

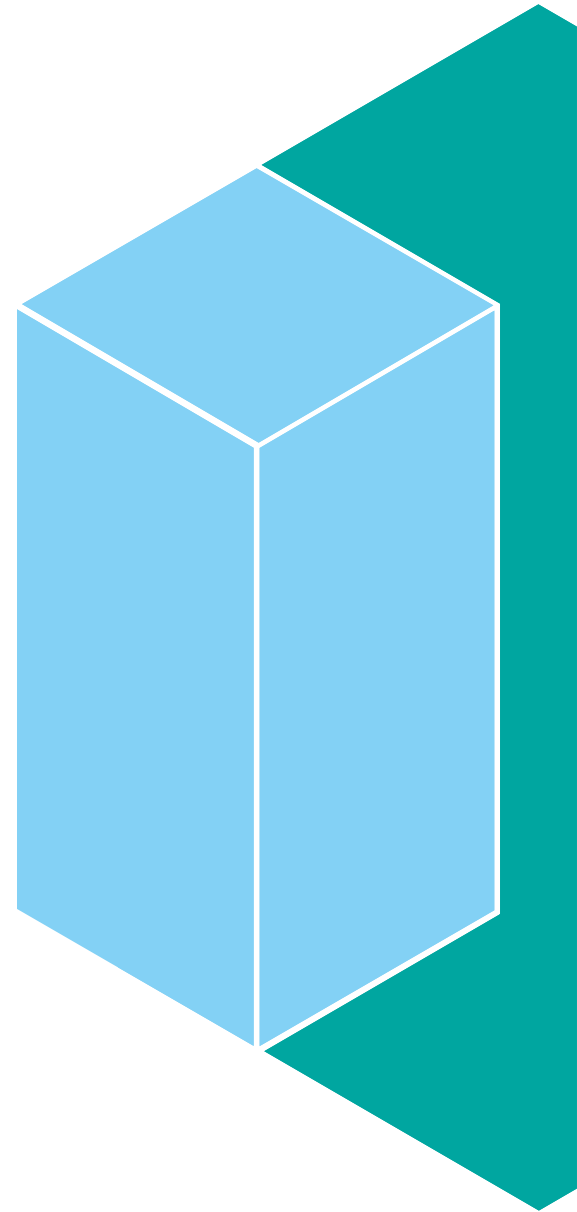
Leading Edge Analytics Solutions with z Systems

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Sharpen your competitive edge

2016 IMS Technical Symposium

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Wiesbaden, Germany

www.ims-symposium.com

Executive Summary

- **Analytics is needed by all enterprise customers!**
 - Today z Systems owns business critical transactional and batch workload!
 - Today z Systems owns business critical data!
 - The new z Systems z13 & z13s allow a real technology shift for analytics!
- **One option is to augment Data Warehouse capabilities to provide Right-Time Data Analytics including Big Data support.**
 - Answer business needs around fraud analytics & customer 360 view
- **Another option is to implement in-line analytics, aka in-transaction analytics aka “Analytics in Business Applications” aka Real-Time Analytics**
 - Add analytics in z/OS based workload
 - Answer business needs around fraud detection at the time of the fraud or customer call optimization to prevent churn and increase cross sell

Bring the analytics to the data for Right-Time Insight
Bring the analytics in the application for Real-Time Decision Management!

Market Trends & Analytics Needs

Business



End customers / consumers

- Drive increased transactional workload through mobile
- Ask for more personalized services and offering

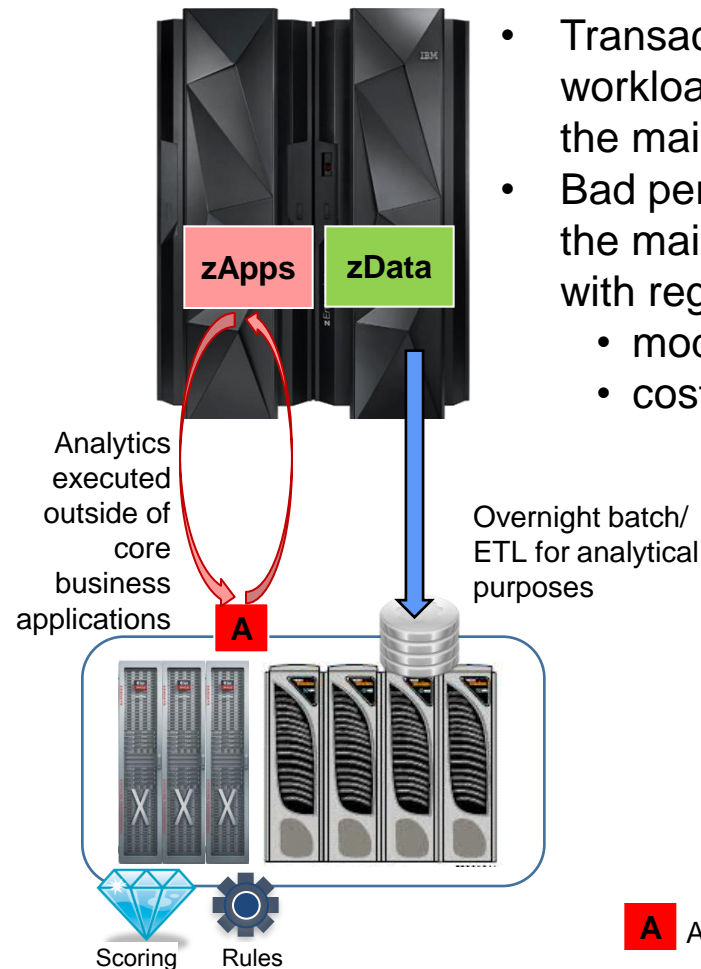
both have a high demand in secure data management



Lines of business/
Data scientists

- Aim to improve level of detail and frequency of existing analytics
- Have innovative ideas for new analytics
- Are driven by increasing demand in regulatory requirements

