Case Study for Information Management

Foundations of Business Intelligence - Database and Information Management: Lego (Chap. 6)

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<td>103/01/14</td>
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Chap. 6
Foundations of Business Intelligence – Database and Information Management: Lego
Case Study: Lego (Chap. 6) (pp.270-271)

Lego: Embracing Change by Combining BI with a Flexible Information System

1. Explain the role of the database in SAP's three-tier system.
2. Explain why distributed architectures are flexible.
3. Identify some of the business intelligence features included in SAP's business software suite.
4. What are the main advantages and disadvantages of having multiple databases in a distributed architecture? Explain.

Overview of Fundamental MIS Concepts

THE DATA HIERARCHY

Student Database

- COURSE File
  - Student ID: 39044, Course: IS 101, Date: F06, Grade: B+
  - Student ID: 59432, Course: IS 101, Date: F06, Grade: A
  - Student ID: 64029, Course: IS 101, Date: F06, Grade: C

- FINANCIAL File
  - PERSONAL File

- COURSE
  - Student ID
  - Course
  - Date
  - Grade

- Record

- Field
  - IS 101 (Course field)

- Byte
  - 0100 1001 (Letter I in ASCII)

TRADITIONAL FILE PROCESSING

ACCOUNTING AND FINANCE
 Users → Application program 1 → A B C D

HUMAN RESOURCES
 Users → Application program 2 → A B D E

SALES AND MARKETING
 Users → Application program 3 → A B E G

MANUFACTURING
 Users → Application program 4 → A E F G

Master file
Data elements
A to Z

Derivative files

HUMAN RESOURCES DATABASE
WITH MULTIPLE VIEWS

Human Resources Database

Employee_ID
Name
SSN
Position
Date_Hired
Gross_Pay
Net_Pay
Life_Insurance
Pension_Benefit
Health_Care

Database Management System

Benefits View
Name
SSN
Health_Care

Payroll View
Name
SSN
Gross_Pay
Net_Pay

### RELATIONAL DATABASE TABLES

**Table: Supplier**

<table>
<thead>
<tr>
<th>Supplier_Number</th>
<th>Supplier_Name</th>
<th>Supplier_Street</th>
<th>Supplier_City</th>
<th>Supplier_State</th>
<th>Supplier_Zip</th>
</tr>
</thead>
<tbody>
<tr>
<td>8259</td>
<td>CBM Inc.</td>
<td>74 5th Avenue</td>
<td>Dayton</td>
<td>OH</td>
<td>45220</td>
</tr>
<tr>
<td>8261</td>
<td>B. R. Molds</td>
<td>1277 Gandolly Street</td>
<td>Cleveland</td>
<td>OH</td>
<td>49345</td>
</tr>
<tr>
<td>8263</td>
<td>Jackson Composites</td>
<td>8233 Micklin Street</td>
<td>Lexington</td>
<td>KY</td>
<td>56723</td>
</tr>
<tr>
<td>8444</td>
<td>Bryant Corporation</td>
<td>4315 Mill Drive</td>
<td>Rochester</td>
<td>NY</td>
<td>11344</td>
</tr>
</tbody>
</table>

**Key Field (Primary Key):** Supplier_Number

**Columns (Attributes, Fields):**
- Supplier_Name
- Supplier_Street
- Supplier_City
- Supplier_State
- Supplier_Zip

Rows (Records, Tuples):

### PART

<table>
<thead>
<tr>
<th>Part_Number</th>
<th>Part_Name</th>
<th>Unit_Price</th>
<th>Supplier_Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>137</td>
<td>Door latch</td>
<td>22.00</td>
<td>8259</td>
</tr>
<tr>
<td>145</td>
<td>Side mirror</td>
<td>12.00</td>
<td>8444</td>
</tr>
<tr>
<td>150</td>
<td>Door molding</td>
<td>6.00</td>
<td>8263</td>
</tr>
<tr>
<td>152</td>
<td>Door lock</td>
<td>31.00</td>
<td>8259</td>
</tr>
<tr>
<td>155</td>
<td>Compressor</td>
<td>54.00</td>
<td>8261</td>
</tr>
<tr>
<td>178</td>
<td>Door handle</td>
<td>10.00</td>
<td>8259</td>
</tr>
</tbody>
</table>

**Primary Key**

**Foreign Key**

THE THREE BASIC OPERATIONS OF A RELATIONAL DBMS

AN UNNORMALIZED RELATION FOR ORDER

ORDER (Before Normalization)

- Order_Number
- Order_Date
- Part_Number
- Part_Name
- Unit_Price
- Part_Quantity
- Supplier_Number
- Supplier_Name
- Supplier_Street
- Supplier_City
- Supplier_State
- Supplier_Zip

