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 (DJ SI) for nine consecutive years (one of 25 banks worldwide)
Today's Discussion

• Overview - Risk Management Analytics

• The Opportunity

• Making It Happen
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

- **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”

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
Key Elements of the Solution

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

- 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
Example: Accelerating Data Exploration

AN EXAMPLE USING SAS/ACCESS:

```sql
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;
```

Example: Accelerating Data Exploration

Banking, Financial Services and Insurance

SAS Global Forum 2011
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
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

- On-site Proof of Concept with DWA
- Business Case for the investment
- Implementation planning
- "Go-Live" into Production
- Optimize
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
What Did We Learn?

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

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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- 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
Changing the Mind Set

• 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

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
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.
Thank You

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