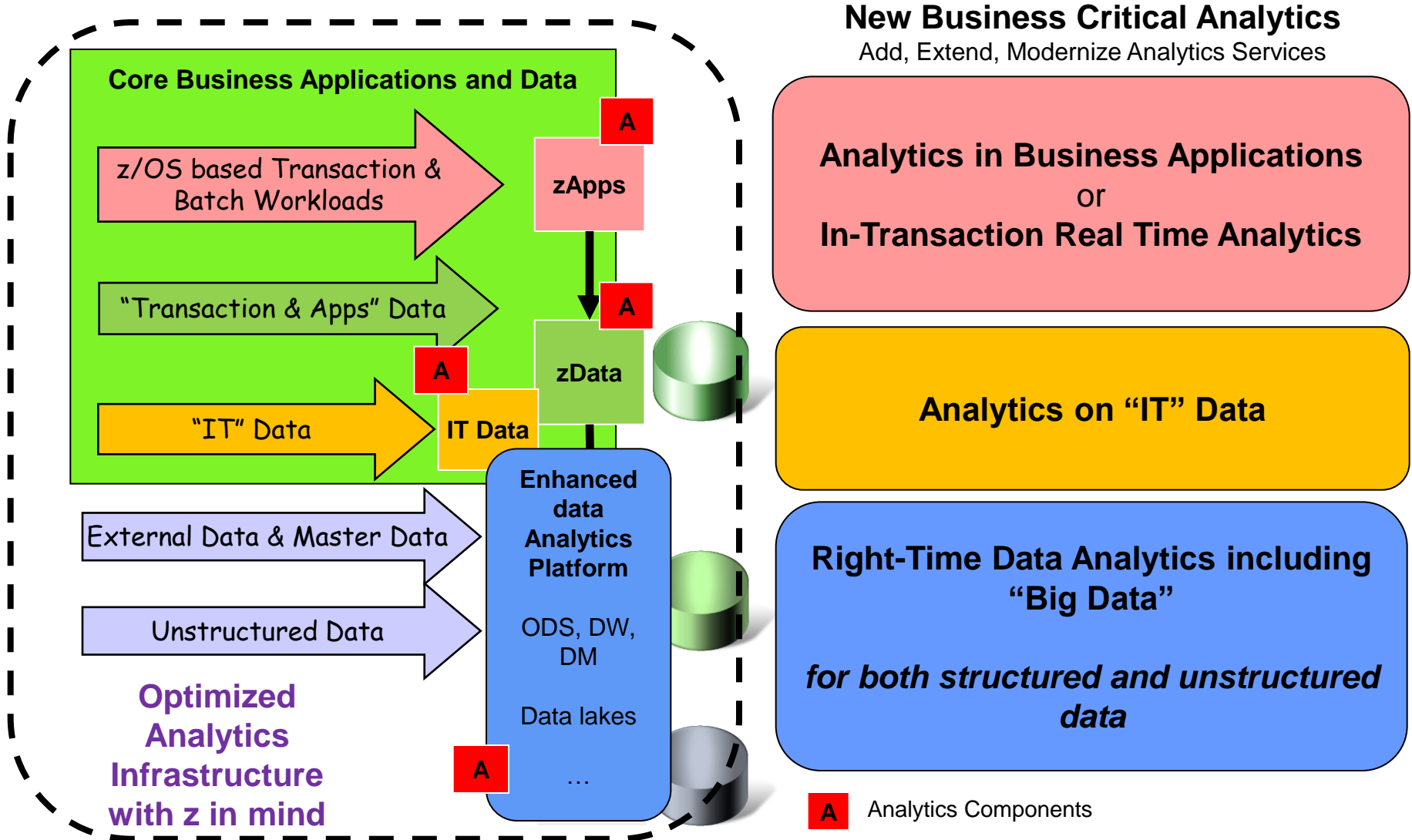
IT



- Transactional workload runs on the mainframe
- Bad perception of the mainframe with regards to
 - modernity
 - cost efficiency

- DW / analytical environment on distributed platforms
- Huge amount of analytics applications

z Systems Analytics Areas – Evolution & Extension



Focus on “Analytics in Business Applications”

What is “real-time analytics?”



*It's about leveraging the power of analytics “in the transactional moment” to achieve a more favorable outcome for a transactional event, *while the event is in progress**

- **This is the time during which a transactional event is still occurring**

- Someone is shopping at a store
- Someone is on the phone with a customer service representative
- An electronic payment is being processed
- ...

- **By acting on threats or opportunities as they arise...**

- Revenues can be increased (up-sell, cross-sell)
- Customer churn can be reduced

The person visiting a store buys more than he or she otherwise would have



What would have been an over-payment is stopped before it gets out the door



The person on the phone, who was about to cancel a service, instead re-ups



A commission of fraud is stopped before it is effected



Focus on “Analytics in Business Applications”

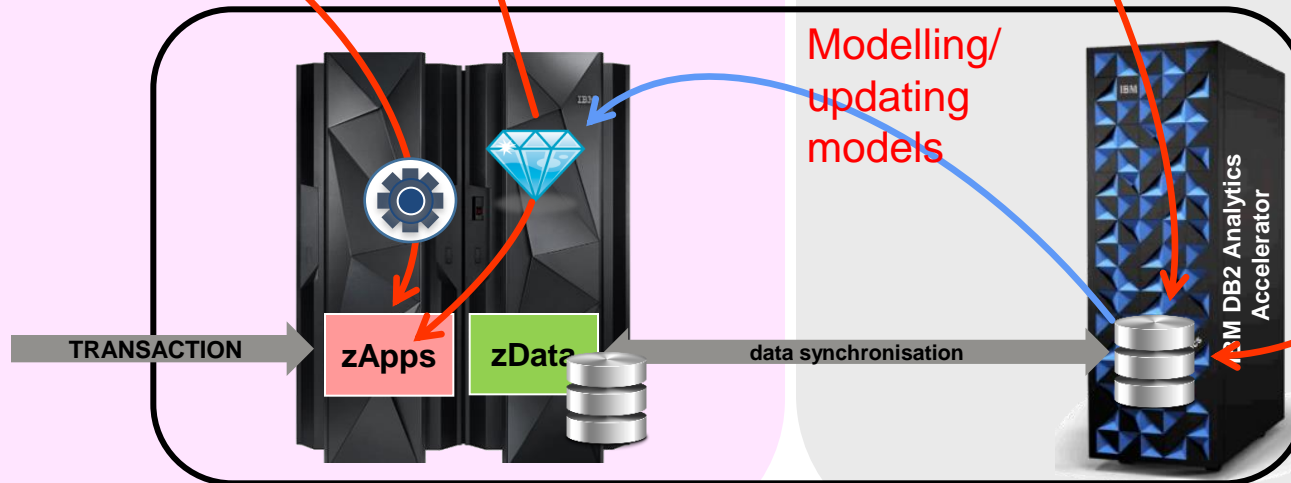
Understand the two different steps

Rule & Model Execution

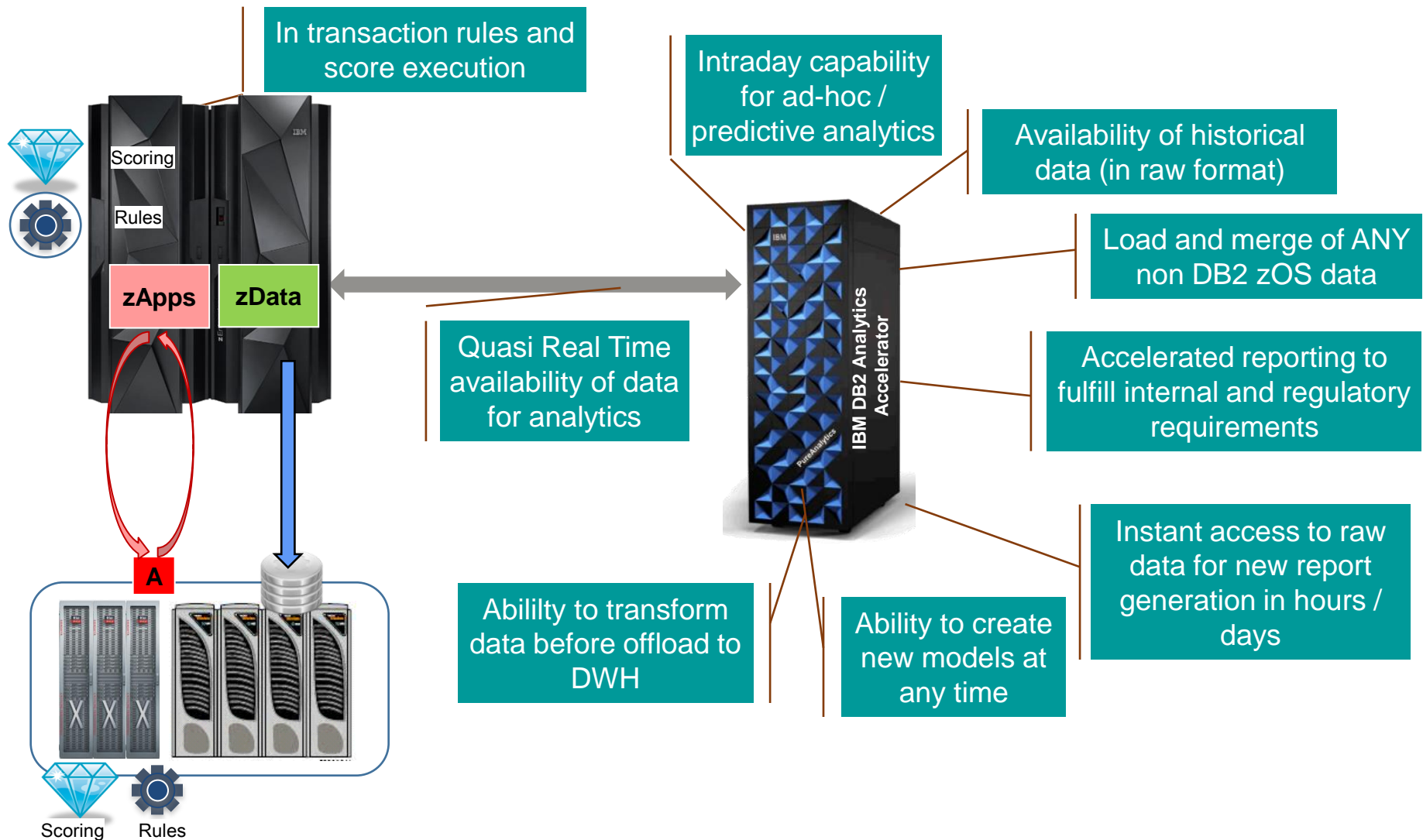
- 1**
Decision Management / Rules application
- 2**
Scoring against an existing model

