TAPESCRIPT

[Task 2 (Page:4-5)]

Interview 1

INTERVIEWER: Excuse me, sir. I'm doing some market research on visitors to the Computer World exhibition. Could you spare me a few minutes to answer some simple questions?

JOHN: OK. Provided that it doesn't take too long.

INTERVIEWER: Thanks very much. It won't take long, I promise. First, what is your name?

JOHN: John Steele.

INTERVIEWER: Could you spell your surname, please?

JOHN: S-T-E-E-L-E.

INTERVIEWER: And what do you do, Mr Steele?

JOHN: I'm a computer consultant.

INTERVIEWER: And what exactly do you do as a computer consultant?

JOHN: Advise customers - usually companies-that want to computerize certain procedures.

INTER VIEWER: Could you give me an example?

JOHN: Of course. I recently did some work for a company that wanted to computerize all their bookkeeping. I advised them on the best hardware to buy and I developed a software package to suit their needs.

INTERVIEWER: What hardware do you use?

JOHN: I use an IBM PC.

INTERVIEWER: Why IBM?

JOHN: Because I know them well. I bought an IBM ten years ago for my personal use, I've been using one ever since.

INTERVIEWER: Is it simply a question of habit, then?

JOHN: No. I also know lots of other IBM users that I exchange ideas with. And of course there's a lot of software available.

INTERVIEWER: Do you ever advise your customers to buy Macintoshes?

JOHN: (laughs) Sometimes. It depends on what kind of application the customer wants to run.

INTERVIEWER: Mr Steele, thank you very much.

Interview 2

INTERVIEWER: Excuse me, sir. I'm doing some market research on visitors to the Computer World exhibition. Could you spare me a few minutes to answer some simple questions?

ENRIQUE: No problem.

INTERVIEWER: First, what's your name and what do you do?

ENRIQUE: My name is Enrique Vargas and I'm a student.

INTERVIEWER : Sorry, how do you spell your name?

ENRIQUE: E-N-R-I-Q-U-E, Vargas: V-A-R-G-A-S.

INTERVIEWER: And where are you studying, Enrique? May I call you Enrique?

ENRIQUE: Yes, of course. I study Computer Science at the Monterrey Institute of Technology in Mexico.

INTERVIEWER: Do you own a PC?

ENRIQUE: Yes, I have an Apple Macintosh.

INTERVIEWER: Why did you choose a Mac as opposed to an IBM or an IBM clone?

ENRIQUE: I think Macs are easier to use than IBM PCs. I use the mouse feature a lot, which is standard on all Macs. Then there's the graphical user interface and the windows.

INTERVIEWER: Graphical user interface? Could you explain that?

ENRIQUE: Well, put simply, it means that you click on icons instead of typing in commands.

INTERVIEWER: I see. You mentioned windows. Doesn't IBM also use windows?

ENRIQUE: Yes, but I think their windows are harder to set up. In any case, I'm used to the Mac.

INTERVIEWER: Thank you very much for talking to me, Enrique.

ENRIQUE: It's my pleasure.

TAPESCRIPT

[Task 2 (Page:14)]

HOST: Sandra, many of our listeners have written to us asking us to talk about portable computers. I hope you'll be able to clarify things for us.

SANDRA: I hope so, too. The first point to make is that portable computers are simply smaller versions of desktop computers. They are as versatile, reliable, and fast as any computer on your desk.

HOST: But then why are some referred to as laptops, others as notebooks, and still others as palmtops? What's the difference?

SANDRA: Simply put, portables are larger than laptops. laptops are larger than notebooks, and notebooks are larger than palmtops. In other words, it's a question of physical size and weight.

HOST: Are there any other characteristics that differentiate them?

SANDRA : Yes. For instance, portable computers can only run on AC power. Like desktop computers. they must be plugged in. They weigh between fifteen and twenty pounds and have a screen that's at least ten inches diagonally.

HOST: How do laptops compare with this?

SANDRA: Laptops are smaller than portables, and most of them can fit into a briefcase. They don't need to be plugged in; they operate on rechargeable batteries. Most weigh between eight and fifteen pounds and have a screen which is about ten inches diagonally.

HOST: What about notebooks?

SANDRA: Well. notebooks weigh less and can have smaller screens. Some weigh as little as four pounds. The smallest screen I've seen is about eight inches diagonally. Notebooks are also thinner than laptops. but they work just as well.

HOST: Now that we know the basic differences between portables. lap tops. and notebooks. what are clipboards?

SANDRA: Clipboards. as the name implies. look like a clipboard or a slate. They can operate with rechargeable batteries and are very thin. weighing between three and six pounds at the most. Their screen size is similar to laptops and notebooks. but one important feature is that they don't have a keyboard. They use a pen or stylus.

