Computer Applications

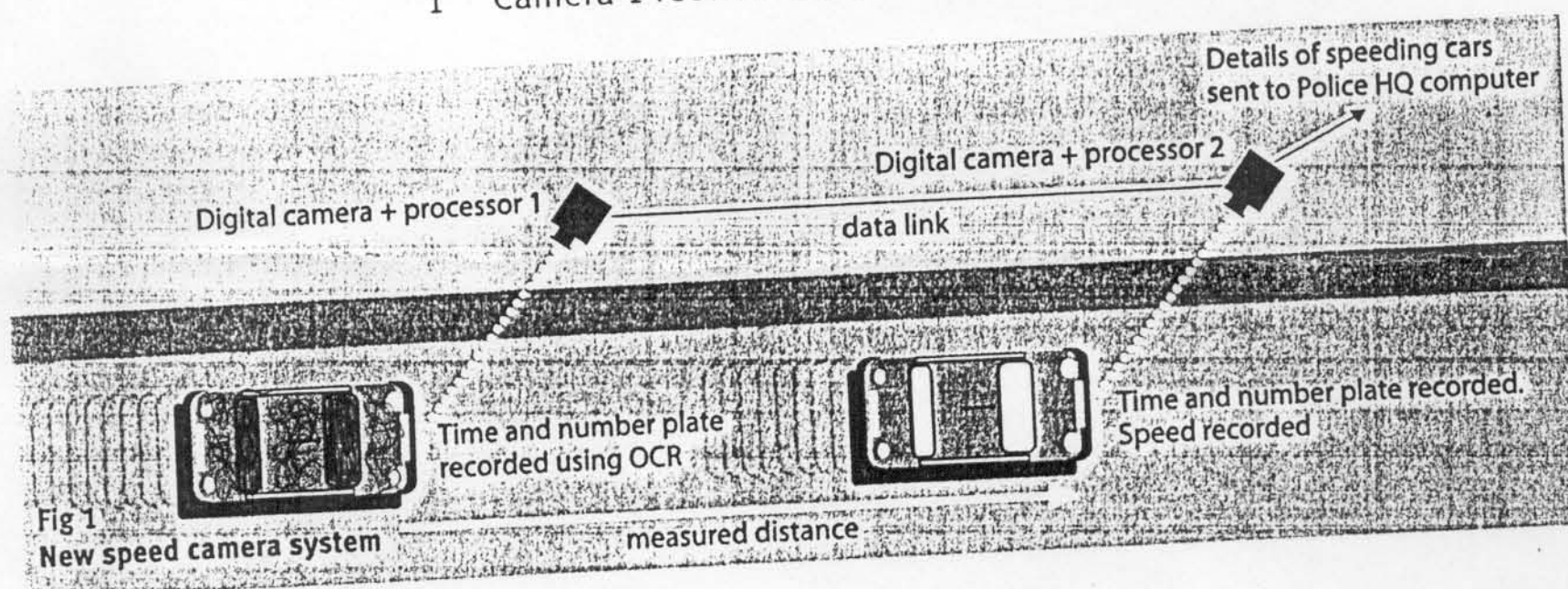**1**   Work in groups. List as many uses as you can for computers in one of these areas.

1   supermarkets
2   hospitals
3   airports
4   police headquarters

READING   **2**   Study this diagram. Using only the diagram, try to list each stage in the operation of this computerised speed trap to make an explanation of how it operates. For example:

1   Camera 1 records the time each vehicle passes.

Fig 1
New speed camera system

Digital camera + processor 1

Digital camera + processor 2

data link

Details of speeding cars sent to Police HQ computer

Time and number plate recorded using OCR

Time and number plate recorded. Speed recorded

measured distance

3   Part 1 of the text describes the system which predates the one shown in Fig 1. Does it contain any information that may help complete your explanation? Read it quickly to find out. Ignore any information which is not helpful to you.