Rule & Model Creation

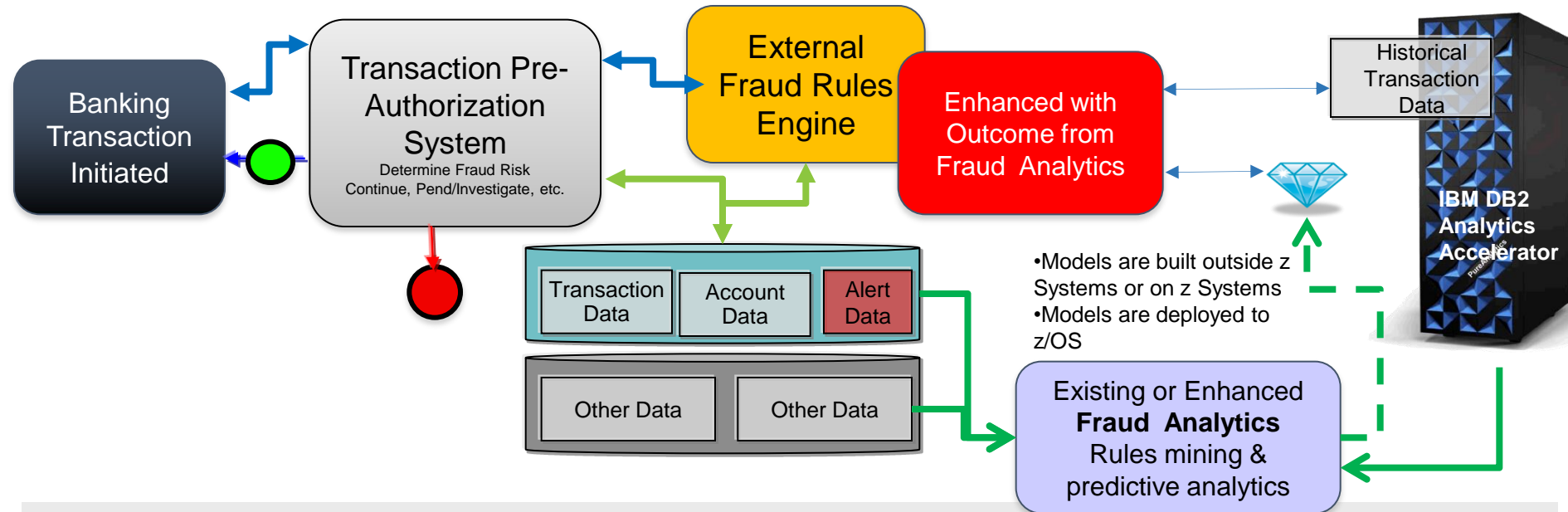
- 3**
Merging non DB2 for zOS data
- 4**
(accelerated)
Real Time / Predictive Analytics / Reporting
- 5**
Modelling/ updating models
- 4a**
In Database Transformation



Focus on “Analytics in Business Applications” *How it complements existing environments?*



Business Example - z/OS Optimized Fraud Detection for Banking Transaction



Business Challenge:

- Improve fraud detection capabilities through added insight: real-time access to most current data, integrated advanced analytics within the business flow, access to aggregated data across geographic locations, merchants, issuer and history

Solution:

- Enhance existing fraud detection with *predictive* scoring integrated with fraud detection transaction at bank-transaction speeds and SLAs for *preventive* capabilities before the transaction completes

Benefit:

- Institution can save significant amounts on fraud detected prior to transaction completion
- Improved customer service using more advanced analytics, avoiding unnecessary account deactivations
- Reduced call center costs
- Able to integrate with institution's existing fraud capabilities to provide enhancement

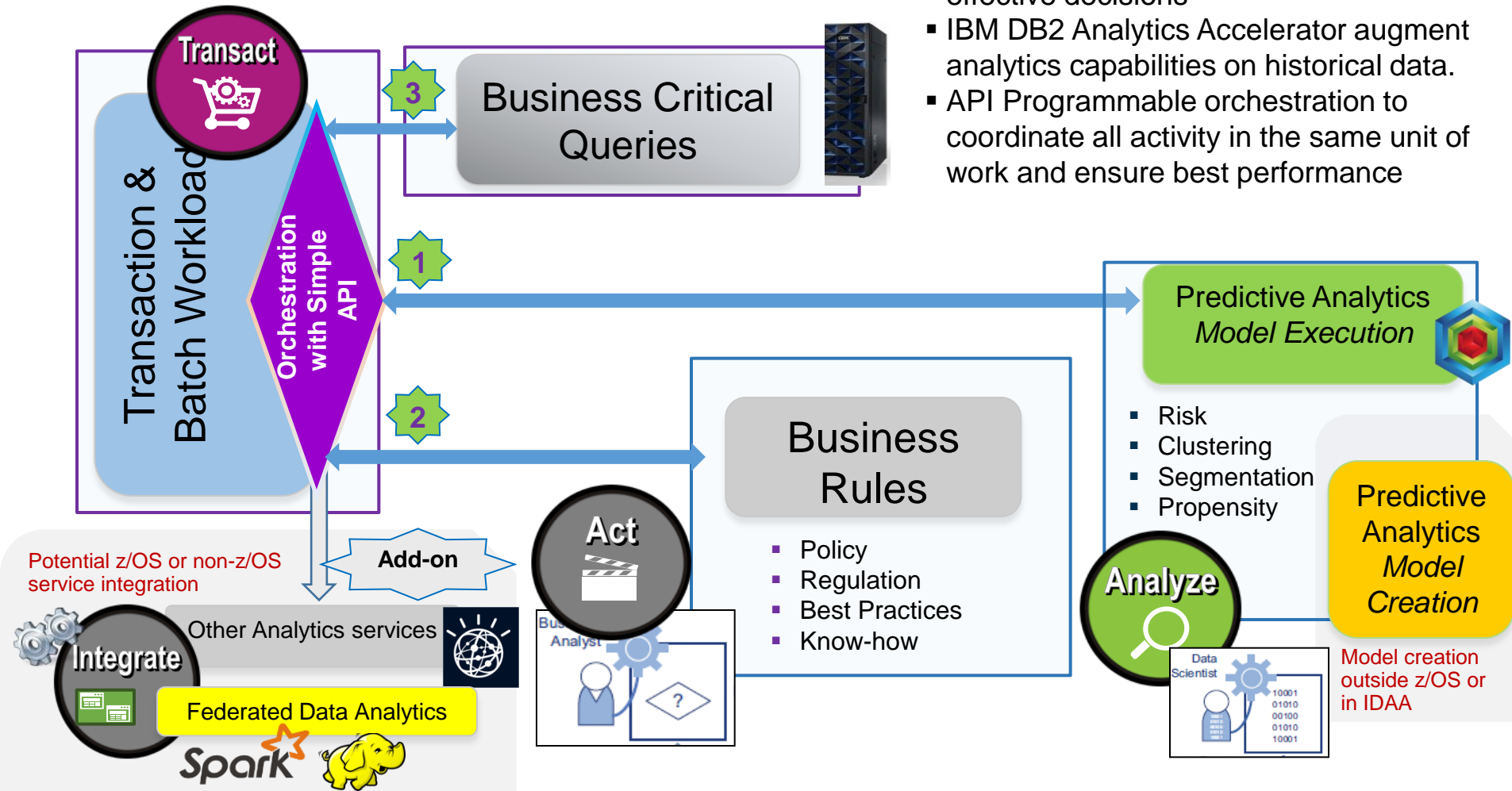
Technology Pillars for Real-Time Analytics Execution

