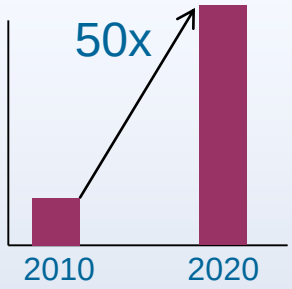
The Gold Standard for Enterprise Computing

Business Analytics on the Ultimate Data Platform

Data growth is accelerating, driving businesses to adapt

Cost effectively processing the growing **Volume**



35 ZB

- Every day we create 2.5 exabytes of data
- 12 terabytes of tweets every day
- Healthcare agency has a 22 billion row data warehouse

Responding to the increasing **Velocity**

30B RFID sensors and counting

- Walmart handles over 1 million customer transactions every hour
- Over 8.6 million cell phone calls a minute

Collectively analyzing the broadening **Variety**

80% of the worlds data is unstructured

- 144 billion emails a day
- Sensors and video feeds
- Twitter tweets
- RFID tags

Source: IBM

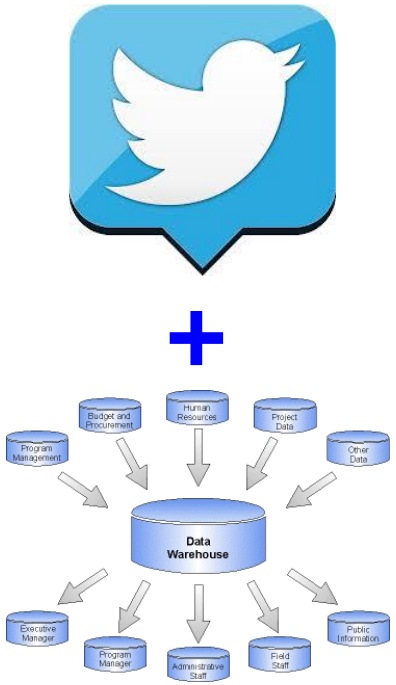
1 ZB = 10^{21} bytes. 1 EB = 10^{18} bytes. 1 PB = 10^{15} bytes. 1 TB = 10^{12} bytes

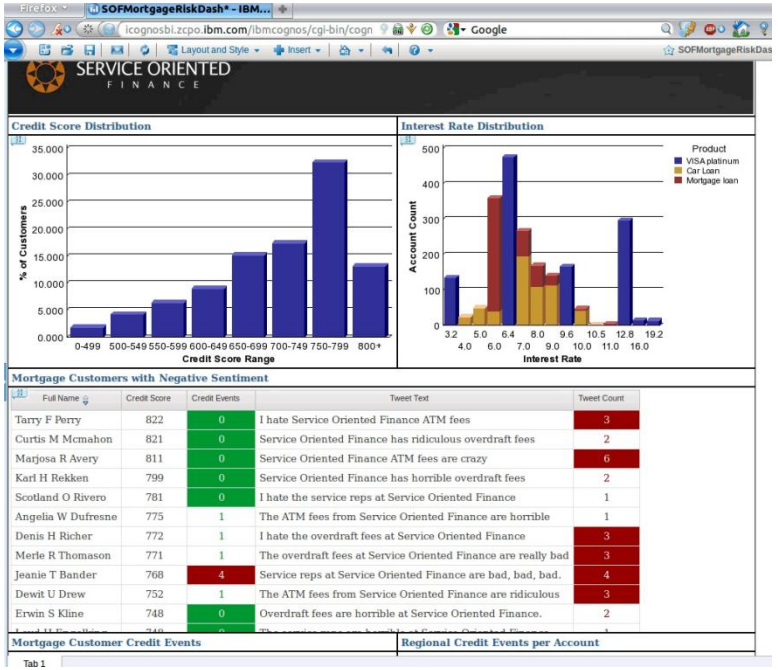
Analyzing all the data about customers adds business value

Data Source	Analysis	Business Value
Traditional RDBMS 	Analyze all customer records across departments	Complete view of customer value to the company
External Data 	Analyze customer sentiment and experience	Attract and retain customers
Real Time Data 	Analyze customer data as it happens	Personalize customer interaction in real time

DEMO: Gain a 360º view of customers to help improve profitability

- Solution
  - Combined data from Twitter with mortgage data in the data warehouse
  - Built report with Cognos Report Studio
- Purpose
  - Identify good customers who have made complaints about Service Oriented Finance on Twitter





Leading businesses are using IBM analytics to gain a competitive advantage

Colt Technology Services Group **saves USD 1.9M** annually through improved business intelligence

Japanese internet company - analyze and process 18M transactions/hour, to increase **subscribers by 100**%

"reduce the time to analyze complex GIS data from **days to minutes** - a more than **98% improvement**."

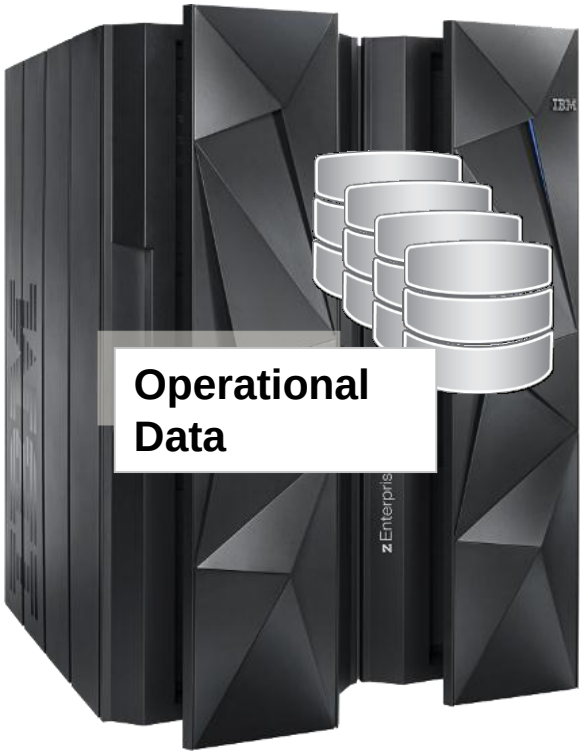
The more analytics a business uses, the better it performs

Increased annual **revenues by 30%**

Enabled **600 percent growth** in mobile solutions and **200 percent growth** in internet banking

Premier Healthcare Alliance improves patient outcomes while **reducing spending by USD 2.85B**