In the last ten years, police have installed speed trap units on many busy roads. These contain a radar set, a microprocessor and a camera equipped with a flash. The radar sends out a beam of radio waves at a frequency of 24 gigahertz. This is equivalent to a wavelength of 1.25 cms. If a car is moving towards the radar, the reflected signal will bounce back with a slightly smaller wavelength. If away from the radar, the waves will reflect with a slightly longer wavelength. The microprocessor within the unit measures the difference in wavelength between outgoing and returning signals and calculates the speed of each vehicle. If it is above the speed pre-set by the police, the camera takes a picture of the vehicle. The information is stored on a smart card for transfer to the police computer. The owner of the vehicle can then be traced using the Driver and Vehicle Licensing Centre database.

4 Part 2 describes the new system. Read it to complete the stages in your explanation.

Part 2

Some drivers have now got used to these traps. They slow down when they approach one to ensure that the camera is not triggered. They speed up again as soon as they have passed. This is known as 'surfing'. One way of outwitting such motorists is a new computerised system. This consists of two units equipped with digital cameras positioned at a measured distance apart. The first unit records the time each vehicle passes it and identifies each vehicle by its number plates using optical character recognition software. This information is relayed to the second unit which repeats the exercise. The microprocessor within the second unit then calculates the time taken by each vehicle to travel between the units. The registration numbers of those vehicles exceeding the speed limit are relayed to police headquarters where a computer matches each vehicle with the DVLC database. Using mailmerge a standard letter is then printed off addressed to the vehicle owner.

LANGUAGE WORK   Present passive

Study these sentences.
1 The radar sends out a beam of radio waves.
2 The information is stored on a smart card.

In 1 the verb is active and in 2 it is passive, the Present passive. Why is this so? What difference does it make? In 1 the agent responsible for the action is included – the radar. In 2 the agent is not included although we know what it is – the microprocessor. The passive is often used to describe the steps in a process where the action is more important than the agent and where the agent is already known to the reader. If we need to add the agent, we can do so like this:

3 The information is stored on a smart card by the microprocessor.

5 Describe the operation of the new speed trap by converting each of these statements to the Present passive. Add information on the agent where you think it is necessary.

1 The first unit records the time each vehicle passes.
2 It identifies each vehicle by its number plates using OCR software.
3 It relays the information to the second unit.
4 The second unit also records the time each vehicle passes.
5 The microprocessor calculates the time taken to travel between the units.
6 It relays the registration numbers of speeding vehicles to police headquarters.
7 A computer matches each vehicle with the DVLC database.
8 It prints off a letter to the vehicle owners using mailmerge.

6 With the help of this diagram, sequence these steps in the operation of an EPOS till. Then write a description of its operation in the Present passive.