An organization can go right to “ultimate” real-time analytics capability, or take a phased approach – and realize benefits at each intermediate stage (and the order of enabler implementation is up to the client)

- **Three technology pillars enable real-time analytics in a z/OS application runtime environment**
 - (1) **Business Rules** with Operational Decision Management – ODM on z/OS
 - (2) **Predictive analytics** with SPSS real-Time scoring or with Zementis solution
 - (3) **Business critical queries** with IBM DB2 Analytics Accelerator for z/OS based historical data
 - Optionally: integration with Hadoop or Spark solutions for **federated data analytics**, CPLEX mathematical algorithm for **Optimization** and Watson-based **cognitive services**
- **Each of the three pillars just mentioned delivers significant value on its own.**
- **Combined, they can work together to**
 - Uncover patterns of events and behaviors
 - Use those patterns to develop models to predict future occurrences
 - Use those models to identify threats and opportunities as they arise
 - Respond immediately to identified threats and opportunities in an autonomic fashion

Technology Pillars - A 100% z/OS based solution for Real-Time Analytics Execution

- Predictive modeling, business rules and orchestration together enable the most effective decisions
- IBM DB2 Analytics Accelerator augment analytics capabilities on historical data.
- API Programmable orchestration to coordinate all activity in the same unit of work and ensure best performance



Real-Time Decision solutions on z Systems

Value of deploying components on z/OS

▪ **Business Benefits**

- Capability to richly analyze in real-time 100% of the transactions without performance impact
- Agility to accept changes in business conditions by updating on the fly rules and models
- Auditability of business rules
- Easy to incorporate scoring in applications – let LOB innovate!

▪ **IT Benefits**

- When Performance Matters!
- No additional skills needed for COBOL/PLI development team
- Continuous availability with non-disruptive operational analytics inherited from the core systems (Hardware, operating system, CICS, IMS, DB2).
- Highest security level by keeping exchanged data within z Systems (no outbound data transit)
- Simplified system management - the integrated architecture leverages existing environment

Simple

Performant

Iterative

Adaptive

Zoom on Operational Decision Management

Modernize zApps with ODM on z/OS

A08 - Following the 'Business Rules' to Gain Agility with you IMS applications - Chris Backhouse
ODM on z Product Manager

Consolidation, Isolation, Extension or Extinction of COBOL or PL/I application portfolio

Cost savings

- *Shorter change cycle*
- *Rule engine processing offload eligible*

Be able to react to increasing variety and volume of change requests

Improved Time to Market

- *Business decisions in natural language*
- *Decouple development and business decision change lifecycles*

Sharing business rules across platforms & channels

Single version of the Truth

- *Shared expression of business policy*
- *Maintain with Center of Competency*

Ensuring seamless business experience in migration / application evolution

Incremental Adoption

- *Deploy one decision at a time*
- *Focus on decisions that are complex or need to change often & quickly*

IBM Operational Decision Manager on z/OS *Restructured for 8.8*

[Ann Letter: IBM Operational Decision Manager Advanced for z/OS](#), V8.8 enables proactive decisions in the business moment on a z Systems server
(Ann Oct 2015 – GA Dec 11 2015)

A10 - Gain new 'Insight' with ODM Advanced's Event Processing capabilities and IMS - Chris Backhouse, ODM on z Product Manager

IBM Operational
Decision Manager for
z/OS 8.7

IBM Business Rules
for z/OS 8.7

IBM ODM Standard 8.8

IBM ODM Advanced

- To capture events, build context, and apply it to operational decisions in real-time
- To detect situations as they occur – presenting risks or opportunities – to enable action – reducing decision latency

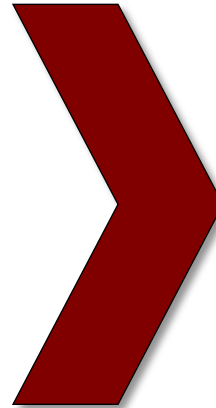
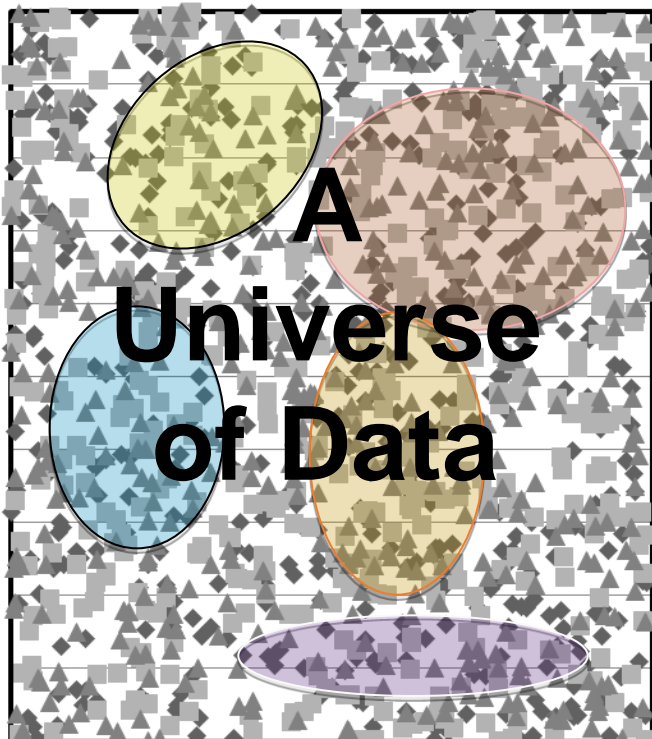
Situation Driven
Decision Automation

- To adapt the decision logic of applications at the pace of business
- Visibility into, control over, and automation of point-in-time business decisions

Request Driven
Decision Automation

Program number	VRM	Program name
5655-Y17	8.8.0	IBM Operational Decision Manager Advanced for z/OS
5655-Y08	1.1.0	IBM Operational Decision Manager Advanced for z/OS S&S
5655-Y31	8.8.0	IBM Operational Decision Manager Standard for z/OS
5655-ILH	1.1.0	IBM Operational Decision Manager Standard for z/OS S&S

Zoom on Analytical Decision Management – Predictive analytics



Example:

