



# The University of Fiji

## School of Science and Technology

Department of Computer Science/ Information Technology

### ITC355 Business Intelligence

Semester 2, 2012

#### FINAL EXAMINATION

#### QUESTION PAPER

| Section | Question Type                     | Marks Allocation |
|---------|-----------------------------------|------------------|
| A       | 27 Open-Ended questions (q1-26)   | 70 marks         |
| B       | 4 Practical Applications (q27-30) | 20 marks         |
| C       | 4 Case Study questions (q31-34)   | 10 marks         |

Time Allowed: 3 Hours (+10 Minutes For Reading the Paper)

Weighting: 50%

Total Marks: 100 marks.

#### Instructions

- Answer All Questions in the ANSWER BOOKLET provided.
- Show your answers clearly in each question to gain maximum marks.
- You may ask for extra sheets from the supervisors if the need arises.
- Do not forget to write your name and ID number on all the extra sheet(s) attached.

## Section A - Short Answers/Descriptive (70 marks)

### *Decision Support and Business Intelligence*

1. Discuss how a wireless system can improve decision making. [2 marks]
2. Discuss at least three differences between *Business Intelligence (BI)* and *Decision Support Systems (DSS)*. [3 marks]

### *Computerized Decision Support*

3. Your company is opening a branch in China. Use Simon's 4-phase model to list typical activities in each phase of the decision whether to open or not. [5 marks]
4. Explain, through an example, the support given to decision makers by computers in each phase of Simon's decision process. [5 marks]

### *Computerized Decision Support*

5. Provide a list of possible strategic, tactical, and operational models for a restaurant. [3 marks]
6. How has the web impacted the components of DSS, and vice versa? [2 marks]

### *Modeling & Analysis*

7. Explain how OLAP provides access to powerful models in a spreadsheet structure. [2 marks]
8. Compare and contrast what-if analysis and goal seeking. [2 marks]
9. What is a spreadsheet add-in? State the purpose of "SQL-Server Data Mining Add-in for Excel 2007". [2 marks]

### ***Data Warehousing***

**10. Define *data warehouse*?**

**[2 marks]**

**11. How is a data warehouse different from a database?**

**[2 marks]**

**12. Differentiate among a data mart, an ODS, and an EDW.**

**[3 marks]**

### ***Data Mining for Business Intelligence***

**13. Define “data mining”.**

**[2 marks]**

**14. What is the main difference between classification and clustering? Explain using concrete examples.**

**[4 marks]**

### ***Artificial Neural Networks for Data Mining***

**15. What is an Artificial Neural Network (ANN)?**

**[2 marks]**

**16. Draw a diagram to show the elements of an ANN that has one hidden layer.**

**[4 marks]**

**17. Say that a neural network has been constructed to predict the creditworthiness of applicants. There are two output nodes: one for yes (1 = yes, 0 = no) and one for no (1 = no, 0 = yes). An applicant receives a score of 0.83 for the “yes” output node and a 0.44 for the “no” output node. Discuss what may have happened and whether the applicant is a good credit risk.**

**[3 marks]**

*Text and Web Mining*

18. Explain the relationship among text mining and web mining. [2 marks]
19. One popular application area of text mining is "Topic Tracking"? Explain *topic tracking*. [2 marks]
20. What are the three main areas of Web mining? Discuss the differences and commonalities among these three areas. [3 marks]

*Business Performance Management*

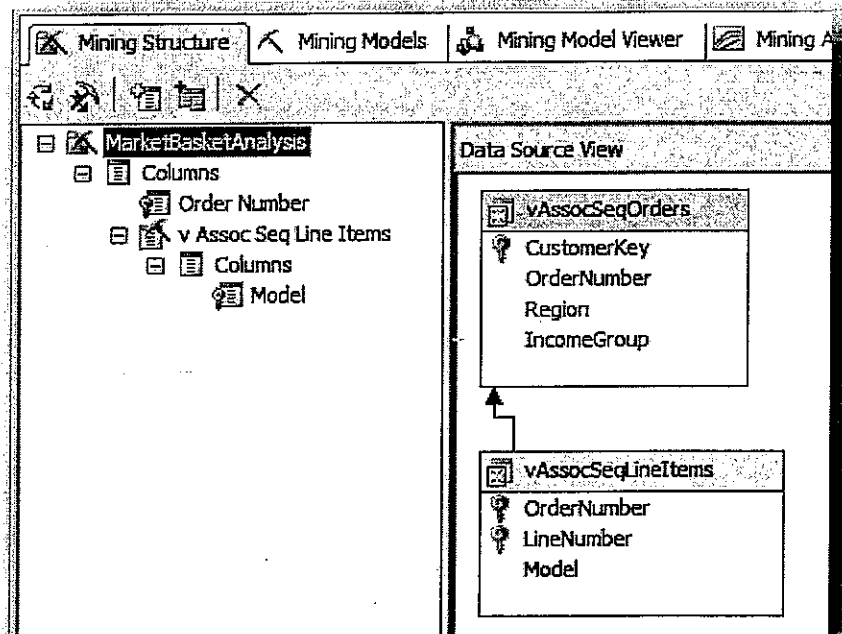
21. Explain the term "Key Performance Indicator (KPI)". [2 marks]
22. Discuss the BPM Methodology – "Balanced Scorecard". [4 marks]
23. Briefly discuss the DMAIC performance model? [2 marks]

*MSS-Emerging Trends*

24. Define Web 2.0. [2 marks]
25. List at least three major characteristics of Web 2.0. [3 marks]
26. How can MSS affect restructuring of business processes? [2 marks]

## Section B –Practical Applications(20 marks)

27. Study the pictorial given below and answer questions that follow.



- a. What is another name of *Market Basket Analysis* mining algorithm?