60-70% of operational data resides on System z…

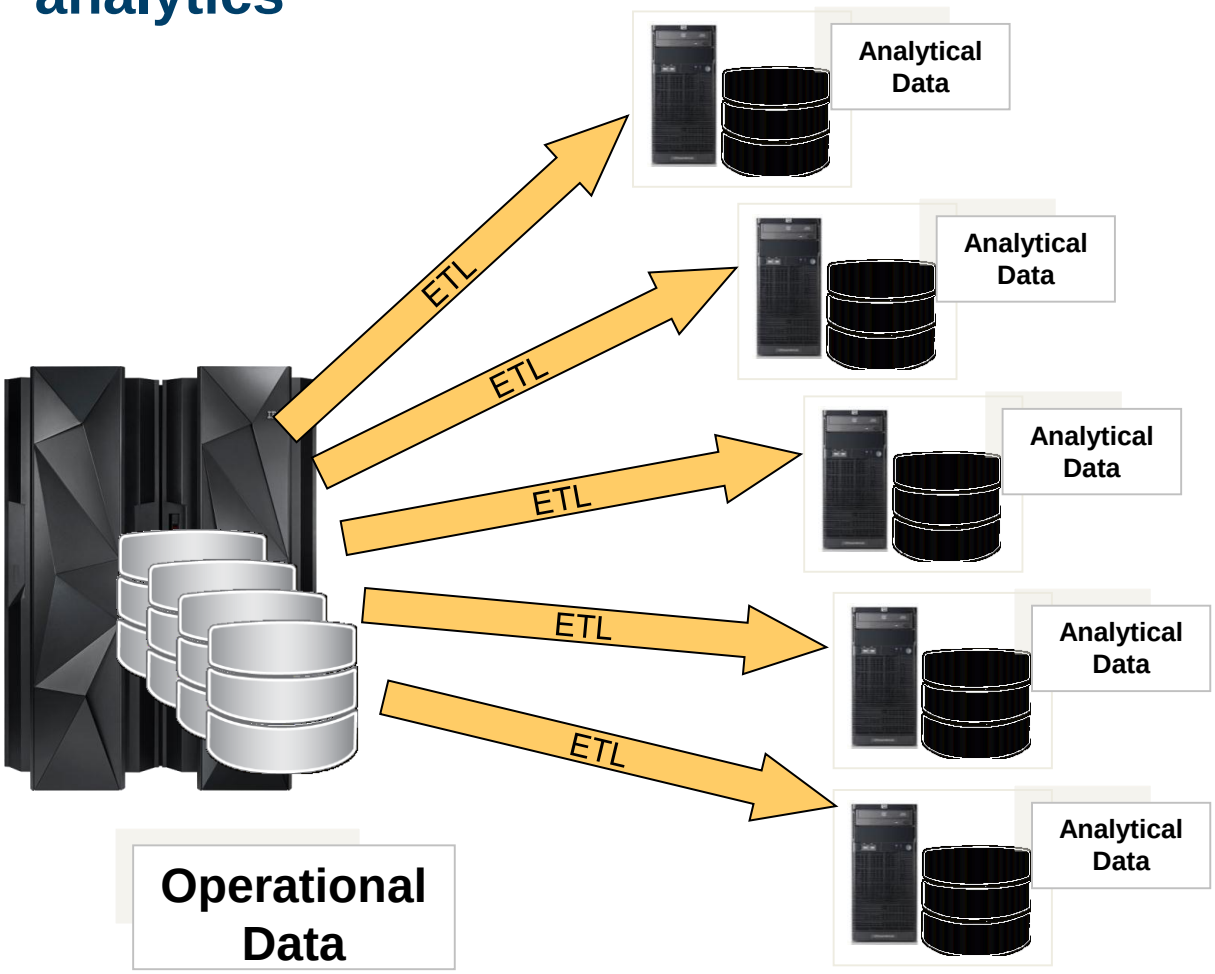


Yet, some customers do not perceive System z as a viable platform for data warehouse and analytics

So what happens?

Source http://www.ibmsystemsmag.com/mainframe/trends/whatsnew/The-Mainframe-at-a-Crossroads/

They adopt an extremely expensive ETL strategy to support analytics



A large European bank:

- 120 database images created from bulk data transfers
- 1,000 applications on 750 cores with 14,000 software titles
- ETL consuming 28% of total distributed cores and **16% of total MIPS**

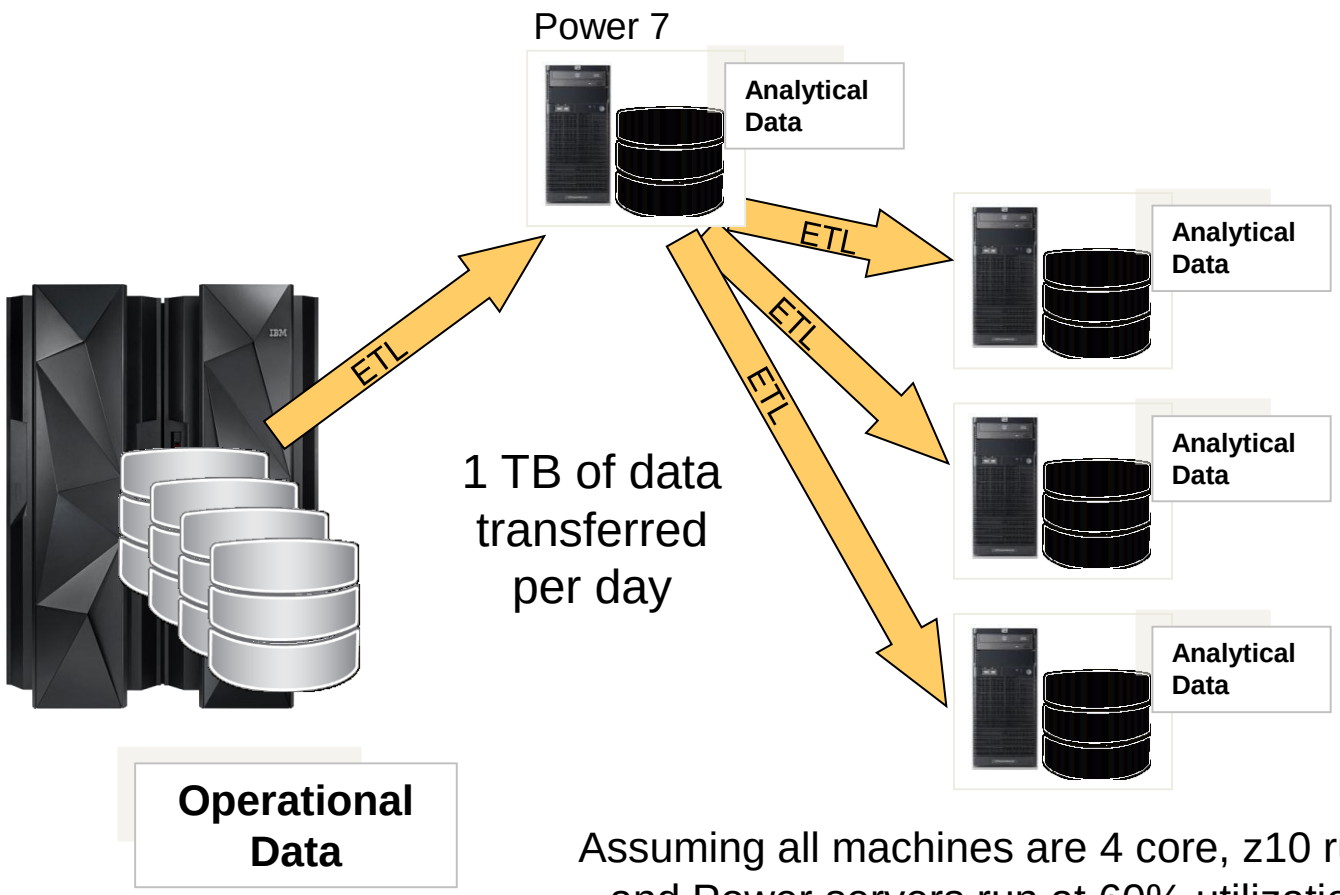
A large Asian bank:

- One mainframe devoted exclusively to bulk data transfers
- ETL consuming 8% of total distributed core and **18% of total MIPS**