Increase customer retention

Reduce Fraud / Loss with detect & prevent

Mitigate risk based on predictions

Drive up-sell and cross-sell

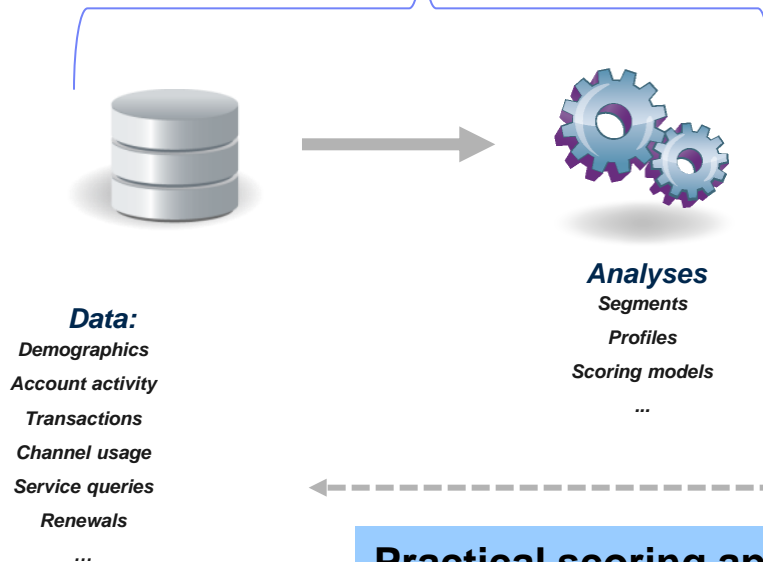
- *Pattern of consumer behavior over last 5 years of purchase history: card present at time of sale*
- *Current transaction:*
 - *Over \$1000, card not present*
 - *Merchant falls into category typical for this consumer's spend*
- *Use predictive analytics to determine likelihood of fraudulent transaction.*

- ***Develop insight to questions that are not binary 'yes' or 'no' → likelihood of a pattern***
- ***Predictive scores provide complementary insight to rules-based systems***

The Traditional “how” of Predictive Scoring - A 2 steps approach

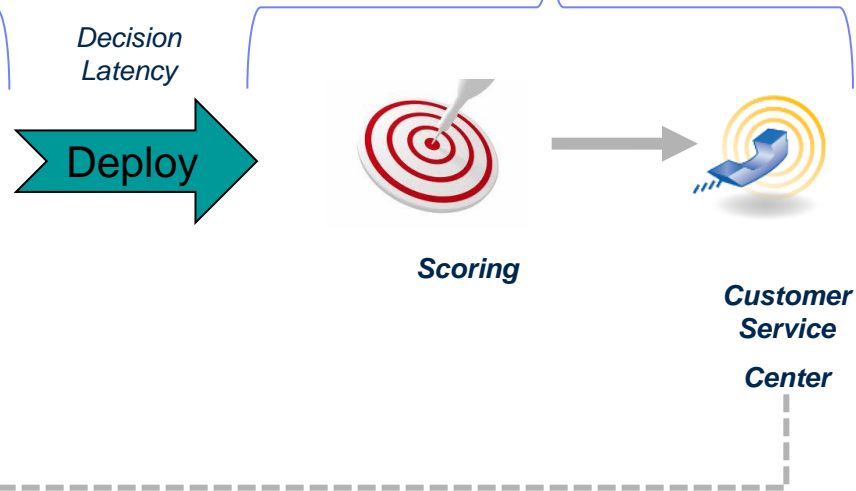
Step 1 – Build the predictive model

Identify **predictive models/patterns** found in historical data



Step 2 – Execute the predictive model

Use those predictive models with variables to score transactions & **identify the best possible future outcomes**

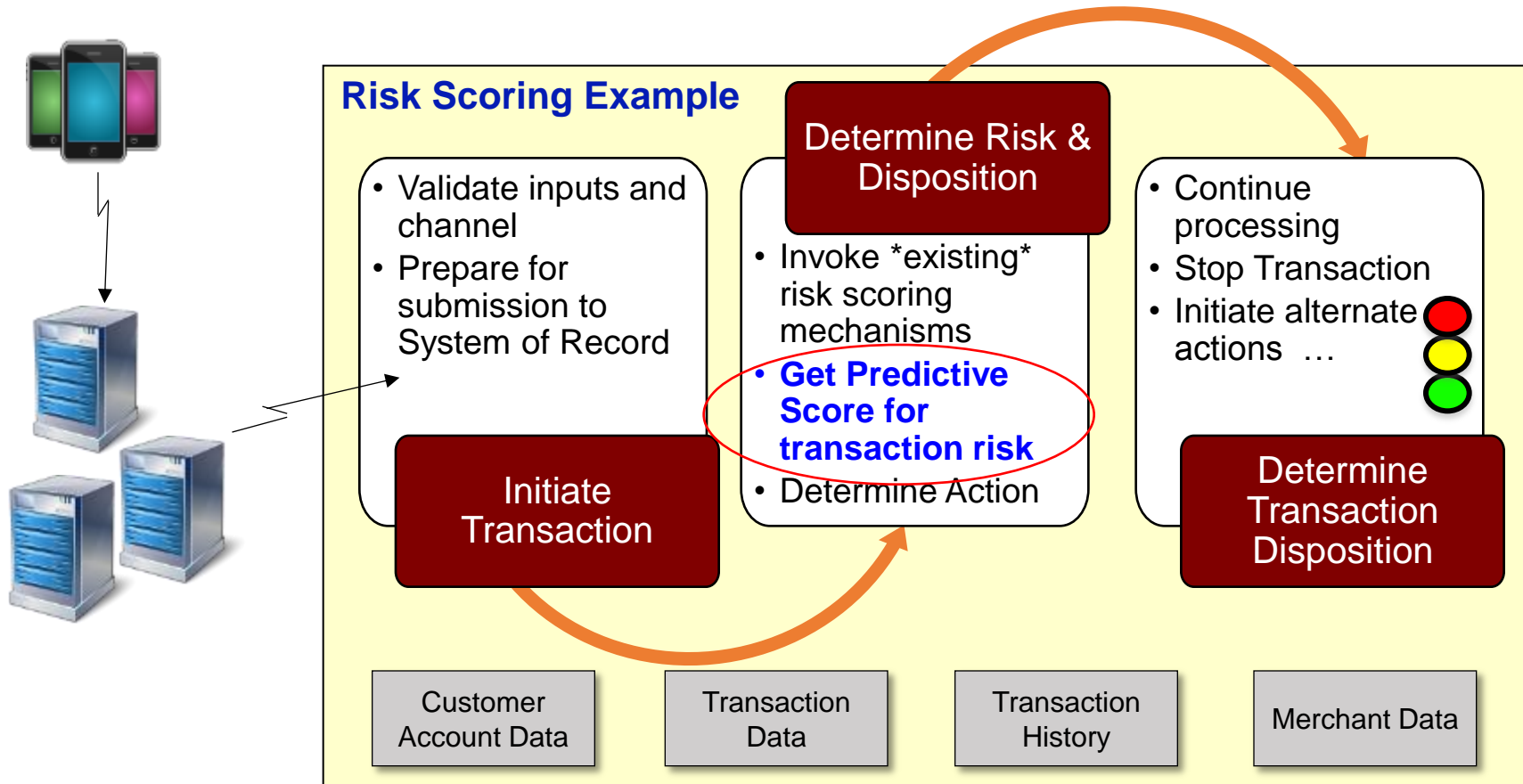


Practical scoring approaches

- Off-line: Batch Scoring
- On-line: External scoring function
- On-line: Within a transaction, in-DB, real time