HOST: You mean to say that you don't have to type in letters or numbers!

SANDRA: Exactly. All you need is a pen that you use to print on the screen. That's why they call them pen-based computers.

HOST: That's incredible!

SANDRA: Now. I didn't mention palmtops. Palmtop computers. or hand-held computers as they are also known. are so small that they can fit in your hand. They weigh less than one pound. Of course. they have a very small screen. but they can operate on alkaline batteries. Most people use these as agenda books. phone books. or address books.

TAPESCRIPT

[Task 7 (Page:31)]

Jean-Yves Martin, a French computer technician, explains the Minitel system to Paul Burgess. an English reporter.

PAUL BURGESS:: SO, Jean-Yves. what exactly is Minitel?

JEAN-YVES MARTIN: The best description I've heard, Paul, is that it's a telephone you can

write with. It's a small computer terminal, linked to the telephone network, which enables users to exchange information with each other and, more importantly, to have access to hundreds of different sources of information.

PAUL BURGESS: Such as?

JEAN-YVES MARTIN: Oh, all sorts of things: weather forecasts, train schedules, home-shopping services, stock-market figures. You name it, it's available on Minitel. Oh, and there is 'Minitel rose'. of course - er, 'pink Minitel', I suppose you'd say in English.

PAUL BURGESS: What's that?

JEAN-YVES MARTIN: It's a sort of rendez-vous service, a way for people to meet each other and communicate online. quite anonymously if they wish. It can get very interesting sometimes!

PAUL BURGESS: I can imagine. How did the system start?

JEAN-YVES MARTIN: It began in 1982. As an experiment, the PTT - which ran telecommunications in France before France Telecom split from the Post Office - put about a million Minitels into people's homes instead of printed telephone directories.

PAUL BURGESS: Did the first users have to pay for them?

JEAN-YVES MARTIN: At first not at all, or else they paid a nominal sum. Anyway, the users soon became used to the system, and started to look at some of the other services provided on Minitel. The whole thing grew from there.

PAUL BURGESS: Why do you think it became so successful?

JEAN-YVES MARTIN: Well, it doesn't cost much, it's very easy to use, and it's readily available. I think that. in the early days, these advantages outweighed all the disadvantages of the system, such as the rather primitive graphics system, the slow transmission speed, and the keyboard design which made it impossible to type really fast.

PAUL BURGESS : What plans do you have to develop Minitel in the future?

JEAN-YVES MARTIN: Well, we already have the possibility of adding a smart-card reader to the system, so that users can make bank and stock-market transactions from their home. Another possibility is portable Minitel, linked on broadband radio channels, which users can operate from their cars. The possibilities for development are endless.

PAUL BURGESS: They certainly are. Well, thank you for explaining it to me.

JEAN-YVES MARTIN: It's my pleasure. I wonder if you'd like to see ...

TAPESCRIPT

[Task 9 (Page:44)]

INTERVIEWER : C was originally written to support the development of the UNIX operating system. Is that right?

DAVID WENDT: Yes, that's right. Dennis Ritchie designed C in the early 19 70s and UNIX is written in C. However, it's actually the result of a development process that began with a language called BCPL. which was developed in 1967.

INTER VIEWER: SO C is based on BCPL?

DAVID WENDT: Indirectly, yes. Ken Thompson, the developer of UNIX, had been using both assembly language and a language called B. C evolved from B and BCPL. In 1973, Ritchie and Thompson rewrote UNIX in C.

INTERVIEWER: C was used almost exclusively for systems programming to begin with, so why has it become so popular as a general purpose language?

DAVID WENDT: Well, it's true that it was - and still is - used for systems programming. Much of MS/DOS and OS/2, and of course UNIX, is written in C. However, when UNIX became one of the most popular multi-user operating systems. C was adopted by programmers for almost any programming task.

INTERVIEWER: But what do you think makes C more attractive than. say PASCAL?

DAVID WENDT: C'S main attraction is that it has a small but very powerful set of operators. It combines the power of Assembler with the elegance of high-level languages.

INTERVIEWER: Could you give some examples of how it does that?

DAVID WENDT: Yes. With C, the programmer can access the underlying hardware. He can access memory addresses directly, he can perform operations on values stored as bits, and he can store variables in registers. just as in Assembler. This produces faster and more efficient code than is produced by high-level languages like PASCAL. At the same time. it provides the fundamental control flow constructs required for well-structured programs: decision-making, loops. and subprograms. These features combined together provide a very powerful tool for the programmer.

INTER VIEWER: You make it sound like the ideal language for everyone.

DAVID WENDT: Well, no, I'm not saying that. But if you need to write programs that are compact, fast in execution, and yet portable from one computer to another, then C is the language you should be using.

