



For what matters

Supercharged Analytics 2011

Case Study:
Canadian Imperial Bank of Commerce





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About CIBC

- Canadian Imperial Bank of Commerce (CIBC) is a leading Canadian-based financial institution
- we offer a full range of products and services to nearly 11 million individuals and small businesses, corporate and institutional clients
- At year-end (October 31, 2010):
 - Market capitalization was \$30.7 billion
 - Tier 1 capital ratio was 13.9%
 - employed more than 42,000 employees worldwide
 - close to 1,100 branches in Canada and nearly 4,000 ABMs
- Constituent of the Dow Jones World Index (DJSI) for nine consecutive years (one of 25 banks worldwide)

Today's Discussion



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- **Overview – Risk Management Analytics**
- **The Opportunity**
- **Making It Happen**

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Overview - Risk Management Analytics

- Key accountabilities of Risk Management Analytics include:
 - acquiring relevant, accurate, complete and timely risk data
 - managing default event history and write-offs / recoveries
 - developing and monitoring performance of risk models
 - modeling multiple business scenarios
 - establishing Basel II / Basel III Framework parameters
 - measuring performance of portfolios of assets
 - supporting business programs with risk data insights
 - regulatory and management reporting
 - monitoring compliance to enterprise risk policies and standards

Key Challenges



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- **Timeliness**
 - to develop and deploy analytic and BI applications
- **Efficient and Effective Management of Risk Data**
 - movement of large volumes of data
 - redundancy (same version?) of data across projects
 - security access and controls
- **Resource-intensive**
 - development and testing of predictive models is iterative

Risk Management Analytic “Road Map”



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Identify required changes in business processes, supported by tools and robust, scalable infrastructure

- shorten the load times for large volumes of source data
- improve processing capability of DBMS / database server
- update SAS tools to leverage latest functionality
- optimize the distribution of work between the SAS Application server and the DBMS / database server
- reduce operating costs

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Key Elements of the Solution



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- In-Database Processing
- Data Warehouse Appliance
- Changing the Mindset and Business Processes

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What is In-Database Processing?



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- with conventional SAS – DBMS implementation, most of the processing is done by the SAS procedure
- with in-database processing, enabled* SAS functions push more of the processing to the DBMS

* using SAS/ACCESS 9.1.3 for Netezza, there are currently 60 supported SAS functions

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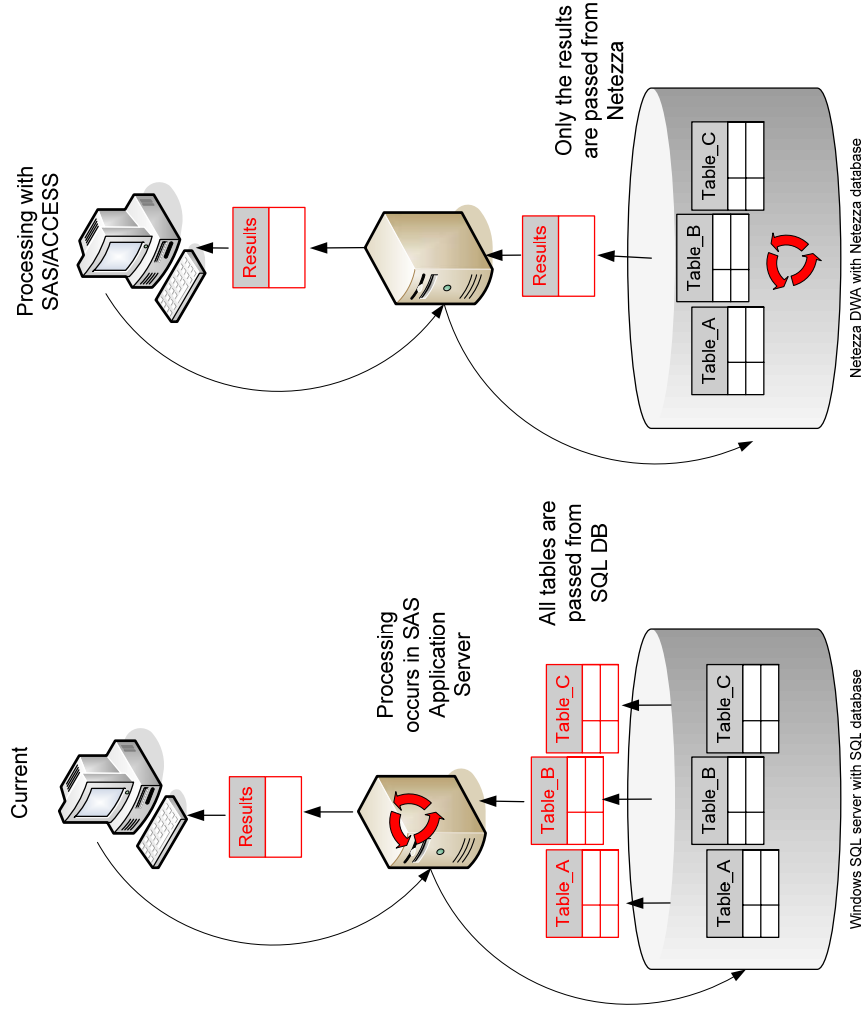
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Example: Accelerating Data Exploration



