High-Performance Analytics

David Pope  Principal Solutions Architect
High Performance Analytics Practice

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Agenda

- Who Is SAS / SAS Technology Evolution
- Current Trends in Analytics
- High Performance Analytics (HPA)
- Big Business Results
  - Customer Case Studies
Who Is SAS: The Leader in Enterprise Analytics Software

**PERFORMANCE**

- #1 World Leader in Business Analytics
- 50,000+ Customers
- 12,000 Employees Worldwide

**CULTURE**

- Relentless Innovation
- Voted #1 Place to Work in U.S. (2010, 2011)
- Currently #3 - 2012
- Trusted Partner to Leading Companies and Governments

**EXPERIENCE**

- 50,000 SAS Sites in 127 Countries
- 93 of the Top 100 Companies in 2011 Fortune Global 500
- 36 Years Leading Analytics Solutions

**THOUGHT LEADER**

- SAS Advanced Analytics Lab Provides Business Leadership
- Domain Expertise in Key Industries
- Culture of Innovation: 24% R&D Reinvestment

SAS Helps Customers: Anticipate Opportunity, Empower Action, Drive Impact
CURRENT TRENDS IN ANALYTICS

LEVERAGE ANALYTICS TO UNLOCK THE INFORMATION CONTAINED IN UNSTRUCTURED DATA

80%
Analytics professionals must be able to adapt to changes in their IT environment including the adoption of open source tools and cloud computing.
Analytics in a Diverse IT Environment

*SAS Approach*

- Enable seamless integration with open source tools such as R and Hadoop
- Provide flexible options for deploying analytics across the organization (PaaS)
- Deliver targeted analytical solutions in a hosted environment
- Support the deployment of analytical results via mobile devices
THRIVING IN THE BIG DATA ERA

DATA SIZE

VOLUME

VARIETY

VELOCITY

VALUE

BIG DATA

INFORMATION OVERLOAD

RELEVANT DATA

TODAY

THE FUTURE

THRIVING IN THE BIG DATA ERA

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THE POWER TO KNOW.
**BIG DATA**
When volume, velocity and variety of data exceeds an organization’s storage or compute capacity for accurate and timely decision-making

**ANALYTICS**
The process surrounding the development, interpretation, and useful application of statistics to solve a problem. Analytics applied to data provides the 4th V = Value
Three types: Descriptive, Predictive, Prescriptive

**BIG ANALYTICS**
The combination of using ANALYTICS on BIG DATA AND/OR the capability to run advanced or complex analytics on any size data.

**OUR PERSPECTIVE**
Big Data is RELATIVE not ABSOLUTE
WHAT PROBLEMS WILL EVENTUALLY DRIVE YOU TO REPLACE YOUR CURRENT ANALYTIC PLATFORM?

- Can’t scale to Big Data volumes
- Can’t fully support the analytic modeling process
- Data loading is too slow
- Current platform only supports OLAP and they need advanced analytics

- TDWI Best Practices Report Big Data Analytics Fourth Quarter
Trusted, analytical-based decisions are needed across the organization.

Successful analytics are necessary in every business discipline: Manufacturing / Development, Marketing, Sales, Operations, Finance, and IT.
Finding treasures in unstructured data like social media or survey tools that could uncover insights about consumer sentiment.

Leveraging historical data to drive better insight into decision-making for the future.

Mine transaction databases for data of spending patterns that indicate a stolen card.

Analyze massive amounts of data in order to accurately identify areas likely to produce the most profitable results.
INFORMATION MANAGEMENT
SUPERIOR DECISIONS ENABLED BY RICH ANALYTIC & INFORMATION SERVICES
SAS® HIGH-PERFORMANCE ANALYTICS

KEY COMPONENTS

ANALYTICS INFRASTRUCTURE

SAS® HIGH-PERFORMANCE ANALYTICS

SAS® Grid Computing

SAS® In-Database

SAS® In-Memory Analytics

DEPLOYMENT FLEXIBILITY:
- On-Premise
- Cloud

ARCHITECTURE FLEXIBILITY:
- SMP
- MPP
- Grid
SAS® HIGH-PERFORMANCE ANALYTICS

SAS® IN-MEMORY ANALYTICS

TOOLS
Data Visualization
Reporting

ANALYTICS
Descriptive Statistics
Predictive Analytics
Model Development
Text Mining
Forecasting
Optimization
...