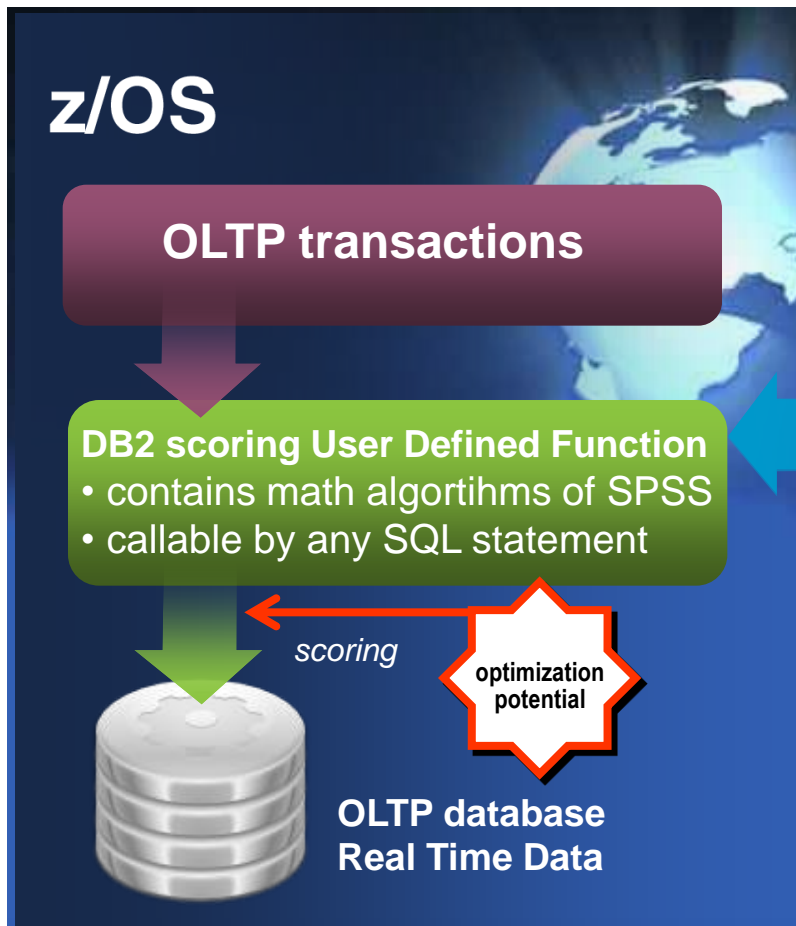
Business Example – Risk Scoring

In-transaction, synchronous predictive analytics



In-transaction predictive analytics can address issues such as data latency, timely execution, tight SLAs, governance of sensitive data, access to both transaction and external data, skills gaps.

Real-Time Scoring on z/OS – The SPSS & DB2 based solution



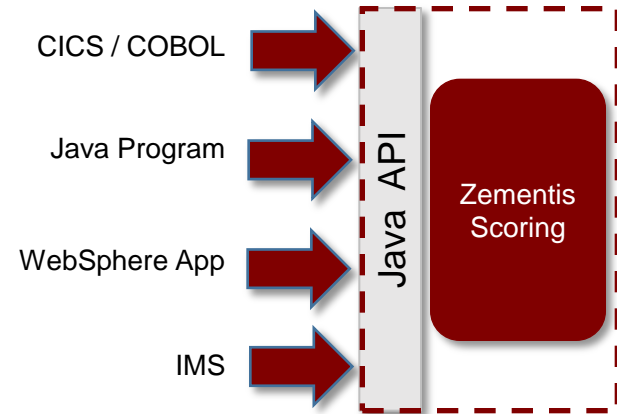
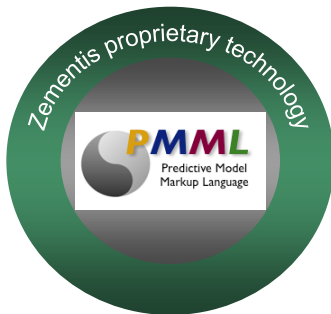
Model Published from SPSS

Example Model Types: Logistic Regression, C&RT, Decision Trees, Neural Net, CHAID, K-Means, Bayes, etc....

IBM SPSS Modeler Server with Scoring Adapter for z Systems

Real-Time Scoring on z/OS – The Java-based Zementis Solution

- **Zementis for IBM z Systems uses the Predictive Model Markup Language (PMML) to import and deploy predictive models**
- **Zementis proprietary technology delivers:**
 - Compatibility with IBM z Systems and other IBM technology solutions and platforms
 - Enterprise-grade performance and stability
 - Extreme scalability to support dynamic analytical requirements



- **Input to Zementis scoring engine is via Java APIs**
- **Model determines the input fields required, application feeds input fields and invokes Zementis' Java API**
- **Application integration will depend on:**
 - Application environment
 - Programming style of interaction
 - Organizational guidelines
 - Other technical factors

Zoom on Business Critical Queries

K05 - IMS meets IDAA - Udo Hertz,
Director of IBM z Analytics
Accelerator and Tools Development

■ Challenges

- IT refuses complex queries lasting too long because of impact on production workload.
- DB administrator needs time and tools to tune the queries
- So queries were executed on Data Warehouse data and not in real-time on operational data at the time of transactions.

*Do things you
could never
do before!*



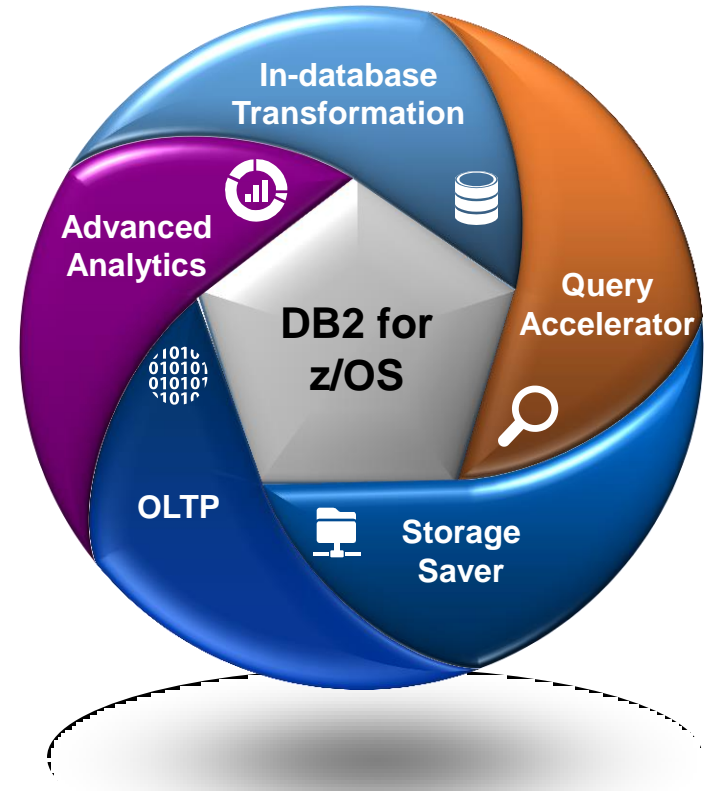
■ Solutions

- IBM DB2 Analytics Accelerator
 - Complex queries are now acceptable!
 - IDAA can be used as High Performance Storage Saver. No data in DB2 for z/OS!
 - IDAA Loader has several options for data refresh.
 - IDAA can be used for non-DB2 data (IMS DB, VSAM, ...)
- Workload management in z/OS
 - The optimized Mixed Workload environment
 - Performance goals assigned by workload based on SLAs

IBM DB2 Analytics Accelerator Strategy

Enable DB2 transition into a truly universal DBMS that provides best characteristics for both OLTP and analytical workloads.