With this strategy, IT costs grow faster than business growth

Source: IBM Eagle Studies

This leads to significant data transfer costs



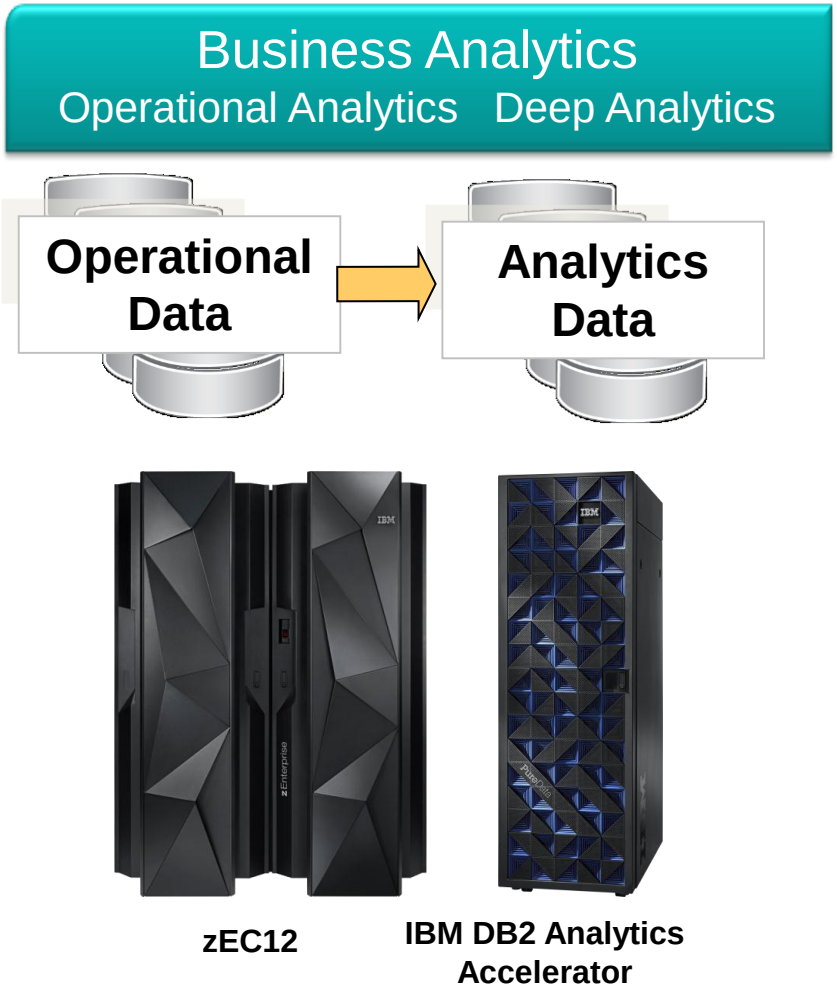
4 yr. amortized cost summary

System costs	= $8.0M
Labor costs	= $0.2M
Total	= $8.2M

Assuming all machines are 4 core, z10 runs at 85% utilization and Power servers run at 60% utilization, transfer will burn **557 MIPS** and use **21 distributed cores** *per day*

Source: IBM CPO cost case

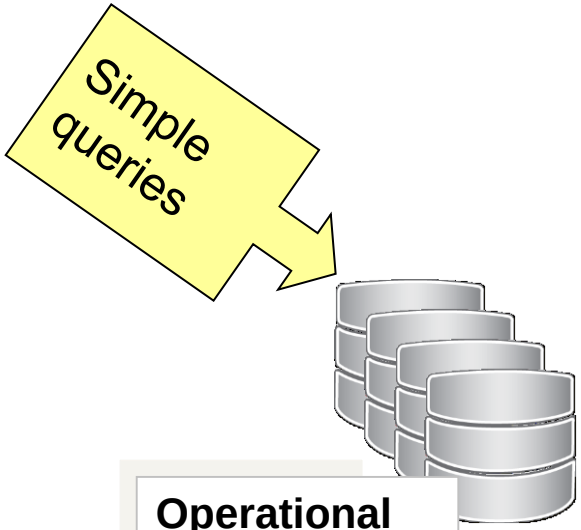
The best-fit solution – *Move analytics closer to the data*

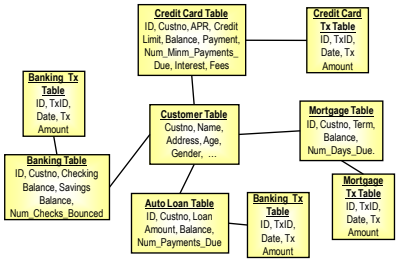


IBM zEnterprise Analytics System 9700

- Run analytics workloads in a separate LPAR
- Offload complex queries to IBM DB2 Analytics Accelerator
- Reduce data transfer costs
- Achieve lowest cost for analytic workload

DB2 for z/OS is a first class platform for operational business intelligence queries





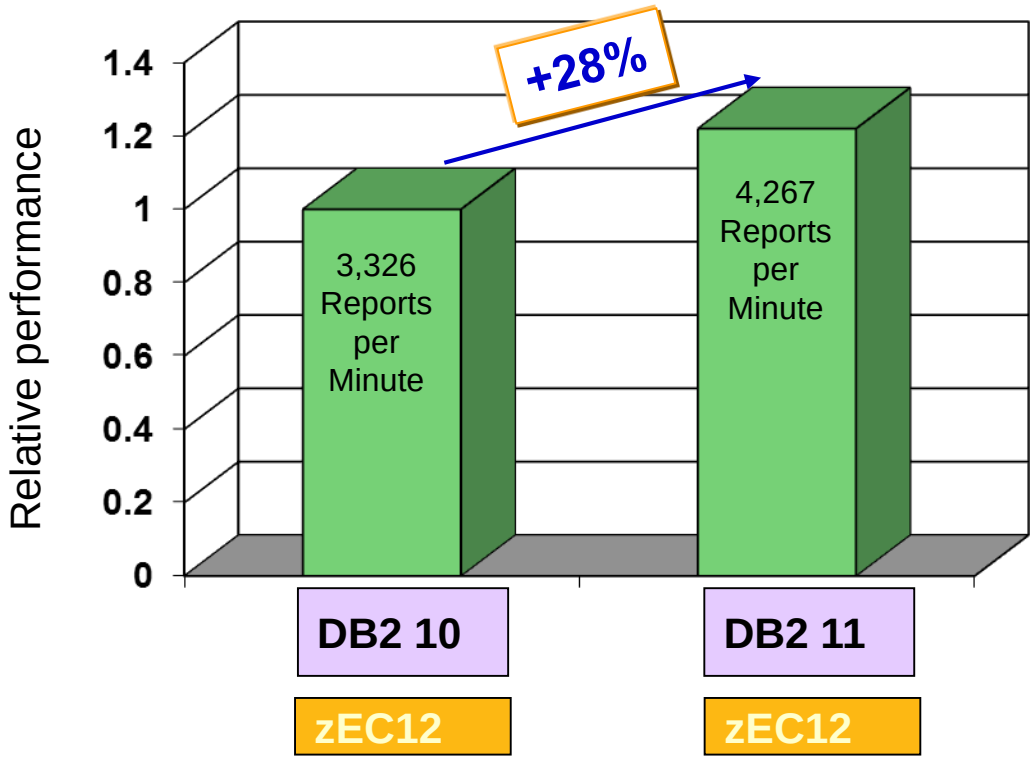
- z/OS WLM optimizes resource sharing to minimize impact on OLTP performance
- Parallel sysplex yields near-linear scaling and high availability
- DB2 Cost Based Optimizer provides best access path and query execution plan

zEnterprise EC12

DB2 for z/OS supports up to 20,000 concurrent connections per subsystem

Up to **22%** CPU savings with DB2 11!

Upgrade to DB2 11 for z/OS to achieve more operational analytics throughput for the same cost

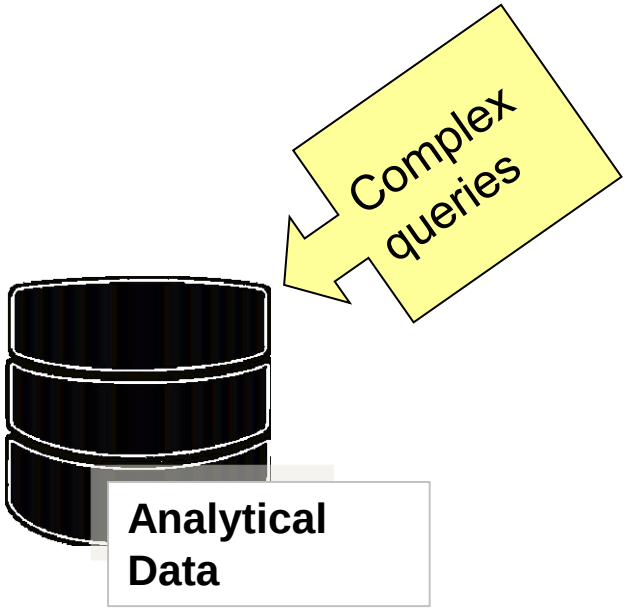


IBM internal analytics workload (BI Day)

Workload consisted of 160,860 Cognos BI Day simple reports. Both tests used 10 CPs and ran at 100% utilization. Results may vary based on customer workload profiles/characteristics.

