tool

Automation and Modernization

DREAM BIG… MAKE IT HAPPEN

CUSTOMERS, IBMERS AND THE WORLD SHOULD SEE:

That the mainframe is already hybrid. It requires a System of Engagement (SoE)

- User Interface: Mobile, PC, ATM, PoS, IoT, etc

That development within existing mainframe applications is desirable

- Using consistent & open tools with other platforms
- Exploiting SoE via APIs (avoiding wrappers & proxies)

That they can leverage the value of data management, virtualization and analytics

That they should breakdown organizational barriers to success

- With a holistic view that improves dev ops, security, resilience, latency, and costs across all IT

…and this LEGACY POWERS LEGENDARY

WHAT CAN YOU DO

- Advocate for the Z platform
  - Most executives and architects do not think Z first
- Advocate for IMS
- Educate your organization
  - What you have in IMS
  - How to access it with modern languages and tooling
    - Applications
    - Analytics
- Bring in the experts

FOR MORE INFORMATION

- IMS Tools website
  www.ibm.com/it-infrastructure/z/ims/tools
- IMS Tools Product Documentation
  www.ibm.com/support/docview.wss?uid=swg27020942
- **IMS newsletter**
  Sign up: ibm.biz/IMS_eNews
- **IMS Tools Youtube Playlist**
  www.youtube.com/playlist?list=PLezLS0Tuqb-5DSdF1Locnq5IhTgcX02vf
- **IMS Tools new functions**
  www.ibm.com/support/docview.wss?uid=swg22015506
- IMS Tools support for IMS V15
  www.ibm.com/support/docview.wss?uid=swg22009341
- IMS Tools support for Managed ACBs
  www.ibm.com/support/docview.wss?uid=ibm10731745
- IMS Tools support for Data Set Encryption
  www.ibm.com/support/docview.wss?uid=ibm107333513
- **IMS Tools Videos on IBM MediaCenter**
  https://mediacenter.ibm.com/esearch/search?fields=all&sortBy=updatedAtDesc&keyword=%22IMS%20tools%22
- IMS new functions
  www.ibm.com/support/knowledgecenter/en/SSEPH2_15.1.0/com.ibm.ims15.doc.rpg/ims_cd_functions.htm
- IBM zITSM newsletter (email every 2 months with summary articles and links to more information)
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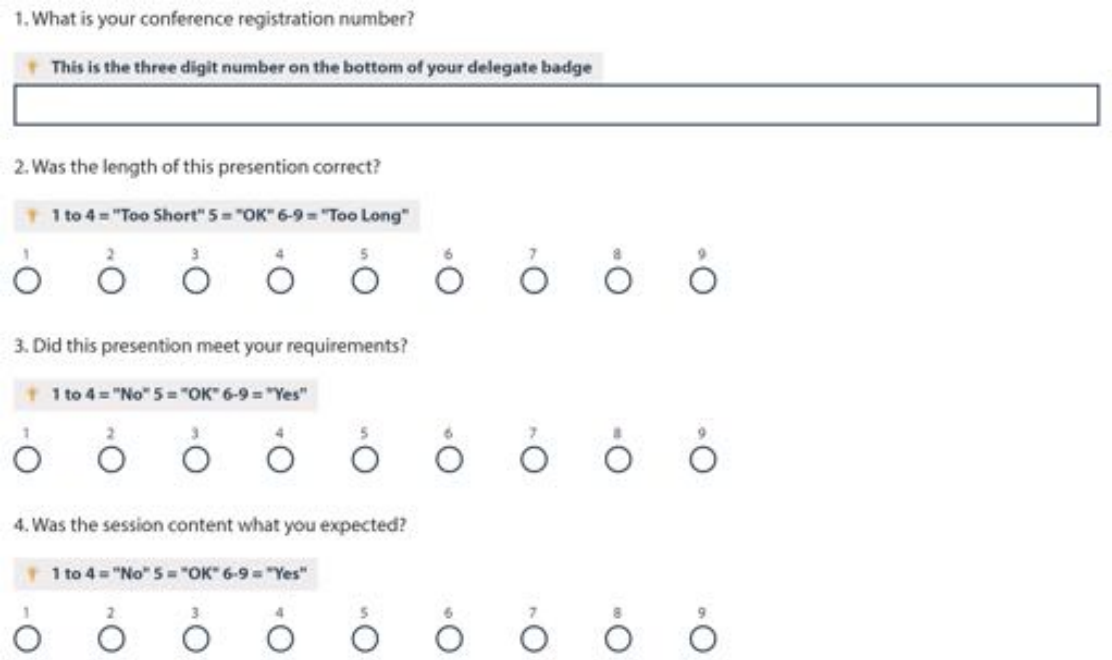
1. What is your conference registration number?

This is the three digit number on the bottom of your delegate badge

2. Was the length of this presention correct?

1 to 4 = "Too Short" 5 = "OK" 6-9 = "Too Long"

1 2 3 4 5 6 7 8 9

3. Did this presention meet your requirements?

1 to 4 = "No" 5 = "OK" 6-9 = "Yes"

1 2 3 4 5 6 7 8 9

4. Was the session content what you expected?

1 to 4 = "No" 5 = "OK" 6-9 = "Yes"

1 2 3 4 5 6 7 8 9