- Complement DB2's industry leading transactional processing capabilities
- Provide specialized access path for data intensive queries
- Enable real and near-real time analytics processing
- Execute transparency to the applications
- Operate as an integral part of DB2 and z Systems
- Reusing industry leading PDA's query and analytics capabilities and take advantage of future enhancements
- Extend query acceleration to new, innovative usage cases, such as:
 - in-database transformations
 - advanced analytical capabilities
 - multi-temperature and storage saving solutions



Ultimately allow consolidation and unification of transactional and analytical data stores

Focus on Federated Data Analytics with Spark on z



Leverage data in place on z to avoid unnecessary data movement
Co-locate with key transactional environments on z

Easily create insight from
complex, messy data



APIs for streaming, graph database, SQL,
machine learning
Knowledge of Hadoop not required
Bring familiar skills to leverage on Spark
Federated data-in-place analytics access
while preserving consistent APIs

All Workloads



Machine learning
Iterative, Batch
App Dev
Java-based and zIIP eligible

Speed



In-memory processing
Capture insight in time to act
No code required to access data and
work across systems
Superior performance and flexibility
from integration with Rocket Software's
Mainframe Data Service for Spark z/OS

[Spark Insights 2015 demo](#)

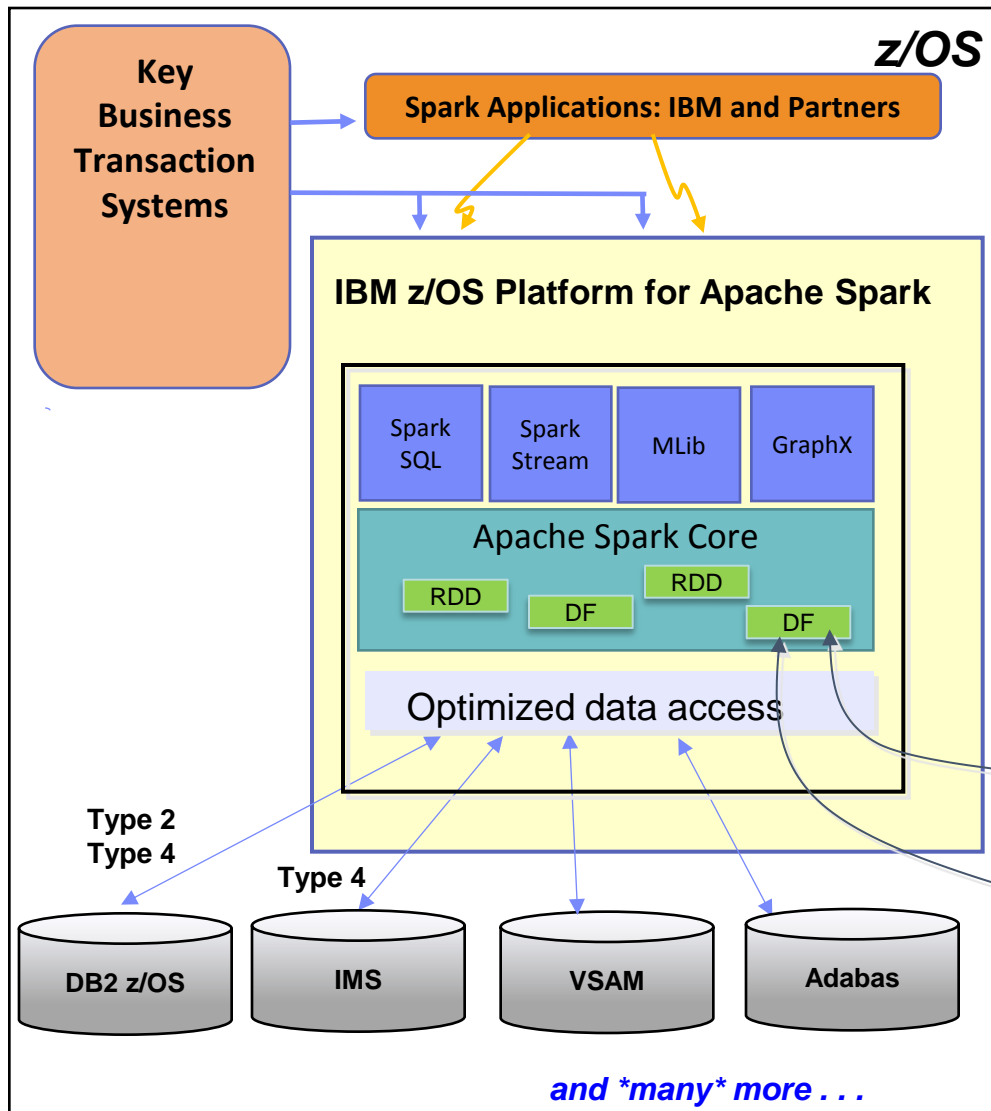
Available today!

Apache Spark for Linux on z Systems
and z/OS

More to come soon!

[Spark on z/OS available now](#)

Spark can run on z/OS close to z/OS-based Applications & Data



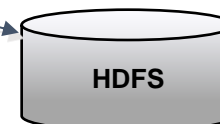
C10 Apache Spark with IMS and DB2 data
Denis Gaebler, IBM Germany

Values:

Data-in place analytics,
without need to ETL or move
data for analytic purposes

Optimized access and **z/OS**
governed 'in-memory'
capabilities for core business
data

Distributed



Unique capability to access
almost all z/OS sources with
Apache Spark SQL & many
non-z data sources