DB2 for z/OS is also optimized for data warehouse queries

- Data is partitioned to increase parallelism and compressed to increase I/O performance
- DB2 Cost Based Optimizer decides best execution plan for each query
  - Complex queries may be decomposed into operations that execute in parallel
  - Queries may be automatically rewritten to take advantage of pre-computed partial results in materialized query tables (MQT)



Data Warehouse workloads typically include a mix of simple, intermediate and complex queries

Up to **40%** CPU savings with DB2 11!

zEnterprise EC12

IBM DB2 Analytics Accelerator executes complex queries significantly faster

Query	DB2 (Secs)	DB2 + Analytics Accelerator (Secs)	Speed Up	Rows Reviewed	Rows Returned
Query 1	9,540	5	1,908x	2,813,571	853,320
Query 2	8,220	5	1,644x	2,813,571	585,780
Query 3	4,560	6	760x	8,260,214	274
Query 4	4,080	5	816x	2,813,571	601,197
Query 5	4,080	70	58x	3,422,765	508
Query 6	3,180	6	530x	4,290,648	165
Query 7	3,120	4	780x	361,521	58,236
Query 8	2,640	2	1,320x	342,529	724
Query 9	2,520	193	13x	4,130,107	137

Run analytic workloads on the same platform as the operational data

- IBM DB2 Analytics Accelerator based on Netezza technology
- Integrated with DB2 for z/OS, transparent to the application
- Unprecedented response times – complex queries run in seconds instead of hours

Actual customer results, October 2011

Swiss Mobiliar uses IBM DB2 Analytics Accelerator to deliver actionable insights

Need:

Cost-effective way to deliver complex analysis for eligibility and excess requirements for insurance products

Solution:

Implemented DB2 Analytics Accelerator and zEnterprise to provide transaction processing and analytics workloads in a cost-effective solution

50%

of the queries performed 100 times faster

20 seconds

to complete queries that took 5 hours

> *"IBM DB2 Analytics Accelerator enables us to support the additional workloads that come with business growth without activating more cores on the mainframe."*

BI Day workload – A typical day's worth of analytics reports

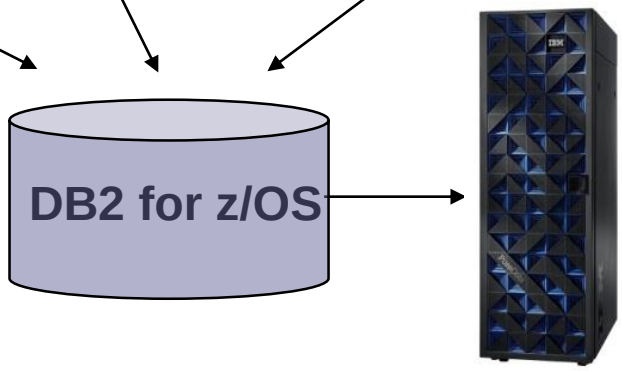
BI Day Fixed Execution Test: Total Number of reports = 161,166

4	3	21	179	99	29,078	84,854	19,600	27,328
Complex Report 1	Complex Report 3	Intermediate Report 9	Intermediate Report 10	Intermediate Report 11	Simple Report 2	Simple Report 4	Simple Report 5	Simple Report 6

4 connections

20 connections

56 connections

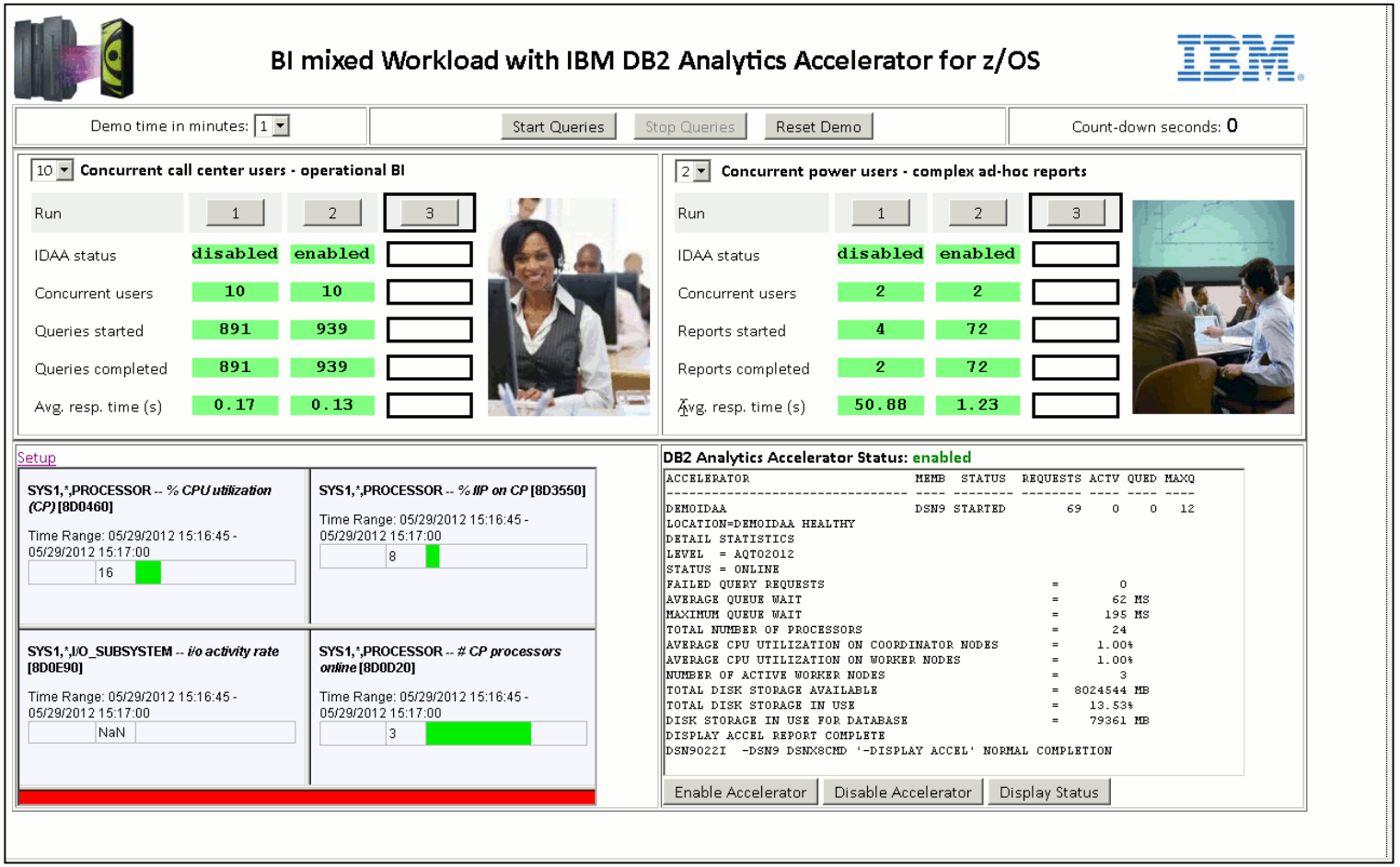


Each report executes one or more SQL queries

- 80 concurrent connections to DB2 for z/OS
- All short running SQL queries processed by DB2 for z/OS
- Long running SQL queries directed to accelerator

DEMO: DB2 Analytics Accelerator

Compare DB2 BI Day query processing using the IBM DB2 Analytics Accelerator



zEnterprise is optimized for business analytics

Standalone Pre-integrated Competitor V3

Quarter Unit

Unit Cost (3yr TCA) **$481/RpH**

Workload Time (mins)	1,318
Reports per Hour (RpH)	7,337

IBM zEnterprise Analytics System 9710

Unit Cost (3yr TCA) **$46/RpH**

Workload Time (mins)*	148
Reports per Hour (RpH)	65,338

***9x** performance*
***10x** price performance!*

Customer Study on 10TB BI Day data running 161,166 concurrent reports. Intermediate and complex reports automatically redirected to IBM DB2 Analytics Accelerator for z/OS. Results may vary based on customer workload profiles/characteristics.

