Reading: Chapter 10, pages 442-448.

You may be wondering why there is a need for two forms of accessing information from databases. The next activity enables you to compare the two approaches.

ACTIVITY 4.10: QUESTION

Relational databases are designed to save data as efficiently as possible. Data are stored in tables that are related by common fields, such that no duplication of information occurs. Examine the four tables (PRODUCT, ORDER, ORDER DETAIL, and CUSTOMER) shown below, from a simplified relational database. Note that the columns (or fields) with underlined titles are the 'key fields' which uniquely identify each row in a table.

Then answer these questions.

1. Examples of OLTP would be to produce an invoice, for example, for Harris Electric, or to report all the recent order values by all customers in the last quarter, organised by region and showing regional totals. Consider how this might be done, in principle.

2. An example of OLAP would be to present the value of orders in any two-way combination of the following dimensions: by Region, by Product type, by Month and by Quarter, such that the user could flip the workstation display between dimensions by clicking a mouse. Why is this more difficult?

PRODUCT

Product #	Product type	Price
2001	Video	100.00
2002	Video	200.00
…		
3010	TV	120.00
3011	TV	240.50
…		

ORDER

Order #	Customer #	Order date	Dispatch date
…			
990001	112	2000-09-21	2000-10-01
990002	301	2000-09-21	2000-09-30
…			

ORDER DETAIL

Order #	Product #	Quantity
…		
990002	2001	200
990002	3010	200
…		

CUSTOMER

Customer #	Name	Address	City	Region	Post code
…					
301	Harris Electric	1 High Street	Wexwood	West Yorkshire	WW9 XY2
…					

ACTIVITY 4.10: ANSWER

Transaction processing versus analytical processing

If we consider how the invoice is generated, we see that first the data need to be assembled, as follows. From the ORDER table, the row with Harris's recent order contains the unique customer number (301) that points to a row in the CUSTOMER table with the address for the invoice. The same row in the ORDER table contains the order number (990002), which points to all the relevant rows in the ORDER DETAIL table. Each of these rows contains a product number that points to the relevant rows in the PRODUCT table, with descriptions and prices.

Now we know where to get the data, we can retrieve it. Simple computations allow the quantities to be multiplied by prices to give the value of the order. If we wished to report all recent order values, similar data would be assembled and again the computations would be repeated sequentially to enable a report to be generated. There is not much flexibility about this report: it is a long list of results. Each row would contain the order information and summary rows would show totals for each of the regions.

Although the data for the OLAP computations are also in the relational database tables, the results are to be placed into a virtual multi-dimensional matrix. For example, one cut through the matrix would show sales values in a table with Regions along the rows and Product type along the columns. (See pages 447-448 of the textbook.)

We need results to fill a table like this for each month. All these values need to be computed because we also need to display tables with other combinations, such as region by month, or product type by month. Thus, to give a manager the flexibility to view the data in many dimensions, much pre-processing is required.

In summary, OLTP is the natural on-line way to process reports and queries directed at a relational database. A relational database, which may belong to a business unit, or may be a consolidated data warehouse, is designed with the objective of efficient and non-redundant storage of detailed transactional data. In contrast, OLAP is designed to support managers. Its objective is **effectiveness**, not **efficient** data storage. Considerable pre-processing of data is needed, to give a manager the flexibility to see data in any way he or she chooses, if those data come directly from a relational database such as a data warehouse. An alternative is to save the data of interest to a management team in a local **data mart** which is designed to function as a multi-dimensional database. Gray and Watson (1998) is a good source if this subject interests you.

Interactive knowledge

Refining and sifting through masses of data are not the only ways to generate valuable information. Another form of organisational information exists as social networks: who knows whom. Putting people in touch with one another, so that they can share the products of their work, their intellectual capital, is another aspect of knowledge management.

Reading: Chapter 10, pages 456-459.

Arthur Andersen's knowledge base is an example of a knowledge network. If you have experience of such a system, or if you might consider implementing one in your organisation, there are some issues to consider. We look at these next.

ACTIVITY 4.11: QUESTION

What would be the reasons to collaborate in the Arthur Andersen knowledge network? Why would a person not contribute to the knowledge base?

ACTIVITY 4.11: ANSWER

The textbook enthusiastically embraces the IT that supports knowledge sharing but clearly there are many complex human issues to resolve in practice. Many, if not all, the major business consulting firms have systems similar to that of Arthur Andersen. The main technologies presently include web servers, for example, an intranet, and Lotus Notes databases.

In a consultancy, business opportunities can arise unexpectedly, and you may need rapidly to come up to speed in an unfamiliar area of business in order to secure a contract. Such situations give a strong incentive to use the knowledge of others. A reason to contribute to the database may be that you need to be seen as part of this self-supporting community. Other reasons may include professional recognition and pride in your accomplishments.

There are also compelling reasons not to contribute to such a system. You may not have time to prepare your contribution. The system may assume a context for your potential contribution to the database that is not appropriate, so the system cannot classify it easily. You might feel that your contribution will be seen out of context, to your disadvantage. Overall, the system is unlikely to be used unless it is an integral part of the job, or it fits seamlessly into your way of working.

The technologies supporting knowledge networks and knowledge discovery are evolving. The textbook provides insights to these evolving, smart technologies in Chapter 11. However, you can read this chapter as part of your further reading if you like.

Summary

During this unit, we explained the function of MSS, the process of rational decision making, and the information channels used by managers as they act out different roles. Different support systems are suitable for various classes of decision, in terms of structure – hard or soft, and type – operational, managerial, or strategic. Moreover, different MSS enhance the various information channels that managers use – personal, interpersonal, reporting and analysis.

Information is a resource, in the sense of other business resources such as people, machines, and money, and in Unit 1 we saw how information can substitute these other resources. In this sense, information supports and enhances the business processes of the value chain. But there is another aspect of information as a resource.

The databases of an organisation digitally record the work that is done. Any of the products of work that are digitally recorded can be used again for other purposes and, in this unit, we examined the ways that this happens. For transaction data, we outlined the steps in the data life cycle, whereby data captured during regular business can be consolidated in a warehouse and later mined to reveal interesting patterns of behaviour. We also saw the importance of tacit background knowledge when interpreting the results of data mining.

Although relational databases are highly efficient for storing large volumes of transactional data, the regular method of interacting with these databases, OLTP, is effective only at the level of professional management. Recall the introduction to this unit for the distinctions between professional, expert and innovative management. If managers want to conduct expert analysis, or follow up the sort of hunches that spring to the mind of an innovative thinker, OLTP cannot deliver suitable results. For this reason, dedicated database management technology exists to deliver OLAP.
Finally, there is another aspect to knowledge than the knowledge that comes from analysing captured data. This is the networking aspect, whereby people with knowledge use technology to share the products of their intellectual work. At the end of the unit, we outlined the issues of managing a knowledge network

References

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Nutt P C (1986) 'Evaluating MIS design principles', *MIS Quarterly*, 10, (2), June, pp.138-155.

Further Reading

Gray P and Watson H J (1998) *Decision Support in the Data Warehouse*, Englewood Cliffs, NJ: Prentice-Hall.

Turban E *et al*., (set textbook) Chapter 11.