

- 一、你 / 妳認為一個線上的股票交易系統應該考慮哪五個最重要的因素？請依重要性依序排列，並說明理由。(15%)
- 二、就物件導向程式設計而言,請說出使用這種技術的三個優點與兩個缺點。(15%)
- 三、寫出網際網路通訊協定的五個層次名稱。(3%)  
試指出下列各種技術分別屬於哪一層或哪幾層：(17%)

Ethernet	Microware	Router
TCP	CRC checking	Modulation (of Modem)
SNMP	T-1	Message digest
Port number	IP address	Layer 4 switch
Firewall	FAX gateway	Synchronous transmission
Public key cryptography		
SET (Secure Electronic Transaction)		
- 四、試述 array、stack、queue、linked-list、tree 的優缺點為何？並分別舉一個實例，說明在什麼樣的場合，它們最適合使用。(20%)
- 五、試述使用資料庫的優點為何？(15%)
- 六、試述結構化分析設計中有哪些重要的觀念被發展出來？(15%)

### Case 1

Answer in Chinese or English all the following 5 questions according to the attached "HFS : Mega-warehouse as marketing tool" case. (50%)

1. Provide a brief abstract for this case with only 300 words or less.
2. What problems are HFS facing? What are the possible alternatives for these problems?
3. If you were the HFS vice president of business development, what actions would you recommend HFS take with the software developed? Why?
4. What is a data warehouse system? What are its benefits? What are the costs?
5. Provide an example from your experience or your work to identify when the data warehouse systems are more suitable than others.

#### **CASE HFS: MEGA-WAREHOUSE AS MARKETING TOOL**

If you think building a data warehouse for one company is hard, try building an integrated version for more than 10.

That's what HFS, Inc. in Parsippany, N.J., is trying to do.

The \$10 billion holding company of national chains said it is nearing completion on a \$5.5 million integrated warehouse that contains data on more than 50 million customers of HFS's brands worldwide. These companies include Avis, Inc., Howard Johnson International, Inc., Ramada International Hotels and Resorts, Century 21 Real Estate Corp., Coldwell Banker Corp. and Resort Condominiums International.

The project, which started in HFS's marketing department, was formally launched about 18 months ago and is expected to wrap up next month.

The objective is to use the consolidated information in new, highly targeted cross-brand promotions aimed at increasing the market share of each HFS brand.

By using the warehouse to provide a single view of customers and their buying preferences across all brands, the company theoretically should be able to target customers with promotional offers tailored to their specific profiles. For example, regular Avis renters could get special discounts at HFS hotels, or time-share purchasers could get special rates on Avis rentals.

#### **Rewarding Loyalty**

"The idea is to reward our customers for their loyalty and bring to the table additional offers at the right time and the right place," said Scott Anderson, vice president and chief marketing officer at HFS. "We think it is going to be a significant value-add to our business."

If HFS can pull it off, the company will have succeeded in doing what corporations everywhere are struggling to do: find a way to harness and shape vast amounts of widely dispersed enterprise data into a powerful business and marketing tool.

Such capabilities will be crucial for HFS, particularly in light of its recent acquisition by Stamford, Conn.-based direct marketing giant CUC International, Inc. One of the goals of that deal is for the companies to cross-market to one another's customers.

No decision has been made on if and how CUC systems will be merged with the unified HFS warehouse, Anderson said.

"Qualitatively, it is no different from what happens when two different companies merge with each other," said Ken Rudin, a partner at Emergent Corp., a consultancy and integrator in San Mateo, Calif. "You have two sets of data with entirely different personalities that you somehow [have] to merge with each other," he said. But in HFS's case, it is more like 15 different sets of data. And getting there isn't easy.

#### **Building from Scratch**

Integration of the type HFS is trying to achieve involves melding different databases, data models, product codes and data collection methods and then building a warehouse from scratch.

The HFS warehouse will be powered by Digital Equipment Corp. symmetrical multiprocessing Alpha servers running an Informix Corp. database engine. The data being fed into it comes from a mix of mainframe, Oracle Corp., Sybase, Inc., Informix and Microsoft Corp. SQL Server databases.

"Digital's 64-bit architecture, their scalability and their support for Very Large Memory provided what we were looking for from the hardware," said Clyde Bryant, manager of database technology at HFS.

The decision to go with Informix was made last year. Tilting the balance in its favor were its partitioning capabilities and features such as the 64-bit and large file support on the Informix 7.23 database, Bryant said.

The data comes from the tens of millions of customer transactions involving HFS brands every year. For example, HFS collects information from about 45 million room reservations, 15 million Avis rentals, 1.5 million real estate sites and about 2 million time-share reservations. To build the warehouse, HFS had to extract, clean, convert and move relevant data from each of these sources to the centralized database.

#### **Fast Growth**

The completed warehouse will start at a relatively modest 500G bytes but is expected to nearly triple to 1.2T bytes by early next year.

"It took almost a year of constant interaction with our brands just to decide what information we wanted to collect, how we were going to collect it and from where," Anderson said.