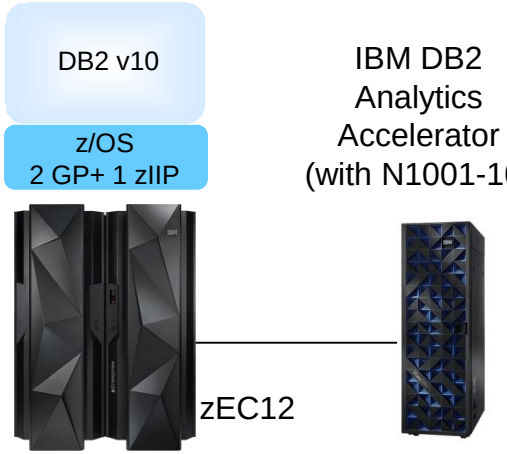
zEnterprise is optimized for business analytics

Traditional Data Warehouse Competitor

6650H

(current generation)

IBM zEnterprise Analytics System 9700



(current generation)

Unit Cost (3yr TCA) **$330K/QpH**

Workload Time (secs)*	1,591
Queries per Hour (QpH)	9
Total Cost (3 yr. TCA) - Teradata 6650H 1-Node (HW+SW+Storage)	$2.9M

Unit Cost (3yr TCA) **$10K/QpH**

Workload Time (secs)*	61
Queries per Hour (QpH)	236
Total Cost (3 yr. TCA) – 9700 : zEC12 (1 GP + 1 zIIP) + DB2 Analytics Accelerator (HW+SW+Storage)	$2.3M

***26x** performance*
***33x** price performance!*

Customer Study on 10TB BI Day data running 161,166 concurrent reports. Intermediate and complex reports automatically redirected to IBM DB2 Analytics Accelerator for z/OS. Results may vary based on customer workload profiles/characteristics.

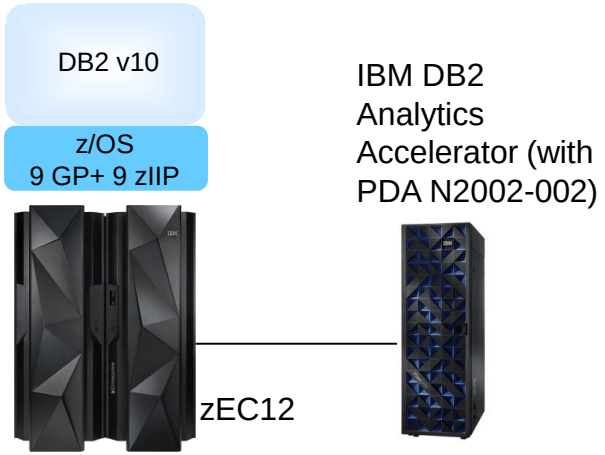
zEnterprise is optimized for business analytics

In-memory Database Competitor
40 Intel Westmere cores
512GB RAM
8x900 HDDs
1.2TB SSD

Unit Cost (3yr TCA) **$72/RpH**

Workload Time (mins)	302
Reports per Hour (RpH)	32,020

IBM zEnterprise Analytics System 9700



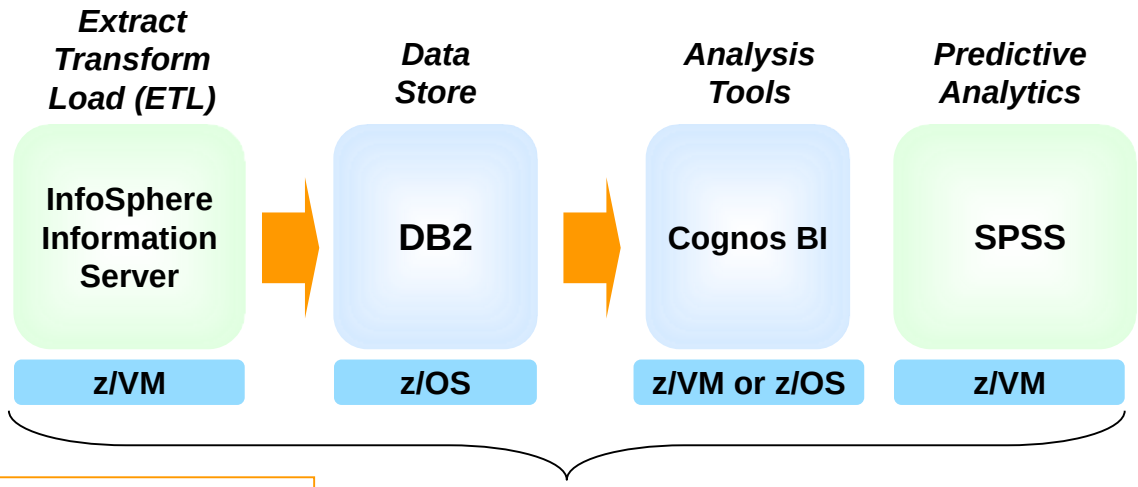
Unit Cost (3yr TCA) **$10/RpH**

Workload Time (mins)*	24
Reports per Hour (RpH)	402,915

***13x** performance*
***7x** price performance!*

Results may vary based on customer workload profiles/characteristics. * Results projected from IBM DB2 Analytics Accelerator V4.1 with N2002-002 hardware and DB2 11 for z/OS on zEC12-710 hardware

Run a complete portfolio of operational and analytics software on IBM zEnterprise EC12



IBM zEnterprise Analytics System 9700 –
A comprehensive packaged solution including hardware, OS, and business analytics software

FastStart Service Pack enables quickest time to value with the least amount of impact

Data Integration Pack provides data movement and transformation, data discovery and real-time delivery

Data Analytics Pack includes QMF, Cognos and SPSS

zEnterprise

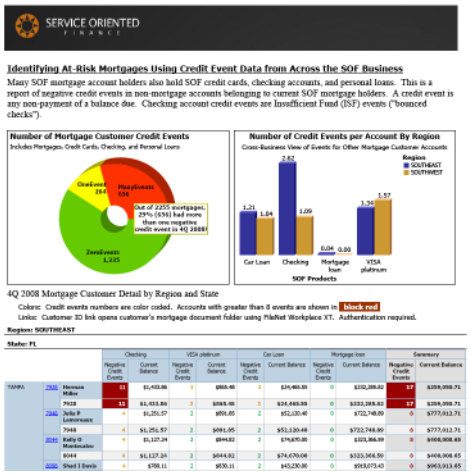
IBM DB2 Analytics Accelerator

Full function operational business intelligence AND business analytics on the same platform

Business analytics answer key questions and drive a competitive edge

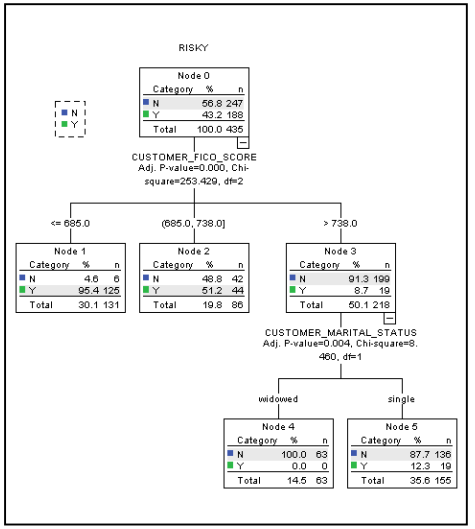
Descriptive Analytics:

- Insight into what has happened
- Provides reports/dashboards
  - Aggregate and drill-down on data using different dimensional attributes such as by date, geography, demographics, etc.
- Visualize data using interactive charts, graphs, maps and other objects



Predictive Analytics:

- Predicts what might happen
- Provides scores that helps in optimized decision support
  - Build models using historical data and mathematical algorithms such as clustering or classification
- Some models provide rules that can be integrated into business processes



IBM Cognos Enterprise

IBM SPSS Statistics and Modeler

Generate reports and dashboards for operational business intelligence and deep analytics queries