INTER VIEWER: One last point: you said earlier that C was the result of a development process. Is this development continuing? I mean, are we going to see a language called D?

DAVID WENDT: (laughs) As you know, nothing stands still in the field of computing. There is a language C++ which has developed from C, and its use is increasing. Things are definitely moving to object-orientated programming. Language like C++ and Smalltalk are the languages of the next decade (pause) as are functional languages, but that's another story.

TAPESCRIPT

[Task 7 (Page:55)]

BARRY HARRIS: Welcome to Computer Forecast. I'm Barry Harris and today's topic is the future of Software Technology. With me today are Sam Barton, representing the Software Manufacturers' Federation, and Liz Graham, a writer on Business Computer Magazine. Liz, Sam, welcome to the programme. We'd all agree that software technology is getting more complicated. Would you, the experts, characterize most PC software users as sophisticated, repeat buyers or first-time buyers? Liz Graham, can I start with you?

LIZ GRAHAM: No, I don't think that most PC users are sophisticated - far from it. Compared with users on other systems, they are far more tolerant of faulty design.

BARRY HARRIS: That's a very strong claim, Liz. Aren't you exaggerating the problem?

LIZ GRAHAM: No, I don't think I am exaggerating. I honestly think the vast majority of software users I've interviewed are not at all sophisticated. In fact, they're barely able to cope with the programs they're using. I estimate they probably use only ten per cent of the features in any given application. Now, we all agree that new software will definitely be bigger and much more complicated, so the problem can only get worse.

BARRY HARRIS: Sam, do you agree with Liz?

SAM BARTON: No, I think Liz isn't giving the whole picture. Maybe some single-users are inexperienced but, in a large company, I'd say that the buyers are definitely sophisticated and knowledgeable: they know what they're doing.

BARRY HARRIS: As a manufacturer, which represents your biggest market: the experienced buyer or the newcomer - the first-time buyer?

SAM BARTON: I think there are both sophisticated repeat buyers and first-time buyers who are buying PCs at the moment, just like always. In fact, I'd say it was about half and half. Of course, this makes it very tricky for a software developer, as the needs of the two groups are really quite different.

BARRY HARRIS: OK, the next thing I want to ask you all about is multimedia. Will multimedia have any serious effect on the software market? Liz?

LIZ GRAHAM: No, I don't think so. Maybe when the hardware price drops drastically, it'll be different, but I doubt it. Most users don't have access to the technology to make multimedia work for them. It takes more than a Mac or a Laser Writer to do multimedia.

BARRY HARRIS: What do you think, Sam?

SAM BARTON: I disagree with Liz again, I'm afraid. I really believe multimedia is having a serious effect on the market now. I feel it definitely has a future for things like presentations, visual effects, in fields like advertising or public relations. I'm convinced there will be a significant market for multimedia in the future, but it won't be as large as DTP.

BARRY HARRIS: We have time for one last question. Do you think developers are paying more attention to making software to be used with local area networks? Liz?

LIZ GRAHAM: Yes, I think they're doing so now. No serious application on the market today can exist without being network compatible.

BARRY HARRIS: Sam?

SAM BARTON: There's no question that we're paying more attention to LANs. New products that ignore the ability to adapt themselves to network use simply won't survive.

BARRY HARRIS: Well, I'm glad we've found at least one point on which both our guests can agree! That's all the time we have for today, I'm afraid. Liz, Sam, thank you very much for sharing your thoughts with us.

TAPESCRIPT

[Task 8 (Page:69)]

INTER VIEWER: Good afternoon, ladies and gentlemen. Welcome to Computerworks. Today's guest is Mary Marsh, a computer consultant and expert on networks and their applications. She'll be answering your questions on LANs. Mary, thanks for coming on the programme.

MARY MARSH: It's a pleasure, Mike.

INTERVIEWER: If you want to speak to Mary Marsh, the number to ring is 071-888 1200. The lines are now free. Mary, one of the impressions that business computer users have is that LANs are only for large businesses. Are they right?

MARY MARSH: Well, Mike, I don't agree that LANs are only for large companies. They're just as useful for smaller companies, as many of them are beginning to realize.

INTERVIEWER: Another common belief among business network users is that something as complex as a LAN can be designed and installed only by a specialist company. Is this correct?

MARY MARSH: No, I think they're wrong again, I'm afraid. It's perfectly possible for small companies to design and install their own LANs. Only the really big LANs for large companies need to be installed by outside experts.

INTERVIEWER : SO, are you saying that every small company should install its own LAN - build a sort of do-it-yourself network?

