Convergence and Collaboration: Transforming Business Process and Workflows

Steven Hagan, Vice President, Server Technologies

• Mandated:
  – Corporate Acquisitions + Mergers
  – Government Department Mergers
  – Policy – “Place Matters”

• Voluntary - Leverage, Value Increase
  – Enterprise Partners Collaborating Together
  – Private Enterprise & Government & Academia Working Together
  – Collaboration due to Many and New Sources, Types of Data
Convergence & Collaboration: Drivers: What

- **BIG Data** – Terabytes, Petabytes, Exabytes, Zettabytes, Yottabytes
  - Sensors, RFID, VIDEO, LIDAR, Raster, 3D, Terrain and City Models
  - Internet of Things, Social Media, Tagged Data, History/Archive/Version Data
  - SDIs, INSPIRE, Linked Open Data -- Persistent Relationships, Semantics, Ontologies

- **BIG Hardware:**
  - CLOUD Platforms – Public and Private
  - Cheaper, more powerful – Clusters of Commodity Servers, Virtualization: = Greener
  - Massively parallel database machines – Software Enablement – e.g. Hadoop

- **BIG Software** –
  - Real Time Analytics –Biggest value from fastest response – Streams and Events — Internet of Things; Spatially Aware – no separate GIS
  - Location Enable All Applications: ERP, CRM, Business Intelligence, Public Sectors
  - CyberSecurity
  - Support Standards – W3C, OGC, ISO, Wide Range
  - Engineered Systems – Fully installed and tested (Labor Cost is now Dominant Factor)
Collaborations: Tools – Understand Data Quickly
Discovery & Predictive Analysis

<table>
<thead>
<tr>
<th>Problem Classification</th>
<th>Sample Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anomaly Detection</td>
<td>Given demographic data about a set of customers, identify customer purchasing behavior that is significantly different from the norm (Fraud?) . For Sensors, Events – problem? Good News?</td>
</tr>
<tr>
<td>Association Rules</td>
<td>Find the items that tend to be purchased together and specify their relationship – market basket analysis</td>
</tr>
<tr>
<td>Clustering</td>
<td>Segment demographic data into clusters and rank the probability that an individual will belong to a given cluster. For customers / govt constituents, what do they want to know about?</td>
</tr>
<tr>
<td>Feature Extraction</td>
<td>Given demographic data about a set of customers, group the attributes into general characteristics of the customers</td>
</tr>
</tbody>
</table>
Global Digital Data Growth: Exceeds Storage Mfg
Growing leaps and bounds by 40+% YoY!

2009 = .8 Zetabytes
  = .08 ZB Structured Data
  = .72 ZB Unstructured Data

2020 = 35 Zetabytes
  = 3.5 ZB Structured Data
  = 31.5 ZB Unstructured Data

*Chart conservatively assumes a constant 9:1 ratio of unstructured data vs. structured data (based upon IDC’s estimate that 90% of all digital data is unstructured).
• Chart does not reflect IDC’s projection that unstructured data is currently growing twice as fast as structured data at the rate of 63.7% vs. 32.3% CAGR.

Source: IDC Digital Universe Study, A Digital Universe Decade – Are You Ready?, 2010
ILM: Hot/Cold Data Classification – Auto Archiving

Enhanced Insight into Data Usage: “heat map”

- Recently inserted, actively updated
- Infrequently updated, Frequently Queried

- Block and Segment level statistics on last Read and last Update

Retained for long term analytics and compliance with corporate policies and regulations
Data Compression / Archiving; Repurposing

Remember: Versioning, Disaster Recover Copies

3X
Advanced Row Compression

10X
Columnar Query Compression

15X
Columnar Archive Compression
Collaboration: Geospatial Value Core

External Data Sources
- Transactional & Operational Systems
- Contents Repository
- Databases
- Web resources
- Blogs, Mails, news

Real-time Data Streams

Search, Presentation, Report, Visualization, Query

Enterprise Data Management Infrastructure
- GeoSpatial
- POIs
- Documents
- Secured
- Historical Records, Archives
- Demographics
- Customer Data
- Call Records