[1 mark]

- b. Which fieldnames (columns) will be *predictable* columns in the above *mining models* tab.

[1 mark]

- c. Explain the goal of market basket analysis algorithm.

[3 marks]

28. Discuss in which parameters will you need to set a Value? What values will you set? Why?

[4 marks]

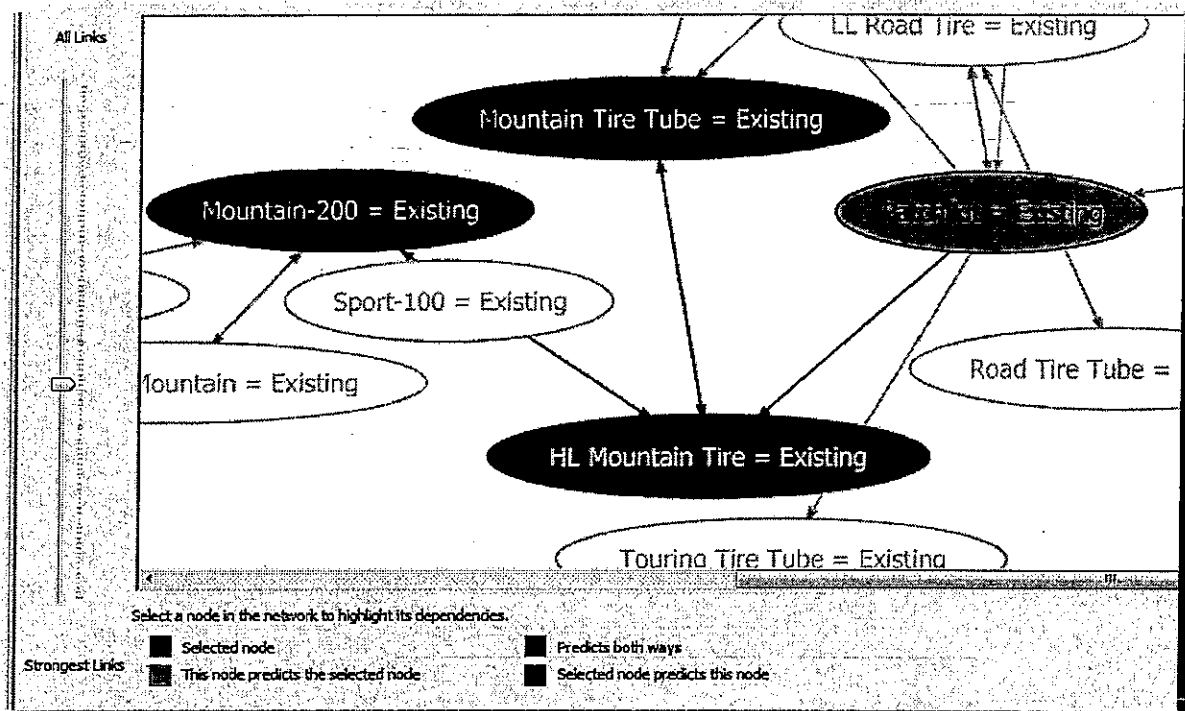
| Algorithm Parameters  |       |            |           |
|-----------------------|-------|------------|-----------|
| Parameters:           |       |            |           |
| Parameter             | Value | Default    | Range     |
| MAXIMUM_ITEMSET_COUNT |       | 200000     | [1,...)   |
| MAXIMUM_ITEMSET_SIZE  |       | 3          | [0,500]   |
| MAXIMUM_SUPPORT       |       | 1.0        | (0.0,...) |
| MINIMUM_IMPORTANCE    |       | -999999999 | (...,...) |
| MINIMUM_ITEMSET_SIZE  |       | 1          | [1,500]   |
| MINIMUM_PROBABILITY   |       | 0.4        | [0.0,1.0] |
| MINIMUM_SUPPORT       |       | 0.0        | [0.0,...) |

29. Interpret the two rows of information from the pictorial below.

[3 marks]

| Probability | Importance | Rule                                                                             |
|-------------|------------|----------------------------------------------------------------------------------|
| 0.851       | 0.687      | Mountain Bottle Cage = Existing, Sport-100 = Existing -> Water Bottle = Existing |
| 0.833       | 0.814      | Mountain Bottle Cage = Existing -> Water Bottle = Existing                       |

30. Study pictorial displayed in the *mining model viewer* and answer questions that follow.



a. What is the special name of this mining model viewer?