MARY MARSH: No, not necessarily everyone. A great deal depends on your ability to work with computers and your willingness to spend time on LAN installation in addition to your normal work. Not everyone is capable of setting up a do-it-yourself network. If you don't have enough computer knowledge, or enough time, you shouldn't attempt it. However, in some cases, you can do part of the installation work, even if you don't do the whole job yourself.

INTER VIEWER: Mary, let's go to our first caller, John from Leeds. Hello. John. What's your question, please?

1ST CALLER: Hello, Mary. My question is this: how much do you have to know about computers to install your own LAN?

MARY MARSH: Well, John, you certainly don't need a college qualification in computer science to do a simple LAN installation. On the other hand, you should be able to open up your machines and add and remove expansion boards easily. Also. you should be familiar with computer documentation. Are you used to doing all those things, John?

1ST CALLER: Yes, Mary, I've got quite a lot of experience.

MARY MARSH: Well, that's fine. Another point I'd want to make is that you have to be ready to try a process several times before you get it right.

INTERVIEWER: SO, Mary's advice is that you've got to keep trying, John.

1ST CALLER: Yes. Thanks, Mary.

INTERVIEWER: OK, let's move on to our second caller, Alison from Sunderland. Hello, Alison, what's your question for Mary Marsh, please?

2ND CALLER: Hello, Mike. Hello, Mary. Mary, how much downtime should I expect while installing a LAN?

MARY MARSH: Hello, Alison. When you're installing a LAN, you may be without your computers for as much as a day or so. A lot depends on how well the installation proceeds, and that depends on your own experience. Professional installers can have each of your machines out of operation for only a few minutes at a time. If you can't live without your computers for a while. you might want to avoid doing it yourself.

INTERVIEWER: Does that answer your question, Alison?

2ND CALLER: Yes. Thank you very much, Mary.

INTERVIEWER: Let's go to caller number three, Bill from Bristol. Hello, Bill. What's your question for Mary?

3RD CALLER: Hello, Mary. I'd like to know if I have to be good at construction techniques to install a LAN?

MARY MARSH: Well, Bill, installing a LAN involves running cable to several offices. This may require you to install junction boxes in walls, do the wiring, and maybe install electrical power as well. If you aren't familiar with these skills, and if you

aren't a qualified electrician, you will need to hire someone for this part, at least. Of course, if you 're installing your LAN in one room, then you might not need to hire anyone.

3RD CALLER: That's what I thought. Thank you very much.

INTERVIEWER: OK, I'll be back with my guest, Mary Marsh, answering questions about computer networks, right after this break ...

TAPESCRIPT

[Task 10 (Page:81)]

RICHARD: Hi, Steve. Are you busy?

STEVE: No, not really.

RICHARD: Good. If you've got a minute, I'd like to talk to you about computer security. I saw a program on TV the other evening about computer hackers. It made me realize that our network system isn't very secure. We have a lot of sensitive information in our data bank, and I think perhaps we should install some kind of system to protect it.

STEVE: That's a good point. Theoretically, anyone could call in and connect their personal computers at home to the office network. All they'd need is a modem.

RICHARD: Exactly. There's nothing to stop students calling in and changing their grades, for example. They could even change their records to show that they'd paid for a course when they hadn't.

STEVE: Hmm. What we need is a password.

RICHARD: Yes, but the problem with passwords is what people do with them. Some put them on scraps of paper on their computer terminals. Others use their own names, or a partner's name. That just makes life easy for a hacker.

STEVE: True, but it's not just what people do with them. The whole idea of using real words is risky. There are programs now that will try every word in the dictionary. If you want to make life difficult for the hackers, it's much safer to use a random mixture of numbers and letter.

RICHARD: I suppose so. But isn't it possible to buy a security system?

STEVE: Of course. It depends how much,you want to spend. You can even buy a system that changes the password every single minute.

RICHARD: Every minute? Then how do the authorized users know what the password is?

STEVE: They carry a smart card that shows a constantly changing number. The number is the password.

RICHARD: Very clever!

STEVE: Yes, as long as you don't leave your card lying around.

TAPESCRIPT

[Task 9 (Page:93)]

DAVID: SO tell me. Charles. how have you applied document-image-processing technology at your company? What exactly happens in the process?

CHARLES: Well. David. first of all. when a document arrives in the mailroom. the envelope is opened by a machine. Then. its pages are removed and arranged by a clerk. Next. these pages are transferred to a mail analyst.

DAVID: What is the analyst's job?

CHARLES: He or she reads the mail to determine the applicable customer and the routing of the document. This information is then entered into the computer.

DAVID: Does the analyst have to supply routing and indexing data?

CHARLES: No. that's largely automated. All the analyst needs to do is enter two items: an IMS index transaction. which is a descriptive code often composed of the form number. and then the customer name. The computer supplies the routing and indexing data.