NORMALIZED TABLES CREATED FROM ORDER

AN ENTITY-RELATIONSHIP DIAGRAM

Data Warehouse vs. Data Marts

• Data warehouse:
  – Stores current and historical data from many core operational transaction systems
  – Consolidates and standardizes information for use across enterprise, but data cannot be altered
  – Data warehouse system will provide query, analysis, and reporting tools

• Data marts:
  – Subset of data warehouse
  – Summarized or highly focused portion of firm’s data for use by specific population of users
  – Typically focuses on single subject or line of business

Business Intelligence (BI)

• Tools for consolidating, analyzing, and providing access to vast amounts of data to help users make better business decisions
  – E.g., Harrah’s Entertainment analyzes customers to develop gambling profiles and identify most profitable customers

• Principle tools include:
  – Software for database query and reporting
  – Online analytical processing (OLAP)
  – Data mining

Online analytical processing (OLAP)

• Supports multidimensional data analysis
  – Viewing data using multiple dimensions
  – Each aspect of information (product, pricing, cost, region, time period) is different dimension
  – E.g., how many washers sold in the East in June compared with other regions?

• OLAP enables rapid, online answers to ad hoc queries

MULTIDIMENSIONAL DATA MODEL

Data Mining

• More discovery driven than OLAP
• Finds hidden patterns, relationships in large databases and infers rules to predict future behavior
  – E.g., Finding patterns in customer data for one-to-one marketing campaigns or to identify profitable customers.
• Types of information obtainable from data mining
  – Associations
  – Sequences
  – Classification
  – Clustering
  – Forecasting

Predictive analysis

• Uses data mining techniques, historical data, and assumptions about future conditions to predict outcomes of events

• E.g., Probability a customer will respond to an offer

Text Mining

• Text mining (text data mining)
  – the process of deriving high-quality information from text
  – Extracts key elements from large unstructured data sets (e.g., stored e-mails)

• Typical text mining tasks
  – text categorization
  – text clustering
  – concept/entity extraction
  – production of granular taxonomies
  – sentiment analysis
  – document summarization
  – entity relation modeling

Web Mining

• Discovery and analysis of useful patterns and information from WWW
  – E.g., to understand customer behavior, evaluate effectiveness of Web site, etc.

• 3 Tasks of Web Mining
  – Web content mining
    • Knowledge extracted from content of Web pages
  – Web structure mining
    • E.g., links to and from Web page
  – Web usage mining
    • User interaction data recorded by Web server

Web Mining

- Web mining (or Web data mining) is the process of discovering intrinsic relationships from Web data (textual, linkage, or usage)

Web Mining

- **Web Content Mining**
  - Source: unstructured textual content of the Web pages (usually in HTML format)

- **Web Structure Mining**
  - Source: the unified resource locator (URL) links contained in the Web pages

- **Web Usage Mining**
  - Source: the detailed description of a Web site’s visits (sequence of clicks by sessions)

Source: Turban et al. (2011), Decision Support and Business Intelligence Systems
LINKING INTERNAL DATABASES TO THE WEB

Business Intelligence and Data Mining

Increasing potential to support business decisions

Decision Making

Data Presentation
Visualization Techniques

Data Mining
Information Discovery

Data Exploration
Statistical Summary, Querying, and Reporting

Data Preprocessing/Integration, Data Warehouses

Data Sources
Paper, Files, Web documents, Scientific experiments, Database Systems

End User

Business Analyst

Data Analyst

DBA

Source: Han & Kamber (2006)
The Evolution of BI Capabilities

Source: Turban et al. (2011), Decision Support and Business Intelligence Systems
A High-Level Architecture of BI

Source: Turban et al. (2011), Decision Support and Business Intelligence Systems
Business Intelligence and Analytics

• Business Intelligence 2.0 (BI 2.0)
  – Web Intelligence
  – Web Analytics
  – Web 2.0
  – Social Networking and Microblogging sites

• Data Trends
  – Big Data

• Platform Technology Trends
  – Cloud computing platform

Business Intelligence and Analytics: Research Directions

1. Big Data Analytics
   – Data analytics using Hadoop / MapReduce framework

2. Text Analytics
   – From Information Extraction to Question Answering
   – From Sentiment Analysis to Opinion Mining

3. Network Analysis
   – Link mining
   – Community Detection
   – Social Recommendation

Big Data, Big Analytics:
Emerging Business Intelligence and Analytic Trends for Today's Businesses

Source: http://www.amazon.com/Big-Data-Analytics-Intelligence-Businesses/dp/111814760X
Big Data:
The Management Revolution

Big Data: The Management Revolution

Exploiting vast new flows of information can radically improve your company’s performance. But first you’ll have to change your decision-making culture.

by Andrew McAfee and Erik Brynjolfsson
Business Intelligence and Enterprise Analytics

• Predictive analytics
• Data mining
• Business analytics
• Web analytics
• Big-data analytics
Three Types of Business Analytics