After testing many of the data acquisition and cleansing tools available in the market—and rejecting them for being too expensive or inflexible—the integration team finally decided to develop its own technology for collecting data from multiple sources and feeding the data to a central warehouse (see box at end of case).

The result was HFS's proprietary "universal message format," which at a basic level defines what kind of information should get into the central warehouse. It also provides a standard set of specifications for exactly how the data gets mapped into the warehouse.

"The basic driver for anything like this is competition. If you look at the real estate business, for instance, our brands have about 25 percent of the marketplace. That means there's 75 percent of sites out there that don't have our flag. That's the opportunity we want to tap" with these technologies, Anderson said.

#### **Support Choices Were Critical**

The centralized warehouse project, which was managed out of HFS's data center in Phoenix, was put together by its information systems staff and a group of systems integration firms.

They included Deloitte and Touche, System Research and Development, Inc. (SRD) and Digital.

"The project was bigger than the warehouse. We needed to find vendors who were willing to partner with us, understand our objectives and help us define our architecture," said Clyde Bryant, manager of database technology at HFS.

"Considering the sheer size and magnitude of this project, it was very important that we pick outside vendors that could support the management capabilities required" and understand our data warehouse architecture, Bryant said.

As project manager, Deloitte and Touche coordinated the effort, including day-to-day management. Lead integrator SRD helped with things such as data modeling and building front-end tools and user screens. Digital was the main technology provider and supplied its high-end 64-bit Alpha servers. Digital also worked with SRD to develop the warehouse architecture.

## Case 2

When you surf the Net, you are being observed. The only questions are by whom and for what purposes? Tools to monitor your visits to the World Wide Web have been developed for commercial reasons—to help organizations determine how to better target their offerings, and to determine who is visiting their Web sites. For example, many commercial sites log the number of visitors and which site pages they visit to collect marketing information about user interests and behaviors. One key issue arises from this data collection—do they know who you are? If so, then what do they do with such data, and are these uses appropriate, legal, and ethical? In other words, is your privacy being improperly invaded?

Do they know who you are? The answer is—maybe! Of course you are known if you register at a site to purchase a product or service. This situation is the same as using a credit card to purchase any product or service. In addition some sites offer you a free service, such as information, in exchange for your agreeing to register, and when you register they have you identified. This is probably no different from your signing up for a supermarket's frequent shopper or discount card—you voluntarily give up some of your privacy in exchange for something you want. In both cases, the company collects the information to use in its own marketing research and to target specific offers to you. They also might sell it to other companies or organizations, raising the privacy issues discussed elsewhere in this chapter.

But what if you do not volunteer personal information at a site? Can they gather it anyway, without your consent and without your knowledge? The answer seems to be yes, with the help of Internet technology. Observers generally agree that the logging products previously described here can obtain your domain name (the portion of your Internet address to the right of the @ symbol) which does not identify you but gives them a piece of the building block. Most also claim these tools cannot obtain your personal identifier (to the left of your address @ symbol), although as technology is developed, that may be changing. Another new tool, the cookie, is now in widespread use that may have that capability.

Cookies are tiny data files that are deposited on your computer by interested Web sites when you visit those sites. Cookies track your visits to the Web site. When you return to a site that has stored a cookie, it will search your computer, find the



cookie, and "know" what you have done in the past. It may also update the cookie, depending on your activity this visit. In this way, the site can customize its contents for your interests (assuming your past activities indicate your current interest). If you are a regular Web user, search your hard drive for files named "cookie.txt" and you are likely to find some. Many claim these cookies cannot gather your name or e-mail address from your computer, but technology is changing and will be able to collect your identity in time. The site may use the data from its cookies for itself, or it too may sell that data to others. If you want more information on cookies, visit the Laudon and Laudon Web site.

Web search engines are another source of privacy invasion. They monitor and store data on who searches and for what, and that data too is becoming public. For example, you can visit McKinley's Magellan site to see a sample of what topics people have searched using Magellan (<http://voyeur.mckinley.com/voyeur.cgi>). While Magellan does not display the identity of the searchers, they have that technical capacity. And they could sell it to interested parties. You are also monitored as you use Usenet newsgroups. Deja News publicly catalogues 15,000 Usenet groups and monitors their visitors. Visit its site (<http://dejanews.com>) and you can view a profile of your own (or other person's) use of Usenet groups—how many times you posted messages and in which newsgroups. You may not want this information released. For example, you may be part of a political newsgroup that you want kept confidential. That information is available for others to see and may even be sold to interested parties.

### Questions:

1. Please summarize the case. (7%)
2. How would you balance the rights of individuals to privacy against the desire of companies to use technology to improve their marketing and to better target their products to the interests of individuals? (12%)
3. How is the Internet challenging the protection of individual privacy? (12%)
4. What management, organization, and technology issues should be addressed by companies to prevent the rights of individuals to privacy? (12%)
5. What are the key technological trends that heighten ethical concerns? (7%)