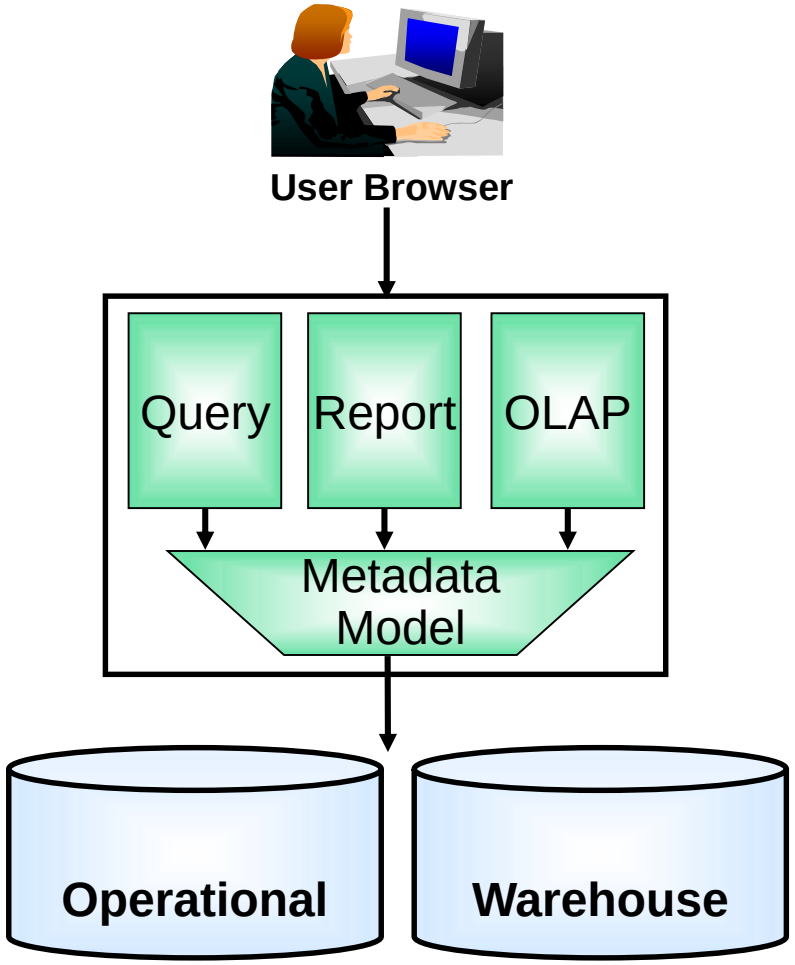
IBM Cognos Enterprise

People-centric

- Server based business analytics accessed via browser
- Consistent user interface for different analytic activities
- Reuse new intelligence assets
- Built-in collaboration and social networking
- Threaded discussions, activities, and notifications

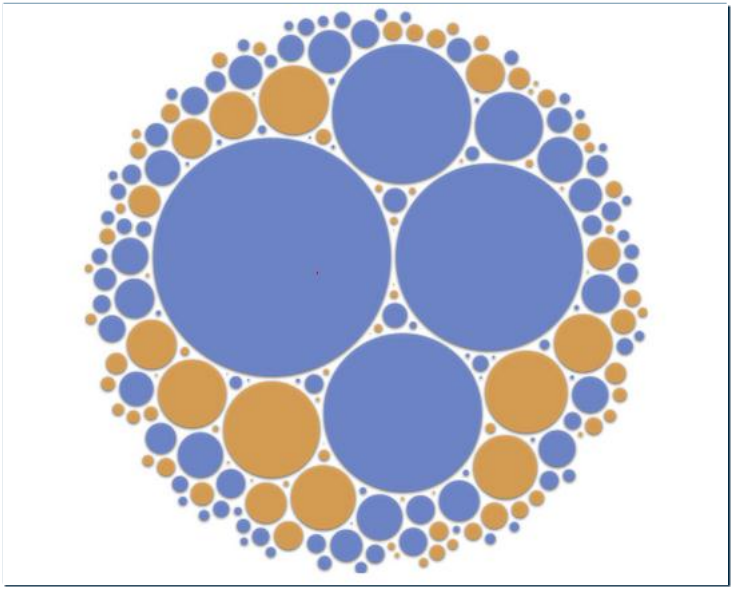
Easy to deploy and manage

- Implemented in Java, runs on WebSphere
- Scales up and out across heterogeneous hardware and operating systems
- Runs on Linux on System z or z/OS



DEMO: New visualization tools help identify new business insights from the data warehouse

- Analyze tweets from Twitter to find features with negative sentiment
- Use DB2 to read the features into Cognos
- Visualize the frequency of the features using a bubble chart
  - Supported by Cognos Rapidly Adaptive Visualization Engine (RAVE) Active Reports

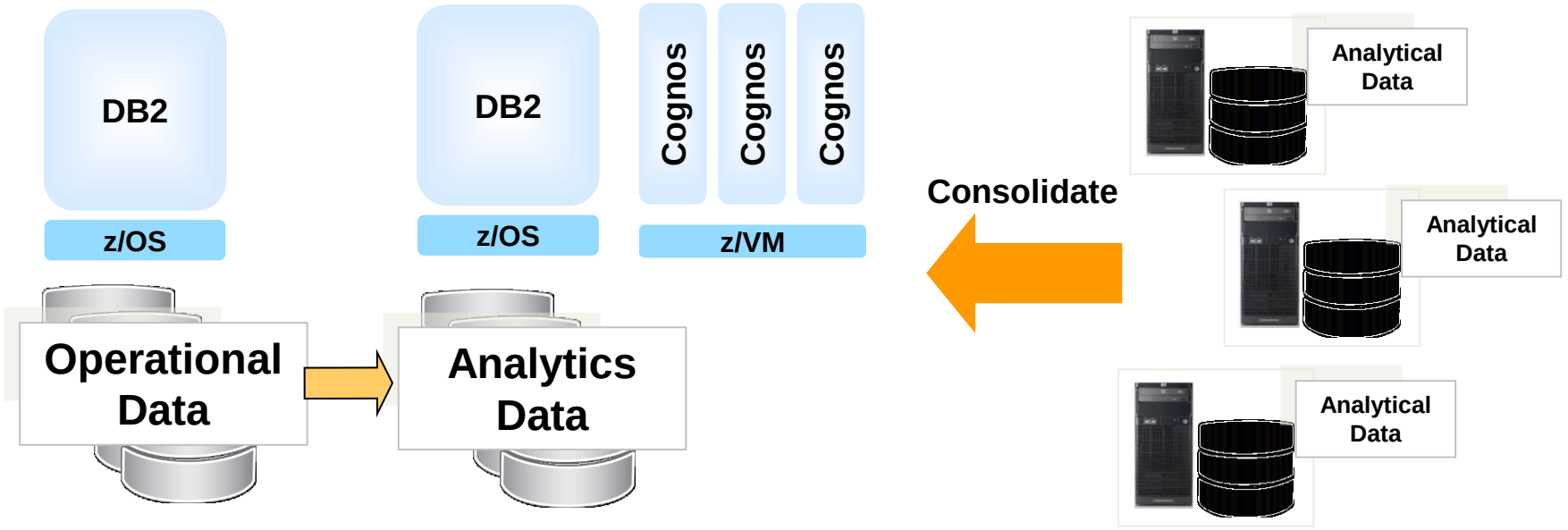


Key features with negative sentiments are identified

IBM Blue Insight uses System z platform to deploy an internal private analytics cloud