[1 mark]

b. How do you use this mining model viewer?

[2 marks]

c. Interpret the information displayed in the above mining model viewer.

[2 marks]

d. What BI decision can be made from the interpretation in part c. above.

[3 marks]

## Section C-Case Study(10 marks)

*Read the Case and answer questions that follow.*

### **Continental Airlines Flies High with Its Real-Time Data Warehouse**

As business intelligence (BI) becomes a critical component of daily operations, real-time data warehouses that provide end-users with rapid updates and alerts generated from transactional systems are increasingly being deployed. Real-time data warehousing and BI, supporting its aggressive Go forward business plan, have helped Continental Airlines alter its industry status from "first to favorite." Continental Airlines is a leader in real-time BI. In 2004, Continental won the Data Warehousing Institute's Best Practices and Leadership Award.

#### **Problem(s)**

Continental Airlines was founded in 1934, with a single-engine Lockheed aircraft in the Southwestern United States. As of 2006, Continental was the fifth largest airline in the United States and the seventh largest in the world. Continental has the broadest global route network of any U.S. airline, with more than 2,300 daily departures to more than 227 destinations.

Back in 1994, Continental was in deep financial trouble. It had filed for Chapter 11 bankruptcy protection twice and was heading for its third, and probably final, bankruptcy. Ticket sales were hurting because performance on factors that are important to customers was dismal, including a low percentage of on-time departures, frequent baggage arrival problems, and too many customers turned away due to overbooking.

#### **Solution**

The revival of Continental began in 1994, when Gordon Bethune became CEO and initiated the Go Forward plan, which consisted of four interrelated parts to be implemented simultaneously. Bethune targeted the need to improve customer-valued performance measures by better understanding customer needs as well as customer perceptions of the value of services that were and could be offered. Financial management practices were also targeted for a significant overhaul. As early as 1998, the airline had separate databases for marketing and operations, all hosted and managed by outside vendors. Processing queries and instigating marketing programs to its high-value customers were time-consuming and ineffective. In addition, information that the workforce needed to make quick decisions was simply not available. In 1999, Continental chose to integrate its marketing, IT, revenue, and operational data sources into a single, in-house EDW. The data warehouse provided a variety of early, major benefits.

As soon as Continental returned to profitability and ranked first in the airline industry in many performance metrics, Bethune and his management team raised the bar by escalating the

vision. Instead of just performing best, they wanted Continental to be their customer's favorite airline. The Go Forward plan established more actionable ways to move from first to favorite among customers. Technology became increasingly critical for supporting these new initiatives. In the early days, having access to historical, integrated information was sufficient. This produced substantial strategic value. But it became increasingly imperative for data warehouse to provide real-time, actionable information to support enterprise-wide tactical decision making and business processes.

Luckily, the warehouse team had expected and arranged for the real-time shift. From the very beginning, the team had created an architecture to handle real-time data feeds into the warehouse, extracts of data from legacy systems into the warehouse, and tactical queries to the warehouse that required almost immediate response times. In 2001, real-time data became available from the warehouse, and the amount stored grew rapidly. Continental moves real-time data (ranging from to-the-minute to hourly) about customers, reservations, check-ins, operations, and flights from its main operational systems to the warehouse. Continental's real-time applications include the following:

- Revenue management and accounting
- Customer relationship management (CRM)
- Crew operations and payroll
- Security and fraud
- Flight operations

## Results

In the first year alone, after the data warehouse project was deployed, Continental identified and eliminated over \$7 million in fraud and reduced costs by \$41 million. With a \$30 million investment in hardware and software over 6 years, Continental has reached over \$500 million in increased revenues and cost savings in marketing, fraud detection, demand forecasting and tracking, and improved data center management. The single, integrated, trusted view of the business (i.e., the single version of the truth) has led to better, faster decision making.

Continental is now identified a leader in real-time BI, based on its scalable and extensible architecture, practical decisions on what data are captured in real-time, strong relationships with end-users, a small and highly competent data warehouse staff, sensible weighing of strategic and tactical decision support and operations, and changed business processes that use real-time data.

(Sources: Adopted from H. Wixcom, J. Hoffer, R. Anderson-Lehmen, and A.Reynolds, "Real-Time Business Intelligence: Best Practices at Continental Airlines," *Information Systems Management Journal*, Winter 2006, pp7-18; H. Wixcom, J. Hoffer, R. Anderson-Lehmen, and A.Reynolds, "Continental Airlines Flies High with Real-Time Business Intelligence," *MIS Quarterly Executive*, Vol. 3, No. 4. December 2004, pp. 163-176)

**Questions for the case**

31. Describe the benefits of implementing the Continental Go Forward strategy. [2 marks]
32. Explain why it is important for an airline to use a real-time data warehouse. [3 marks]
33. Identify the major differences between the traditional data warehouse and a real-time data warehouse, as was implemented at Continental. [2 marks]
34. What strategic advantage can Continental derive from the real-time system as opposed to a traditional information system? [3 marks]

**THE END**