a   The scanner converts the barcode into electrical pulses.
b   The branch computer sends the price and description of the product to the EPOS till.
c   The scanner reads the barcode.
d   The branch computer records the sale of the product.
e   The till shows the item and price.
f   The checkout operator scans the item.
g   The scanner sends the pulses to the branch computer.
h   The till prints the item and price on the paper receipt.
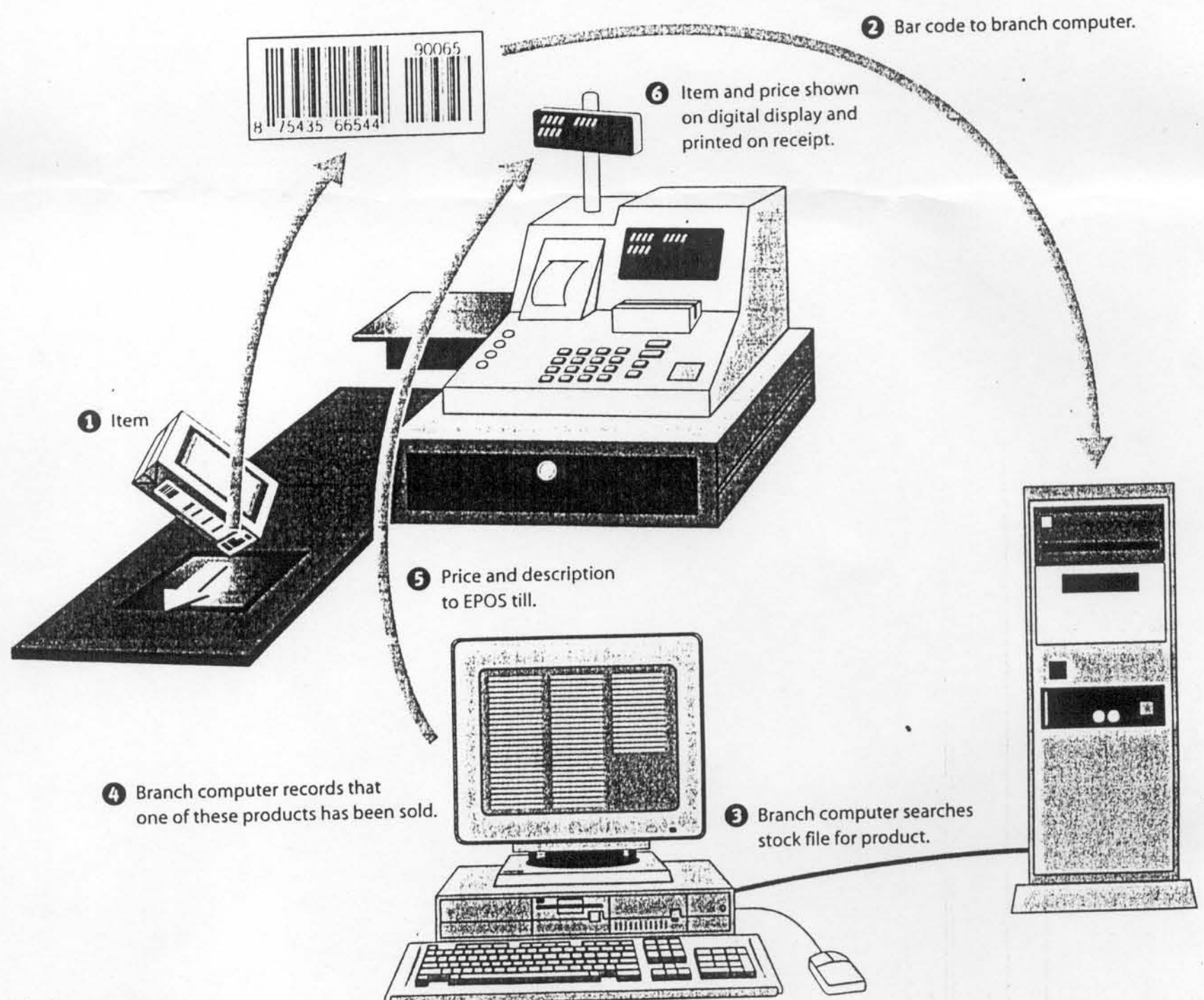i   The branch computer searches the stock file for a product matching the barcode EAN.

❷ Bar code to branch computer.

❻ Item and price shown on digital display and printed on receipt.

90065

8 75435 66544

❶ Item

❺ Price and description to EPOS till.

❹ Branch computer records that one of these products has been sold.

❸ Branch computer searches stock file for product.

Fig 2
Operation of EPOS till

in

PROBLEM-SOLVING **7** Assuming cost is not a problem, what computer applications would make today's cars safer, more comfortable, more secure and more efficient? List your ideas; then compare ideas with others in your group.

SPEAKING **8** Work in pairs, A and B. Be prepared to describe the process shown in your diagram to your partner. Take notes on the process described to you. Ask your partner to repeat or explain further if you do not understand any of the steps in his/her description. If you prefer, you may describe another computing process you are familiar with.

Student A Your process is on page 184.
Student B Your process is on page 190.

WRITING **9** Write a description of the process you described in Task 8.

A **Find the answers to these questions in the following text.**

1 What tool is often used in data mining?
2 What AI method is used for the following processes?
   a Separate data into subsets and then analyse the subsets to divide them into further subsets for a number of levels.
   b Continually analyse and compare data until patterns emerge.
   c Divide data into groups based on similar features or limited data ranges.
3 What term is used for the patterns found by neural networks?
4 When are clusters used in data mining?
5 What types of data storage can be used in data mining?
6 What can an analyst do to improve the data mining results?
7 Name some of the ways in which data mining is currently used.