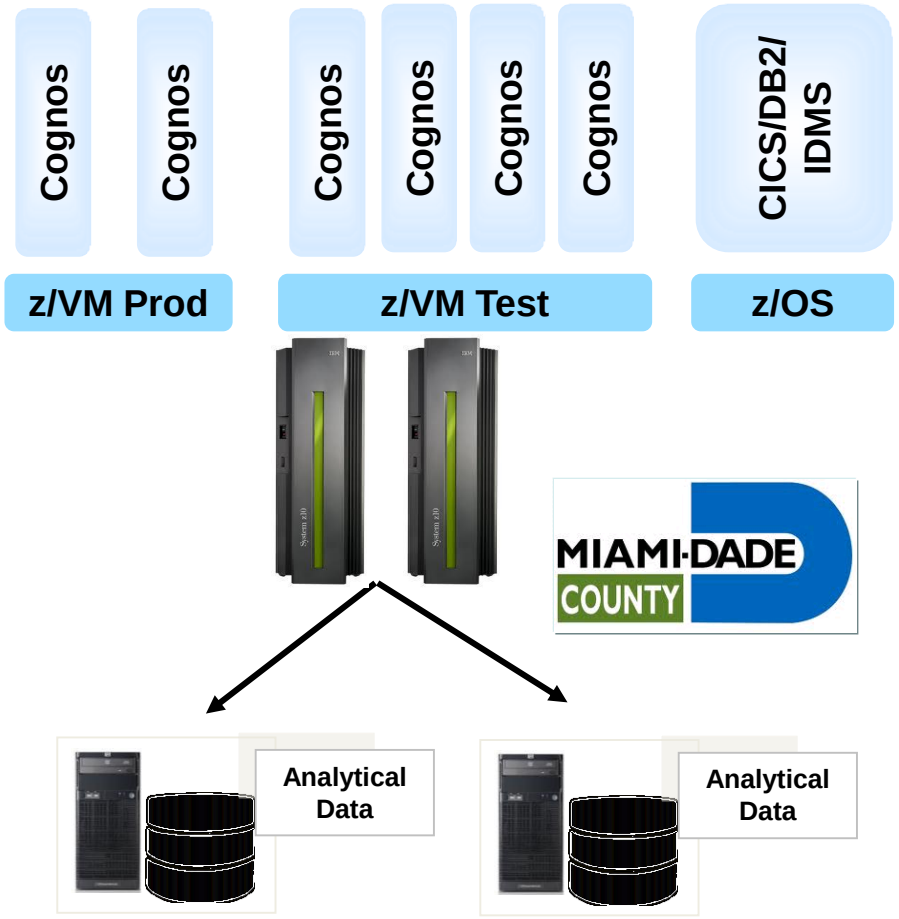
Project Scope

- Over 200K named users, 390 distinct Cognos BI reporting projects, over 2M reports/quarter
- 250 data sources - DB2, PowerCube, XML, Power, Linux on System z, z/OS
- Savings of over 74K sq. ft. floor space, 30K MWh energy, and user cost $237K



> *"Our commitment to informed decision-making led us to consider private **cloud delivery of Cognos via System z**, which is the enabling foundation that makes possible **+$25M savings over 5 years**."*
>
> *-- IBM CIO Office*

Miami-Dade County runs IBM Cognos on business class mainframes



Business Benefit:

- Moved Cognos BI deployment from Intel servers to System z10 BC in 11 days
  - Consolidated multiple deployments to a single platform
  - Consolidated multiple disparate data sources
  - Single point for BI administration
  - Offer a complete disaster recovery plan
  - Additional green savings
- Easily met requirements for growth, 24x7 availability and TCO savings
- Upgrading to Cognos 10

"We have users from 25 County Service departments with almost 2000 users consuming and creating reports with stable environments on System z"

- Jaci Newmark, Miami-Dade County

Predictive analytics helps a business run smarter

Turn a Call Center in a Profit Center

A large Dutch financial services company generated **$30 Million in incremental sales**. Essentially, 1M calls generated 180,000 suggestions, reps made 60,000 offers generating 30,000 leads and 22,000 sales.

Prevent crime before it happens

A large city in the US optimized deployment of police resources, **reducing homicides by 35%** year over year, and robberies by 20%.

Turn clients into advocates

A large Swiss telecommunications provider adopted a client retention approach based on satisfaction. And **reduced churn from 14% to 2%.**

Reduce the cost of claims

A large US insurer maximized and accelerated the collections process achieving an **ROI of 403% with payback in 3 months**.

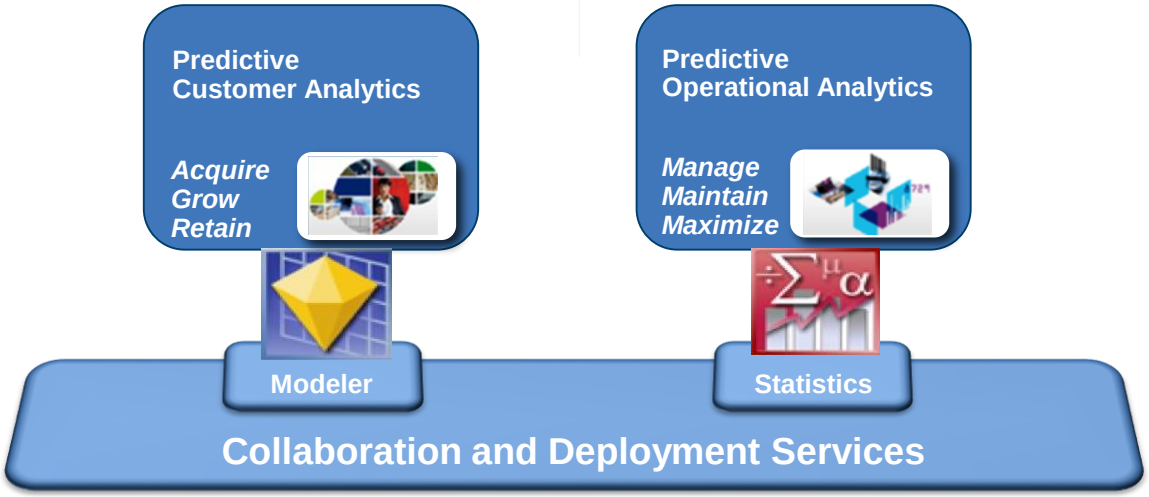
SPSS enables customers to predict future events and drive better business outcomes

SPSS Statistics for Linux on System z

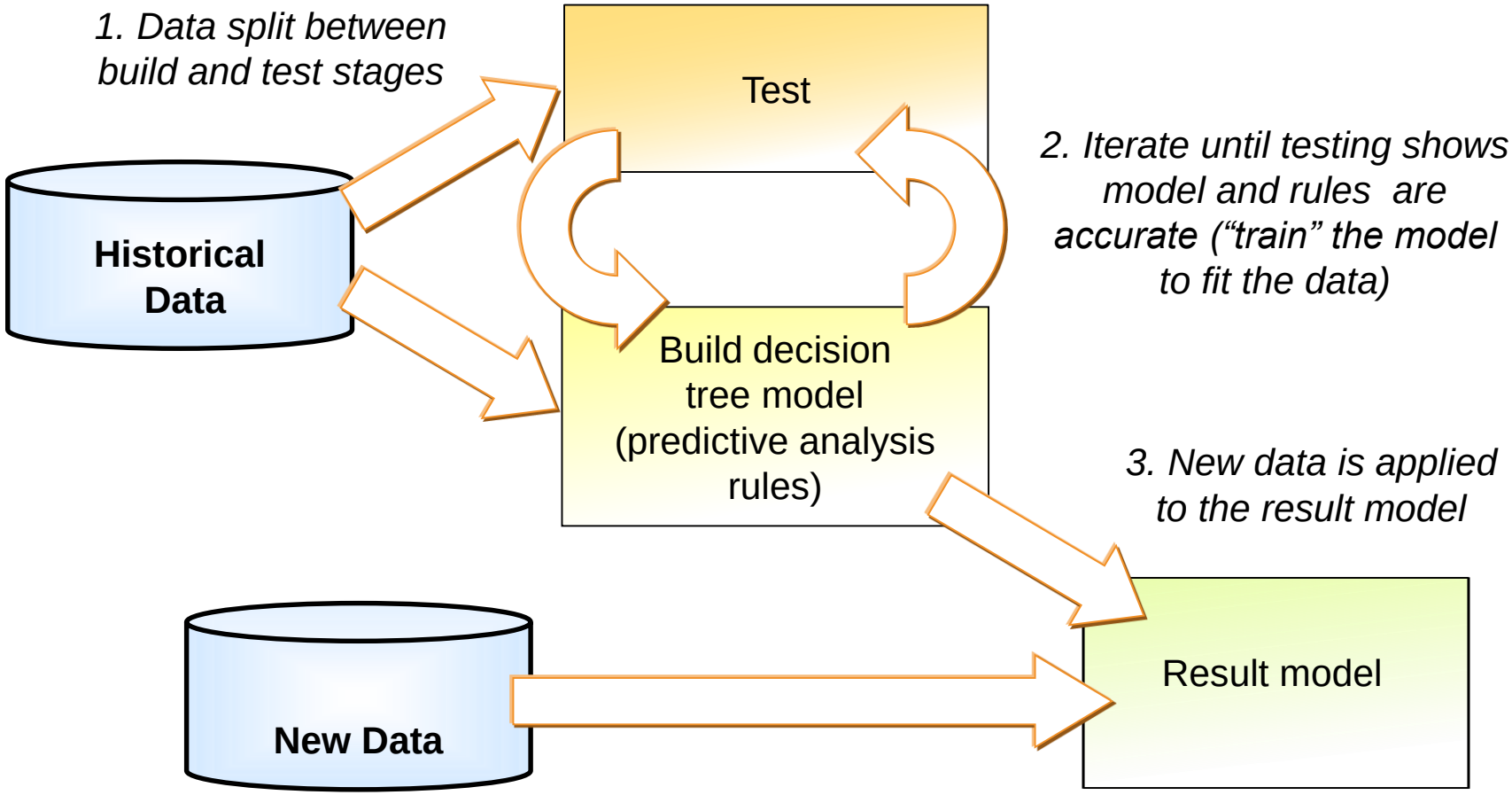
- Apply mathematics to decision making and research for commercial, government, and academic users