ANALYTIC APPLICATIONS
Retail Planning
Revenue Optimization
Marketing Optimization
Stress Testing
Liquidity Risk Management
Fraud Detection
...

IN-MEMORY ANALYTICS

UNSTRUCTURED
STREAMING
STRUCTURED

MANAGEMENT
ADMINISTRATION
SECURITY

HADOOP
GREENPLUM
TERADATA

BANKING
RETAIL
COMMUNICATIONS
LIFE SCIENCES
INSURANCE
GOVERNMENT
Business Visualization: SAS Visual Analytics

ENVIRONMENT MANAGER
- In-memory analytic platform
- Security
- Monitoring

VISUAL ANALYTICS EXPLORER
- Ad hoc analysis
- Data discovery

VISUAL DESIGNER
- Reports for web or mobile

MOBILE BI
- Native, interactive reports
- iOS, Android
SAS HIGH-PERFORMANCE ANALYTICS

- Volume of Data
- Velocity of Data
- Complexity of Analytical Problem
- Near Real-time Insights
- Reduced Data Movement
- Variety of Workload
- High Availability
- SAS Workload Management
- SAS Workload Constraints

- SAS Grid Computing
- SAS In-Database
- SAS In-Memory Analytics
## SAS High Performance Analytics Drives Big Business Results: Before and After HPA

<table>
<thead>
<tr>
<th>Business Problem</th>
<th>Data Size and Analysis</th>
<th>Before SAS HPA</th>
<th>After SAS HPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Loan Default</td>
<td>• 1 billion rows of data • Regression analysis</td>
<td>11 to 20 hours depending on hardware configuration</td>
<td>Less than 54 seconds</td>
</tr>
<tr>
<td>Optimize Response to Marketing Campaign across multiple channels</td>
<td>• 100 million rows of historical contact information • 15 million customers • 900 offers • 20 offers per customer • Many business rules</td>
<td>2.5 to 5 hours</td>
<td>Less than 90 seconds</td>
</tr>
<tr>
<td>Visual Exploration looking for Insight</td>
<td>• 1.1 billion rows • Using 14 variables out of 47 columns • 91 correlation calculations</td>
<td>Hours</td>
<td>Less than 10 seconds</td>
</tr>
</tbody>
</table>
SAS High Performance Analytics Drives Big Business Results

Retention Campaigns

15% improvement
(SAS® Grid Manager)

Increase coupon redemption rate from 10% to 25%
(SAS® Scoring Accelerator (In-DB))

Regression analysis from

167 hours (1 week) to 84 seconds!
(SAS® High-Performance Analytics)

Recalculate entire risk portfolio from
18 hours to 12 minutes
(SAS® High-Performance Risk)

270 million price points analyzed in
2 hrs. (from 30 hrs.)
(SAS® High-Performance Markdown Optimization)
15% improvements in Marketing campaigns
CUSTOMER CASE STUDY  
IN-DATABASE ANALYTICS PROCESS

DATA EXPLORATION  
MODEL DEVELOPMENT  
MODEL DEPLOYMENT

INCREASE COUPON REDEMPTION

10%  
25%

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CUSTOMER CASE STUDY

IN-MEMORY ANALYTICS PROCESS

84 SECONDS

Bottom-line Impact:
Tens of Millions of Dollars

167 Hours
CUSTOMER CASE STUDY
HIGH-PERFORMANCE ANALYTICS PROCESS

- **Current Process**
  - 5 hours
  - 1 model per day per modeler
  - One algorithm (Neural Network)
  - 7 iterations of NN training
  - Model lift of 1.6%

- **HP Data Mining**
  - 3 minutes
  - 1 model per 30 minutes conservatively
  - Random Forest, SVM, Logistic and other challenger methods
  - More complex network 5000 iterations in 70 minutes
  - Model lift of 2.5%

6.4 Million customers so even with just a 1% improvement and a Life Time Value per customer of $500.00 This is worth 10’s of Millions of dollars (6.4M x 0.01 x 500 = 32M)
High-Performance Analytics

Key Benefits

Business Value
• Highly accurate & decisive results
• Derive faster time-to-insights
• Expedite time-to-decision for competitive advantage

IT Value
• Superior performance and scalability
• Better data governance
• Optimal IT Resource usage
Q/A: High-Performance Analytics

- What is High-Performance Analytics?
- How Does it Work?
- What Can High-Performance Analytics Do for Me?

Answers to these and other questions can be found here:

http://www.sas.com/high-performance-analytics/