AN EXAMPLE USING SAS/ACCESS:

```

Proc SQL;
Create table Results as
Select coalesce (table_A.balance,
                table_B.balance,
                table_C.balance) as OS_balance
From Table_A, Table_B, Table_C
Where Table_A.customer =
Table_B.customer
and Table_B.customer =
Table_C.customer;
Quit;
    
```



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What Is A Data Warehouse Appliance ?

- A Data Warehouse Appliance (DWA) is purpose-built, integrating database, server, and storage in one compact system
- Optimized for processing “in bulk” vs. transaction processing
- Architecture principles include:
 - processing close to the data source
 - balanced, massively parallel architecture
 - platform is engineered for advanced analytics
 - appliance simplicity vs. traditional separate components
 - extreme scalability of internal storage capacity
- Advertised performance gains of 10 x to 100x baseline



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Leveraging Power of SAS and the DWA

To leverage the analytic power of SAS and the in-database processing capabilities of the high performance Netezza DWA:

- use the SQL pass-through facility
 - submit RDBMS-specific SQL statements that are sent directly to the DBMS for execution
- use the SAS/ACCESS LIBNAME statement and PROC SQL
 - submit SAS statements that SAS/ACCESS translates into the SQL of the RDBMS and the passes to DBMS for processing
 - SAS/ACCESS 9.1.3 for Netezza includes 60 functions

The Road to Implementation



For what matters.

- On-site Proof of Concept with DWA
- Business Case for the investment
- Implementation planning
- “Go-Live” into Production
- Optimize

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Implementation Plan

The key elements of the implementation plan include:

- install and test the DEV/UAT Netezza DWA
- new operations support model with technology groups and the vendor
- install and test the PROD Netezza DWA with SAS 9.1.3
- migrate SQL databases to new Netezza databases
- build a new SAS Application Server (32 bit -> 64 bit OS)
- upgrade analytic applications to the SAS 9.2 components
- optimize applications

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What Did We Learn?



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- Using SAS pass-through SQL and SAS/ACCESS provides significant performance gains using the Netezza DWA

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Performance Example



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Using 12 years of monthly account level credit card data (~580 million rows)

Join two large tables of credit card data, on two common fields

Ask for:

- Number of accounts and average utilization amount
- Total and average outstanding balance at month end and statement date
- Number and percentage of "good" and "bad" accounts
- Current Credit Bureau score and current account Behaviour Score
 - minimum, maximum and average
 - Percentage of accounts with missing, zero, and non-zero scores

Group Results by Month-End Date

Report by Card Grouping and Month-End Date

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Performance Example



For what matters.

Using 12 years of monthly account level credit card data (~580 million rows)

Join two large tables of credit card data, on two common fields

Ask for:

- Number of accounts and average utilization amount
- Total and average outstanding balance, a month-over-month percent change and statement date
- Number of accounts with a "good" or "bad" credit score
- Current Credit Bureau score and current delinquency score

- minimum, maximum and average scores
- Percentage of accounts with missing, zero, and non-zero scores

Group Results by Month-End Date

Report by Card Grouping and Month-End Date

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What Did We Learn?



For what matters.

- Using SAS pass-through SQL and SAS/ACCESS provides significant performance gains using the Netezza DWA
- Break-through performance requires changing how we think about how to explore the data
 - move from transactions to bulk

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Changing the Mind Set



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- the Netezza DWA is not a transaction system – it deals in bulk
- think about what can be processed “in bulk”
- the Netezza DWA can process millions of rows per second
- for example,
 - bulk load a big set of data into one or more staging tables
 - process the data using SQL in bulk operations
 - load the results into your target tables
- this is a different mindset than “row at a time processing”

Transactions vs. Bulk



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CURRENT STORED PROCEDURE USING SAS

- Read a table of 1 million records on DBMS (Oracle)
- For each record, apply 4 business rules in SAS
- This entire process takes hours of time

USING THE NETEZZA DWA

- Read a table of 1 million records on DBMS (Oracle) into DWA
- Process all 1 million records through the first business rule on DWA
- Then process all 1 million records through the next rule, etc.
- This entire process takes mere seconds

ILLUSTRATIVE



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Summary

- The future for “supercharged” analytics includes in-database processing using scalable, high performance data warehouse appliances and “made-to-fit” analytic tools
- The stated strategic direction of SAS Institute Inc. is to continue to integrate SAS procedures with data warehouse appliances to leverage this capability
- Business processes may need to change to fully leverage this new capability
- For CIBC, there is a good “payback” for this investment

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Thank You

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