SPSS Modeler for Linux on System z

- Mine data to generate hypotheses and scoring
- Model consumer behavior using text analysis of unstructured data
- In-transaction scoring with DB2 z/OS



With SPSS, use historical data to build and test a model; then apply model to new data



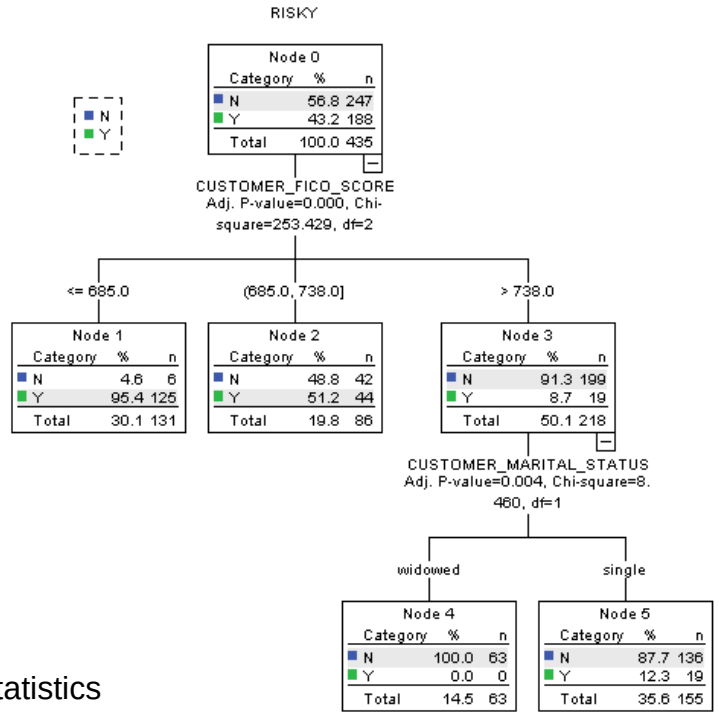
DEMO: Use predictive analytics to better understand and proactively address customer dissatisfaction

Problem: A bank is dealing with unhappy customers

- Some customers complain about ATM fees, some about overdraft fees

Solution: Use predictive analytics to better characterize customers

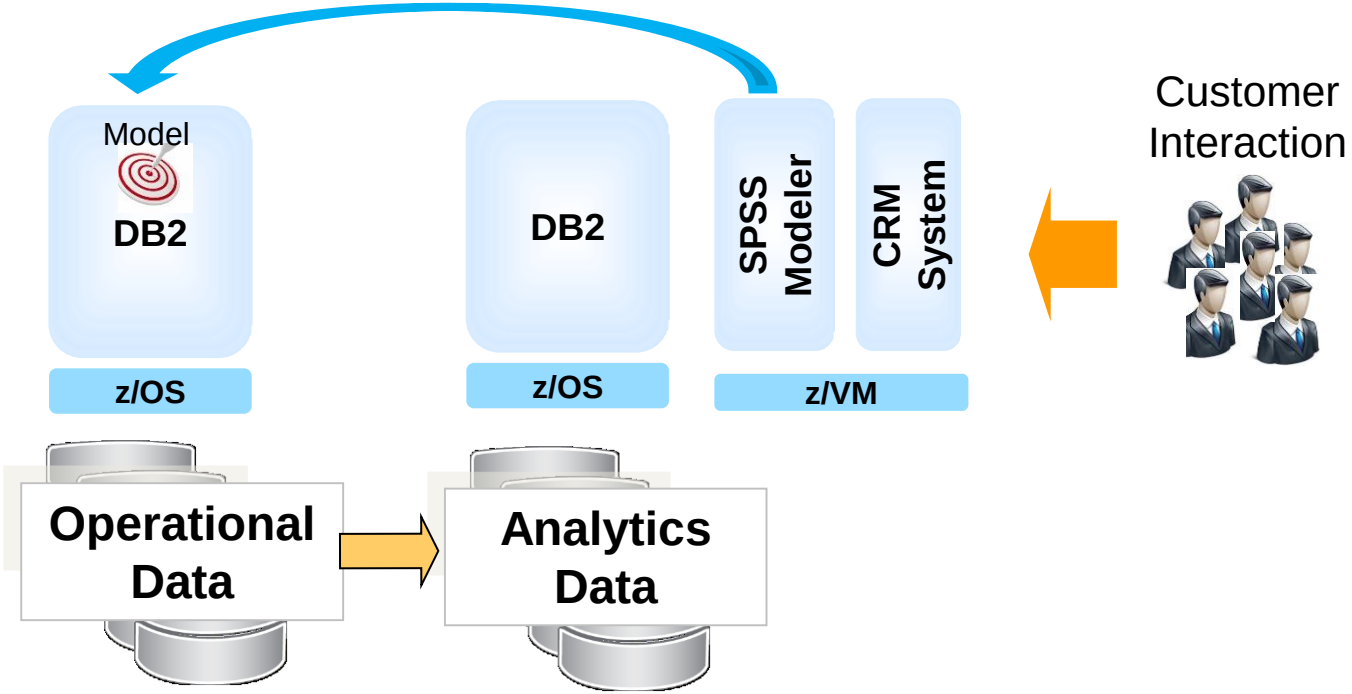
- In the future, the bank can target these customers differently to improve their satisfaction levels



1. Load data from Data Warehouse on DB2 for z/OS into SPSS Statistics
2. Select good customers based on high credit scores and negative credit events less than 3
3. Run Decision Tree to discover rules for characterizing customer complaints about overdraft and ATM fees

Improve business outcomes by taking analytics to the data with in-transaction scoring

- Instantaneous and accurate decision based on real-time information or events
- Reduce risk by putting high risk customers on “watch”
- Increase satisfaction of valued customers by providing the “next-best offer”



Run end-to-end analytics on zEnterprise to reduce costs and improve reliability

- 60-70% of operational data resides on System z
- zEnterprise offers a fully integrated, optimized analytics solution on one platform
  - From operational data to business analytics
- Consolidating data warehouses on zEnterprise with DB2 Analytics Accelerator can reduce costs by over 90%
- Cognos adds unmatched descriptive intelligence
- SPSS adds unmatched predictive intelligence

Source http://www.ibmsystemsmag.com/mainframe/trends/whatsnew/The-Mainframe-at-a-Crossroads/

Run end-to-end analytics on zEnterprise to reduce costs and improve reliability

Question:
How can you quickly and easily deploy an analytics platform?

Answer:
Using a private cloud on zEnterprise!