DATA MINING

Data mining is simply filtering through large amounts of raw data for useful information that gives businesses a competitive edge. This information is made up of meaningful patterns
5 and trends that are already in the data but were previously unseen.

The most popular tool used when mining is artificial intelligence (AI). AI technologies try to work the way the human brain works, by making
10 intelligent guesses, learning by example, and using deductive reasoning. Some of the more popular AI methods used in data mining include neural networks, clustering, and decision trees.

Neural networks look at the rules of using data,
15 which are based on the connections found or on a sample set of data. As a result, the software continually analyses value and compares it to the other factors, and it compares these factors repeatedly until it finds patterns emerging. These
20 patterns are known as rules. The software then looks for other patterns based on these rules or sends out an alarm when a trigger value is hit.

Clustering divides data into groups based on similar features or limited data ranges. Clusters
25 are used when data isn't labelled in a way that is favourable to mining. For instance, an insurance company that wants to find instances of fraud wouldn't have its records labelled as fraudulent or not fraudulent. But after analysing patterns
30 within clusters, the mining software can start to figure out the rules that point to which claims are likely to be false.

Decision trees, like clusters, separate the data into subsets and then analyse the subsets to
35 divide them into further subsets, and so on (for a few more levels). The final subsets are then small enough that the mining process can find interesting patterns and relationships within the data.

40 Once the data to be mined is identified, it should be cleansed. Cleansing data frees it from duplicate information and erroneous data. Next, the data should be stored in a uniform format within relevant categories or fields. Mining tools
45 can work with all types of data storage, from large data warehouses to smaller desktop databases to flat files. Data warehouses and data

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data

Data stores
You must first have data to mine. Data stores include one or several databases or data warehouses.

Cleanse data
Data must be stored in a consistent format and free from errors and redundancies.

Search data
Actual mining occurs when data is combed for patterns and trends. Rules for patterns are noted.

Analyse reports
Someone must analyse mining results for validity and relevance.

Report findings
The mining results can then be reviewed and interpreted, and a plan of action determined.

marts are storage methods that involve archiving large amounts of data in a way that makes it easy
50 to access when necessary.

When the process is complete, the mining software generates a report. An analyst goes over the report to see if further work needs to be done, such as refining parameters, using other
55 data analysis tools to examine the data, or even scrapping the data if it's unusable. If no further work is required, the report proceeds to the decision makers for appropriate action.

The power of data mining is being used for
60 many purposes, such as analysing Supreme Court decisions, discovering patterns in health care, pulling stories about competitors from newswires, resolving bottlenecks in production processes, and analysing sequences in the human
65 genetic makeup. There really is no limit to the type of business or area of study where data mining can be beneficial.

[Adapted from 'Data Mining for Golden Opportunities', Smart Computing Guide Series Volume 8 Issue 1, January 2000]

B Re-read the text to find the answers to these questions.

1 Match the terms in Table A with the statements in Table B.

Table A		
a Data mining	c	Cleansed data
b AI	d	Data warehouse

Table B
i Storage method of archiving large amounts of data to make it easy to access
ii Data free from duplicate and erroneous information
iii A process of filtering through large amounts of raw data for useful information
iv A computing tool that tries to operate in a way similar to the human brain

2 Mark the following as True or False:

a Data mining is a process of analysing known patterns in data.
b Artificial intelligence is commonly used in data mining.
c In data mining, patterns found while analysing data are used for further analysing the data.
d Data mining is used to detect false insurance claims.
e Data mining is only useful for a limited range of problems.

3 Complete the following description of the data mining process using words from the text:

Large amounts of data stored in data .... are often used for data .... The data is first .... to remove .... information and errors. The .... is then analysed using a tool such as .... An analysis report is then analysed by an .... who decides if the .... need to be refined, other data .... tools need to be used, or if the results need to be discarded because they are .... The analyst passes the final results to the .... makers who decide on the .... action.