DAVID: What happens once the index is stored?

CHARLES: Once the index is stored. a temporary key number is generated and written on the document.

DAVID: How much time does all that take?

CHARLES : Believe it or not. only 11 seconds. That's all the time it takes for this step.

DAVID: That's pretty fastl So. after the document's scanned. what's the next step?

CHARLES: The last phase of the inpm process involves checking the quality of the scan and entering the temporary document ID number to link it with the index that's already been generated.

DAVID: How soon can it be available on the system?

CHARLES: Once the document number's entered, any user in the system can access the document, including users at remote - sites.

DAVID: How long does it take to retrieve a document?

CHARLES: If the document's been processed within the past year, it only takes 15 or 20 seconds. Requests for older documents take longer because an operator must manually mount an archived disk.

DAVID: Well, your system sounds quite impressive. What kind of advantages are we taking about? Money, time?

CHARLES: Actually both. We've saved 39,000 square feet of office space and freed 120 employees from file maintenance. The net saving is approximately three million pounds per year.

DAVID: Well, it sounds like the move to DIP has certainly been a success here. I wonder if ...

TAPESCRIPT

[Task 10 (Page:104)]

TEACHER 1: Tony, I'm sorry to begin with an obvious question, but. em. what exactly is CALL?

TONY LONGSTONE: CALL stands for Computer Assisted Language Learning. In fact, CALL is a very general term which is used to describe the use of computers in any form as part of a language course.

TEACHER 1: When you say 'in any form', do you mean that all uses of computers in language education can be described as CALL?

TONY LONGSTONE: Well, yes, within reason.

Obviously, if a teacher is using a computer just to type out a worksheet, or if a private college provides a computerized bill for a student for language course fees, that doesn't count as CALL. The computer has to be actively used by the students as well.

TEACHER 2: What sort of computer do you need?

TONY LONGSTONE: Well, an important thing to find out at the beginning is what software is available for the machine or operating system you're thinking of buying. If there's no available software specifically written for CALL, you should check that there is at least some good applications software available, such as word processing, databases, and spreadsheets.

TEACHER 2: Mm. How many machines do you need?

TONY LONGSTONE: That depends very much on factors like the number of students, the amount of space available, and, above all, the size of your budget. In an ideal world, you would have one computer per student, and all the computers would be linked by a local area network. This would allow the students to exchange material and send each other information and messages.

TEACHER 1: But supposing we can't afford that level of investment. Is it possible to have CALL using only one computer?

TONY LONGSTONE: Yes, provided that you organize things properly.

TEACHER 1: Mm. Could you be more specific?

TONY LONGSTONE: Well, if you are going to have just one computer available, you should try to get a screen that's big enough for all your students to see. Alternatively, you could use a display device which will allow you to project the picture from the computer on to an overhead projector.

TEACHER 2: Talking about organization, what's the best way to organize the equipment, in your opinion?

TONY LONGSTONE: Again, that depends on your situation. I think the most common way of organizing computers is to locate them in one special-purpose computer room, with the furniture set out so as to allow group work at machines. However, if you prefer to limit your CALL activities to one computer per class, the ideal would be to have one computer permanently in each of your classrooms. If this isn't possible, a good solution is to install the equipment on a trolley which can be taken into the classroom for the lesson. Of course, computers needn't be limited to the classroom.

TEACHER 1: What do you mean?

TONY LONGSTONE: Well, given sufficient resources, it's a good idea to have some computers available for teachers in the teachers' room. Also, it's very useful to have a self-access facility for use by students. In both cases, they - eh. teachers and students - can gain a lot of confidence and proficiency by having free access to the equipment. Finally, an excellent idea is to have one computer with a large screen functioning as an electronic noticeboard for messages prepared for students and staff. This should be located in a 'public part of the instutition, such as the hall or library. I first saw this system used in a school in ...

TAPESCRIPT

[Task 9 (Page:115)]

INTERVIEWER: What size is the database at Grovemount Hospital?

ALEX COLLINS: Pretty big! To give you some idea: over a five-day period of care for one patient, somewhere in the region of 25,000 characters of data might be generated. That would include matters relating to the patient's medical history, laboratory reports, medical treatment, invoices, and so on. Now, if we have an average of, say, 300 occupied beds, that means well in excess of 500 million characters of stored data per year.

INTERVIEWER: And that is presumably only data relating to patients?

ALEX COLLINS : Precisely. We also have data relating to the administration of the hospital-em, for example, information on staff, bed occupancy, that sort of thing.

INTERVIEWER: SO how exactly is the database organized?