Automatic Responses and Publishing
- SMS
- Console Alerts
- EV Grid Management
- Workflow Initiation
- Real-time Dashboards
Ontology-driven Geospatial Applications - Actionable Knowledge

National Map Core Datasets
- Geographic Names
- Spatial Data
- Raster Data

RDF & OWL Data
- Data Integration
- National Map schemas
- Geographic names
- Temporal
- Naïve Geography

Application Ontologies

Simple Features
- GeoRaster
- Topology
- Networks
- Gazetteers

Situational Awareness

Theater

Targeting

Spatial Data

Geographic Names

Raster Data

Core Datasets

Geographic Names

Raster Data
Convergence: Breadth of Enterprise Data Above / Across Stovepipes
Linking Your Cloud with other Clouds
Convergence / Collaboration must Respect Information Security and Privacy

Oracle Database

- Monitoring
  - Configuration Management
  - Audit Vault
  - Total Recall

- Access Control
  - Database Vault
  - Label Security

- Encryption & Masking
  - Advanced Security
  - Secure Backup
  - Data Masking, Redaction

- Blocking & Logging

- Encryption & Masking

- Access Control

- Monitoring
Privacy: Redacting Sensitive Data

Mask Application Data Dynamically – By Location, if Needed

Policy enforced redaction of sensitive data

Call Center Operator

Payroll Processing

<table>
<thead>
<tr>
<th>CLIENT CONTACT</th>
<th>SOC. SEC. NO.</th>
<th>DOB</th>
<th>PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARA JONES</td>
<td>*<strong>-</strong>-3428</td>
<td>01/01/01</td>
<td>****</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CLIENT CONTACT</th>
<th>SOC. SEC. NO.</th>
<th>DOB</th>
<th>PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAMES SMITH</td>
<td>*<strong>-</strong>-2356</td>
<td>01/01/01</td>
<td>****</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMPLOYEE NAME</th>
<th>SOC. SEC.#</th>
<th>DOB</th>
<th>PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARA JONES</td>
<td>115-69-3428</td>
<td>11/06/71</td>
<td>5623</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMPLOYEE NAME</th>
<th>SOC. SEC.#</th>
<th>DOB</th>
<th>PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAMES SMITH</td>
<td>114-59-2356</td>
<td>01/06/69</td>
<td>2703</td>
</tr>
</tbody>
</table>
Cloud Choices from Oracle: Public, Private

Public Clouds

- SaaS
- PaaS
- IaaS

Private Cloud

- Apps
- PaaS
- IaaS

Oracle Technology in public clouds

- Enterprise deployment option
- Power 3rd party public clouds

Run on private shared platform or public SaaS model

Oracle Private Cloud Platform
Seeking Order through Standards

"We intend to complete development for a new suite of tools for developing the next generation of applications. And there are several interesting things with the next generation of tools, but perhaps the single most interesting thing about them is that for the first time a major application company is going to commit to an absolute standards-based development environment."
– Larry Ellison

- ISO
  - TC 211
  - TC 204

- Open Geospatial Consortium
  - Simple Features
  - GML
  - Web Services

- De-facto Standards
  - SHP, MGE, DXF, KML

- Professional Standards
  - ISPRS, FIG, WMO

- Java, .NET, Flash

- TAGGED METADATA – agree on tags

SQL3/MM Spatial
Convergence & Collaboration: Best Success Requires Complete Platforms

**Big Data**
- Volunteered Geographic Information
- Sensors
- Streaming Data
- Geo-referenced Video, 3D, LiDAR

**Simplified Spatial IT**
- Support for Open Standards
- Spatial Database, Application Server, BI, tools
- Support by Leading Partner solutions
- Spatially-enabled Engineered Systems

**Deep Analytics**
- Real-time Spatial Event Processing
- Dense Visualization
- Spatial Analysis

**On Premise, On Cloud, Shared Services**
- Shared GeoSpatial Services
- Location Aware Everything
Cloud Computing + Oracle Engineered Systems