• Prescriptive Analytics
• Predictive Analytics
• Descriptive Analytics

### Three Types of Business Analytics

<table>
<thead>
<tr>
<th>Optimization</th>
<th>“What’s the best that can happen?”</th>
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</thead>
<tbody>
<tr>
<td>Randomized Testing</td>
<td>“What if we try this?”</td>
</tr>
<tr>
<td>Predictive Modeling / Forecasting</td>
<td>“What will happen next?”</td>
</tr>
<tr>
<td>Statistical Modeling</td>
<td>“Why is this happening?”</td>
</tr>
<tr>
<td>Alerts</td>
<td>“What actions are needed?”</td>
</tr>
<tr>
<td>Query / Drill Down</td>
<td>“What exactly is the problem?”</td>
</tr>
<tr>
<td>Ad hoc Reports / Scorecards</td>
<td>“How many, how often, where?”</td>
</tr>
<tr>
<td>Standard Report</td>
<td>“What happened?”</td>
</tr>
</tbody>
</table>

Big-Data Analysis

• Too Big, too Unstructured, too many different source to be manageable through traditional databases

The Rise of “Big Data”

• “Too Big” means databases or data flows in petabytes (1,000 terabytes)
  – Google processes about 24 petabytes of data per day

• “Too unstructured” means that the data isn’t easily put into the traditional rows and columns of conventional databases

Examples of Big Data

• Online information
  – Clickstream data from Web and social media content
    • Tweets
    • Blogs
    • Wall postings

• Video data
  – Retail and crime/intelligence environments
  – Rendering of video entertainment

• Voice data
  – call centers and intelligence intervention

• Life sciences
  – Genomic and proteomic data from biological research and medicine

BIG DATA
BIG ANALYTICS

EMERGING BUSINESS INTELLIGENCE AND ANALYTIC TRENDS FOR TODAY’S BUSINESSES

Michael Minelli • Michele Chambers • Ambiga Dhiraj

Source: http://www.amazon.com/Big-Data-Analytics-Intelligence-Businesses/dp/111814760X
Big Data, Big Analytics:
Emerging Business Intelligence and Analytic Trends for Today's Businesses

• What Big Data is and why it's important
• Industry examples (Financial Services, Healthcare, etc.)
• Big Data and the New School of Marketing
• Fraud, risk, and Big Data
• Big Data technology
• Old versus new approaches
• Open source technology for Big Data analytics
• The Cloud and Big Data

Source: http://www.amazon.com/Big-Data-Analytics-Intelligence-Businesses/dp/111814760X
Big Data, Big Analytics:
Emerging Business Intelligence and Analytic Trends for Today's Businesses

- Predictive analytics
- Crowdsourcing analytics
- Computing platforms, limitations, and emerging technologies
- Consumption of analytics
- Data visualization as a way to take immediate action
- Moving from beyond the tools to analytic applications
- Creating a culture that nurtures decision science talent
- A thorough summary of ethical and privacy issues

Source: http://www.amazon.com/Big-Data-Analytics-Intelligence-Businesses/dp/111814760X
What is **BIG Data**?

**Volume**
- Large amount of data

**Velocity**
- Needs to be analyzed *quickly*

**Variety**
- Different types of structured and unstructured data

Data Scientist: The Sexiest Job of the 21st Century

(Davenport & Patil, 2012)(HBR)
Data Scientist: The Sexiest Job of the 21st Century

Meet the people who can coax treasure out of messy, unstructured data.
by Thomas H. Davenport and D.J. Patil

When Jonathan Goldman arrived for work in June 2006 at LinkedIn, the business networking site, the place still felt like a start-up. The company had just under 8 million accounts, and the number was growing quickly as existing members invited their friends and colleagues to join. But users weren’t seeking out connections with the people who were already on the site at the rate executives had expected. Something was apparently missing in the social experience. As one LinkedIn manager put it, “It was like arriving at a conference reception and realizing you don’t know anyone. So you just stand in the corner sipping your drink—and you probably leave early.”

Case Study: Google, Apple, and Microsoft (Chap. 7)

Google, Apple, and Microsoft struggle for Your Internet Experience

1. Define and compare the business models and areas of strength of Apple, Google, and Microsoft.

2. Why is mobile computing so important to these three firms? Evaluate the mobile platform offerings of each firm.

3. What is the significance of applications and app stores to the success or failure of mobile computing?

4. Which company and business model do you believe will prevail in this epic struggle? Explain your answer.

5. What difference would it make to you as a manager or individual consumer if Apple, Google, or Microsoft dominated the Internet experience? Explain your answer.

資訊管理個案
(Case Study for Information Management)

1. 請同學於資訊管理個案討論前
   應詳細研讀個案，並思考個案研究問題。
2. 請同學於上課前複習相關資訊管理相關理論，以作為個案分析及擬定管理對策的依據。
3. 請同學於上課前
   先繳交個案研究問題書面報告。
References


– 周宣光譯 (2011)，資訊管理系統—管理數位化公司，第12版，東華書局