ALEX COLLINS : Well, our database is organized in the same way that any other database is organized. The basic component is a named collection of data called a file. The file called

PATIENT, for example, contains the name, address, date of birth, National Health Service number, etc. of each patient. Within each file there is a collection of records of the same type. So, in the case of the patient file, each record relates to a single patient. Each record must obviously have a unique identifier so that it can be accessed in the database.

INTERVIEWER: You mean a name or number?

ALEX COLLINS: Yes, usually a combination of the two.

INTERVIEW ER: Right. So each file contains an organized collection of records. Does that mean that each individual record has an internal structure, too?

ALEX COLLINS: No, not necessarily. I've already said that all records in a given file must be of the same type. Well, all the patient records do have an internal structure - or fixed format, as we call it. This means that each component-name, date of birth, etc. - is stored separately and can be accessed separately. However, some files contain free-format records, and in those cases each record simply contains a long string of text.

INTERVIEWER: You mean letters, reports, that kind of thing?

ALEX COLLINS: Yes.

INTERVIEWER: I see. Now, can you tell us what happens when the database is updated?

ALEX COLLINS: Yes. Each input message is called a transaction. When a transaction enters the system for processing, the computer must retrieve related data from the database. At the end of the processing. the computer stores updated data to reflect the changes caused by the transaction.

INTERVIEWER: Could you give an example?

ALEX COLLINS: Yes. of course. Each time a patient is admitted to the hospital, the database must be updated to show his or her details. This is obvious. However, the database must also be updated to show that there is one less bed available. This will. in turn. affect summary operational data, such as bed occupancy for the month, and so on.

INTERVIEWER: OK. But you have lots of different people accessing the database at the same time, don't you?

ALEX COLLINS: It's a multi-access system, yes.

INTERVIEWER: Right. But what happens if two people access the same data at exactly the same time?

ALEX COLLINS: Hm. It can't happen. In that situation, the database management system would grant access to one of the users only. The other user would have to wait until the first transaction was processed and the data updated.

TAPESCRIPT

[Task 2 (Page:124)]

Welcome to the National Science Museum's new exhibition: Robots: past, present, and future. This recording is intended to guide you through our exhibits. Before we begin our tour, let's briefly review the history of robots in the twentieth century. Of course. you could argue that the history of robots goes back way before our own century. Throughout history, people have tried to invent machines to perform a whole variety of tasks, such as writing, drawing, or even playing musical instruments.

The word 'robot' was invented by the Czech playwright, Karel Capek. It comes from the Czech word for 'work'. In Capek's play RUR (Rossum's Universal Robots), which came to London in 1921, the robots became so intelligent and so disillusioned with their human masters that they revolted. They destroyed the humans and created a new world inhabited only by robots. This theme of ungrateful robots rebelling against their human creators is one that has been used by many science fiction writers.

In 1954, the American inventor George Devol began work that eventually led to the industrial robot as we know it today. His company, the Unimation Company. developed flexible industrial machines and began to market them in the early sixties. Since then, many companies have entered the robotics market.

Between 1967 and 1969, researchers at the Stanford Research Institute in the United States developed a robot with wheels named Shakey. Shakey was fitted with bump detectors, a sonar ' , range finder, and a TV camera. All three helped Shakey to move freely and avoid obstacles. However, at the time, Shakey was thought to be a failure. This was because it could only be controlled by a separate mainframe computer, which sent its commands to the robot through a radio channel.

The next important step was the development of robots with legs. In 1967, the General Electric Corporation (GEC) had developed a four-wheeled machine for the US Department of Defense. The machine carried a human operator who had to control each of the four legs. This was an extremely difficult job for the driver, and the machine regularly became unbalanced and fell over.

Later devices were more successful- for example, a four-legged robot developed at the Tokyo Institute of Technology in 1980. This system combined a human controller with automatic processing of information about the terrain, right down to the foot movements needed to ensure smooth movement.

In 1983, a six-legged robot was developed by Ode tics Incorporated, for commercial production. A battery-powered model. Odetics I. used a radio channel for leg control and a video link for conveying images. This machine could walk over obstacles and lift loads several times its own weight.

Meanwhile, research continues on machines that rely on one or two legs. In 1984, Marc Raibert developed one-legged hopping robots at Carnegie-Mellon University in the USA. Now, let's begin our tour of the exhibits. As you enter room 1, you can see on your left one of the earliest. . .

TAPESCRIPT

[Task 10 (Page:138)]

INTERVIEWER: I'm here at the Virtual Reality Exhibition at Olympia in London. With me is Michael Emsley, who is one of the exhibitors. Michael. there's obviously an enormous amount of interest in YR. Do you think it can live up to people's expectations.