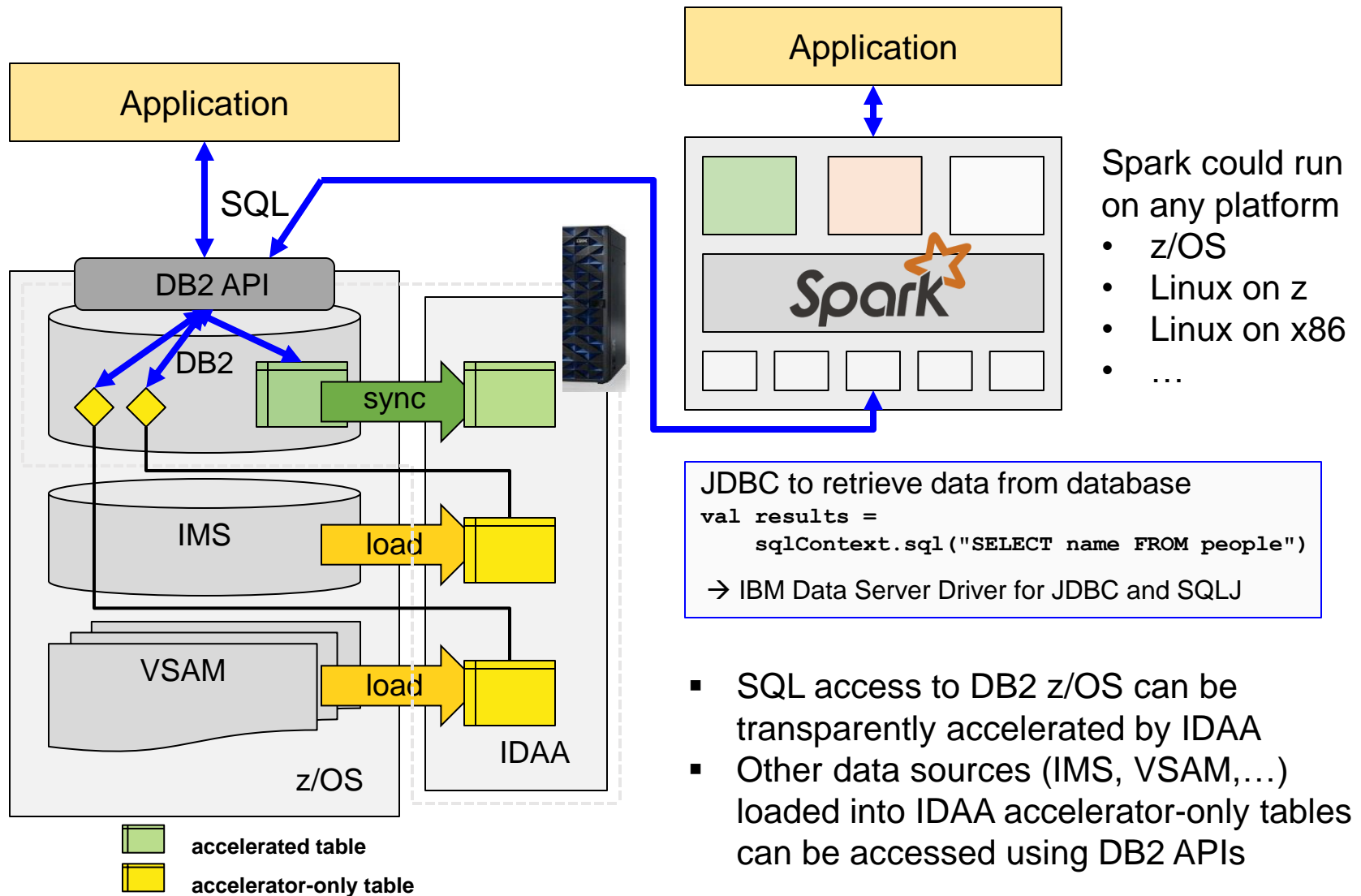
Almost all zIIP eligible

Integration of analytics
across core systems, social
data, website information,
etc.

and *many* more ...

and *many* more ...

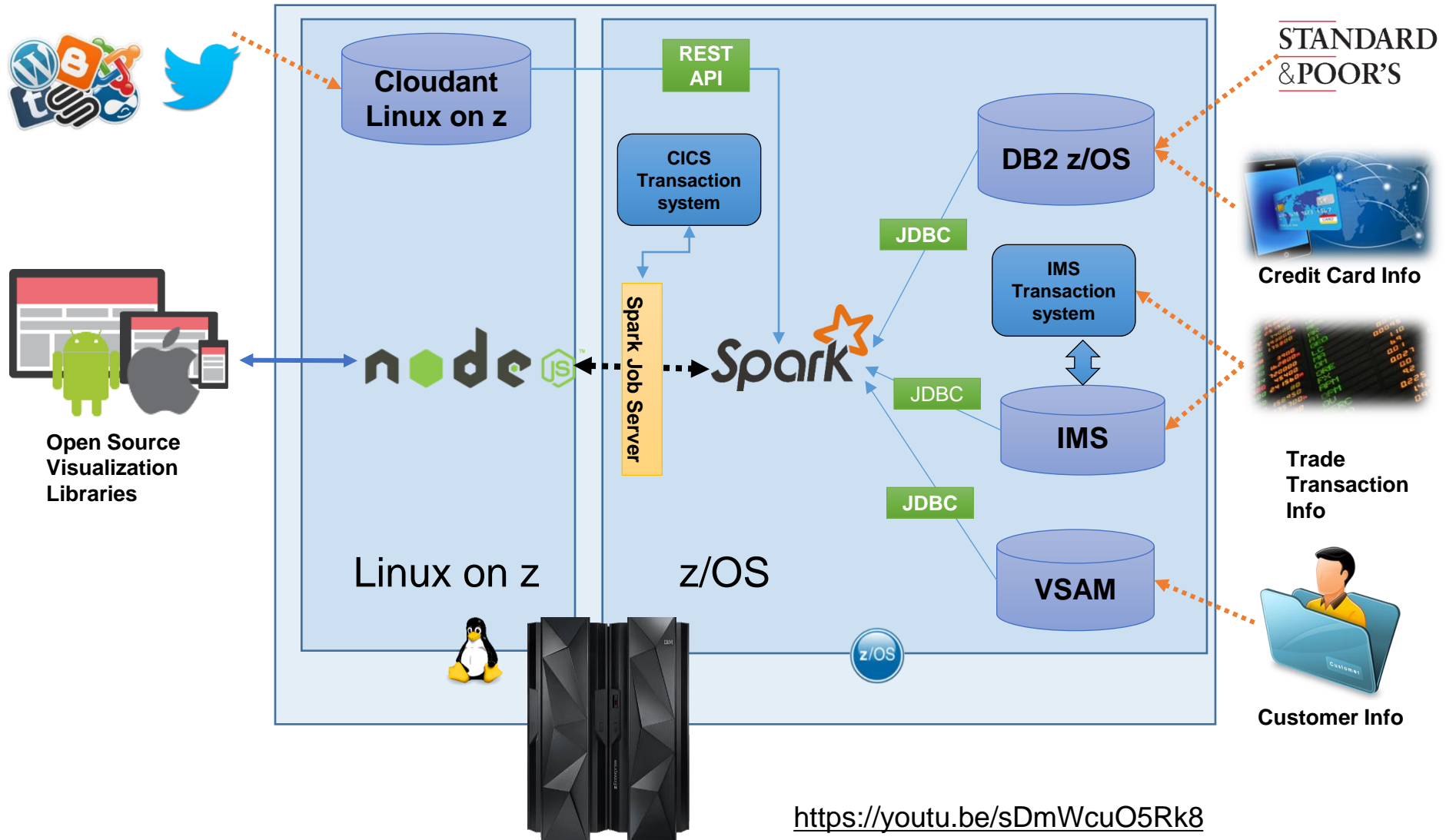
Spark can access z/OS-based Data – Accelerated or enabled by IBM DB2 Analytics Accelerator



Apache Spark z/OS Advantages: based on z/OS system characteristics, co-location with transactions & data on z/OS

- Real-time, fast, efficient access to **current transactions**, data as well as historical
- **Only Apache Spark z/OS offers integrated, optimized, parallel access to almost all z/OS data environments as well as distributed data sources**
- All Spark memory structures that will contain sensitive data are governed with **z/OS security capabilities**
- Analyze data in place means that you can include real-time operational data *and* warehoused data
- No need to have all data on z/OS: Spark z/OS can access a **wide variety of sources**
- **Sysplex** enabled Spark clusters for world class availability
- Leverages z/OS superior capabilities in **memory management, compression, and RDMA** communications to provide a high-performance scale up and scale out architecture.
- Uses unique features of z such as: **large pages**, incorporating DRAM with large amounts of Flash as an attractive means to provide scalable elastic memory.
- Provides a best fit analytic capability for the investments made in SMF in-memory analytics
- Leverages and gets benefit from our **zEDC compression** technology, particularly when compressing internal data for caching and shuffling.
- **SMT2** for added thread performance
- **SIMD** for better performance on select operations
- **zIIP eligible** -- for affordability
- **Intra-SQL and intra-partition parallelism** for optimal data access

Spark z/OS Demo: Configuration



A new approach for Enterprise Analytics with z Systems

Conviction 1: Bring the **analytics to the data** for Right-Time insight
Bring the **analytics in the application** for Real-Time Decision Management!

- Enrich transactions with real-time analytics allowing optimized decision management
- Improve Business value of mainframe applications
- Access to Mainframe data without moving it outside z Systems secured environment.
- Reduce data latency
- Minimize Cost & Complexity
- Improve Data Governance & Security

Conviction 2: Accelerate insight and simplify implementation with z13 & IBM DB2 Analytics Accelerator

Conviction 3: z Systems is the Most Securable for Data!

- Centralized data security
- Tracking of activity to address audit and compliance requirements
- Highly available cryptography

Conviction 4: Integrate Open Source technology in the z Systems Environment



IBM **LinuxONE**

- Did you miss the LinuxONE announcement?
- Linux Your Way, Linux Without Limits, Linux Without Risk