MICHAEL EMSLEY: That's a very good question. I think most people do expect far more from VR than it can give them - at least for the present, and this is largely due to the way the media have presented it.

INTERVIEWER: SO what should people expect from it?

MICHAEL EMSLEY: Well, they shouldn't expect to be able to have a holiday abroad without leaving their living room, which is what quite a number of visitors today seem to think. VR should be seen as a means, not an end.

INTER VIEWER: What exactly do you mean by that?

MICHAEL EMSLEY: I mean that it should be seen as an 'enabling technology'. The potential applications are as diverse as robot operation in contaminated nuclear power stations, em, recreating crime scenes for the police, em, helping people with physical disabilities, and curing psychological problems.

INTERVIEWER: In other words, the ultimate interface between humans and computers?

MICHAEL EMSLEY: Potentially, yes.

INTER VIEWER: How long do we have to wait for these possibilities to become realities?

MICHAEL EMSLEY : Another good question, but difficult to answer. One thing is certain, though. If VR doesn't start producing results soon, then it is likely to run into the same problems as artificial intelligence.

INTERVIEWER: Meaning?

MICHAEL EMSLEY: Meaning that if there are no results soon, industry will stop investing in it. Then it certainly won't fulfil its potential.

INTERVIEWER: SO, where is the technology at the moment?

MICHAEL EMSLEY: Well, the virtual worlds we can create today are still a long way from resembling the real world. This is mainly because of the visual system. Even the best VR display gives only a fraction of the detail of human vision.

INTERVIEWER: How is the display created?

MICHAEL EMSLEY: Most VR vision systems are headsets that block out everything except two liquid crystal display screens, one for each eye. Using a technique learnt from artificial intelligence work on vision, the images on each screen are distorted and displaced, giving the illusion of a three-dimensional view.

INTERVIEWER: What happens when the person moves his head?

MICHAEL EMSLEY: The movements are detected by three electromagnetic coils - one coil for movements up and down, one for left and right, and one for movements forwards and backwards. This information is digitized and passed to the computer, which then updates the data it holds on the popsition of the headset. Once the new position of the headset has been calculated, the visual display is updated.

INTERVIEWER: It sounds like a long process.

MICHAEL EMSLEY: It's only a matter of milliseconds, but there is still enough of a delay to be noticed by the person wearing the headset.

INTERVIEWER: How much computing power is needed to operate a VR system?

MICHAEL EMSLEY: (laughs) Even an unsophisticated visual system needs a processor able to handle about one hundred and twenty megaflops. To make what I would call a reasonable visual system would require a processor able to handle a thousand megaflops - and that's expensive!

TAPESCRIPT

[Task 8 (Page:148)]

KEVIN: David, the last time we talked about AI. you said it was concerned with developing computer programs that perform tasks which require intelligence when done by humans.

DAVID: Yes, exactly.

KEVIN: OK. But then you gave some examples-playing games, understanding natural language, forming plans, er ... proving theorems. You also gave the example of visual perception. Now surely visual perception -seeing - doesn't require intelligence?

DAVID: (laughs) It may not seem so, Kevin, but perceptual tasks such as seeing and hearing involve a lot more computation than is apparent. But because this computation is unconscious in humans, it's much harder to simulate.

KEVIN: SO you're saying that AI is better at intellectual tasks such as game playing and proving theorems than at perceptual tasks like seeing and hearing.

DAVID: I'm saying AI has been more successful at intellectual tasks.

KEVIN: Right, but in any case, AI is trying to simulate human behaviour.

DAVID: That's an oversimplification. Sometimes programs are intended to simulate human behaviour, as in computational psychology, but sometimes they're simply built for technological application, as in the case of expert systems.

KEVIN: Expert systems are part of AI. right?

DAVID: Well, to be more accurate, expert systems are programs built using the programming techniques of AI. especially techniques built for problem-solving. The actual subdiscipline of AI concerned with building expert systems is called 'knowledge engineering'.

KEVIN: What are expert systems used for?

DAVID: They're built for commercial applications. Up to now they've been used for a variety of tasks - medical diagnosis, electronic fault-finding, machine translation, and so on. But the point about them is that you can interrogate them about how they came to a particular conclusion.

KEVIN: SO, in that respect, they imitate human experts.

DAVID: Yes. I read recently about a Japanese system that can be used by lawyers to draw conclusions about new legal cases. It refers to databases of statutory laws and legal precedents and is able to see similarities in the reasoning processes used to decide each case - exactly as a skilled lawyer would.

KEVIN: How can it do that?

DAVID: The system has two reasoning mechanisms, known as inference engines, which work in parallel. One operates on the written laws, the other operates on the legal precedents. They draw all the possible conclusions and then output them in the form of inference trees.

KEVIN: Inference trees?

DAVID: Yes. Inference trees show how each conclusion was arrived at. And that is what makes this program different from any normal program.

TAPESCRIPT

[Task 2 (Page:155)]

INTERVIEWER: Nathan, first question: what is multimedia?

NATHAN WARD: Multimedia isn't a thing. It's a capability -like graphics. Just as there are applications that generate graphic images and applications that use graphic images. so there are with multimedia.

INTERVIEWER : OK, but could you give a more specific definition?

NATHAN WARD : I suppose multimedia could be defined as a set of technologies for capturing. manipulating. and presenting information involving different types of data.

INTERVIEWER: What different types of data are involved?

NATHAN WARD: Well, they include audio, image, video, animation, graphics, and text. The data may originate in either digital or analog form.

INTERVIEWER : Can any PC owner adapt his machine for multimedia applications?

NATHAN WARD: Unfortunately, it's not as simple as that. As far as hardware goes, the machine must have colour. a reasonably high-resolution display - say 640 by 480 pixel resolution. plenty of hard disk storage, and a fairly fast processor .. .

INTERVIEWER: How is the audio and video processing done?

NATHAN WARD: I was just coming to that. Audio and video processing is generally still done by add-in circuit boards - or expansion boards, as they're called - so the machine needs slots for those.

INTERVIEWER: Now, I've heard the expression 'full-motion video' being used in connection with multimedia. Isn't video already 'full-motion'?

NATHAN WARD: 'Full-motion video' refers to the impression the viewer has that he or she is watching flicker-free television. The idea is to capture full-motion video in real time and digitize and compress the information so that the system can treat it like any other digital data stream. Some systems do it better than others.

INTERVIEWER: I see. Getting back to hardware requirements, apart from the expansion boards that you mentioned. is there anything else that's needed?

NATHAN WARD: Yes. The machine must have interfaces for a variety of input and output devices.

INTERVIEWER: Such as?

NATHAN WARD: Such as a CD-ROM drive, VCR, digital audio tape ...

INTERVIEWER : Isn't there a problem of compatibility?

NATHAN WARD: There is, but that situation is changing. Microsoft's base-level MPC specification has some support, but it's only a start. The lack of standards is the main reason that multimedia is not bigger than it is. Once these are in place, users will have easy plug-and-play compatibility, and developers will be able to develop applications that can run on a variety of platforms.

INTERVIEWER: By 'a variety of platforms' you mean IBM pes, Macs, UNIX and OS/2 workstations, etc.

NATHAN WARD: Exactly. So far, we've only talked about pes, but workstations are really the ideal platform for multimedia. They have inherent advantages in terms of graphics and power which make them particularly suitable as multimedia authoring machines.

INTER VIEWER: You mean for programmers developing multimedia applications?

NATHAN WARD: Yes.

INTERVIEWER: What is multimedia being used for?

NATHAN WARD: Our research shows that businesses are most interested in multimedia for education and training. That was one of the first areas targeted by developers. But it's also seen as an excellent tool for sales presentations.

INTERVIEWER: What about other applications?

NATHAN WARD: The possibilities are endless. Multimedia is a capability that can be built into products across a variety of market segments, applications, and platforms. In the future, we'll find multimedia in databases, spreadsheets, document processing, e-mail, and many other applications. It'll become as natural to us in our business computing as it is in our home through television and stereo systems.

TAPESCRIPT

[Task 2 (Page168)]

1. **Graphics are increasingly being used for medical applications. This computer-generated image shows the major veins and organs of the human body, and is used by doctors who are training medical students. The image was created entirely using a graphics package, rather than using actual medical scans as input.**

2. **This image was used as an advertisement for a PC business graphics software product. It was created using Tapestry's Quantel Graphics Paintbox. The peacock was photographed several times, and the final image of the bird was made up of various components from each one. The roller-skates were incorporated from a separate shot.**

3. **This picture shows a series of high-resolution images on screen. The images are displayed using a 24-bit graphics expansion board to drive the monitor. The image of the bird was scanned in from a colour print. Some graphics applications, such as the one used to create the picture of the peacock, allow the manipulation of images at pixel-level.**

4. **This picture shows another medical application of computer graphics. The screen shows a three-dimensional image of a brain with a tumour on the left. The image is achieved using powerful computer programmes which use two-dimensional scan data as input to create three dimensional images on screen. Such images are also useful to surgeons in planning for reconstructive or cosmetic surgery.**

5. **This image was output through a high-resolution slide recorder. Business graphics packages, such as the one which created this image, can automatically translate numbers on spreadsheets into a variety of charts and graphs. This kind of package makes it easy for anyone to create clear and effective business graphics for presentations and reports.**