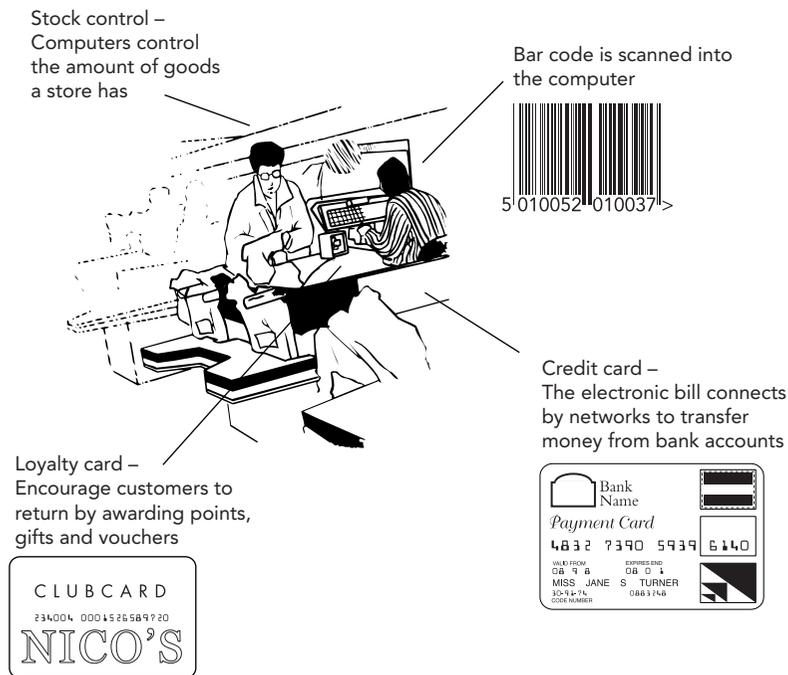


3 ICT in supermarkets

Computers are vital to the operation of a supermarket store. If you have ever experienced the situation of being in a supermarket when the computer system has crashed, you will know about the chaos this causes. The checkout tills come to a standstill and, if the crash lasts for any length of time, you have to leave your trolley and walk out of the shop empty-handed!

One reason why the checkout tills cannot process the goods in the trolley is that none of the products are marked with the price. The bar code needs to be read in order to obtain the price of the goods from the computer. Computers also control stock levels and process customer payments at the tills.



The checkout till

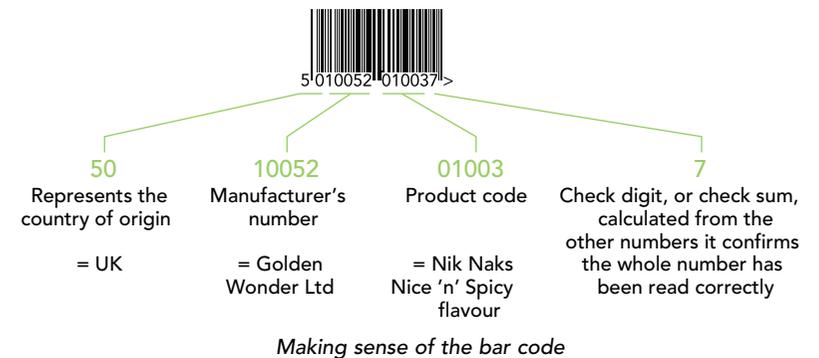
Supermarket checkout tills are quite sophisticated with laser scanners to read the bar codes. They are also connected to the store's computer and so the till is given a special name in ICT:

- An ordinary checkout till is called a point of sale (POS) terminal.
- A checkout connected to a computer with a bar code scanner is called an electronic point of sale (EPOS) terminal.
- A checkout connected to a computer, with a bar code scanner, and which can transfer money from a customer's account using the customer's credit and debit cards is called an electronic funds transfer point of sale (EFTPOS) terminal.

As all modern supermarket checkouts will accept customer payments by plastic cards they are all technically called EFTPOS terminals.

Scanning and bar codes

All goods found on the shelves in supermarkets are labelled with bar codes. The bar codes are formed from a series of black and white lines of varying thickness and represent a 13-digit number, which is also printed under the lines. The number uniquely identifies the type of product and the 13-digits are divided into four groups of numbers showing the country of manufacture, the maker, the product number and a check digit.



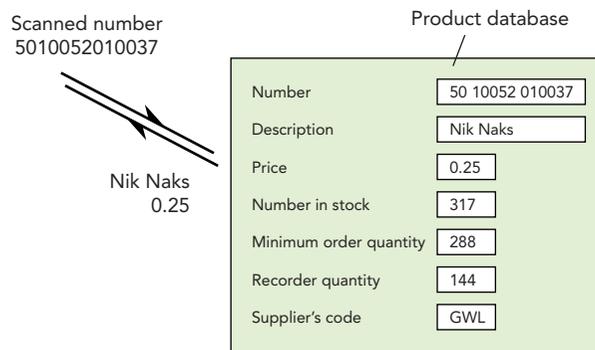
The bar code can be read with a hand-held scanner or the laser scanner at the checkout. The scanner emits a beam of light that reflects off the bar code. The white lines reflect the light strongly while the black lines reflect less strongly. These variations in reflection are picked up by sensors in the scanner and converted into a digital signal.

Bar codes are cheap to produce (just part of the printing on the packaging) and can be read upside down and on curved surfaces.

If the bar code is damaged, the computer might read the number incorrectly and a tin of beans may be recorded as a bag of potatoes!

The final number of the bar code is a check digit which is calculated mathematically from the other 12 numbers. When the 13 numbers are read, the check digit is recalculated by the computer and if it is different to the character read by the scanner, the reader will not give the beep to indicate a successful scan. In this situation, the cashier at the till can enter the number manually.

The supermarket's computer holds a database containing information on all the products sold in the store. As the item is scanned, the bar code number is passed to the computer where a search is made of the database. As soon as the number is matched with the data held in the computer, the price and description are passed back to the till where the customer's itemised receipt is printed.



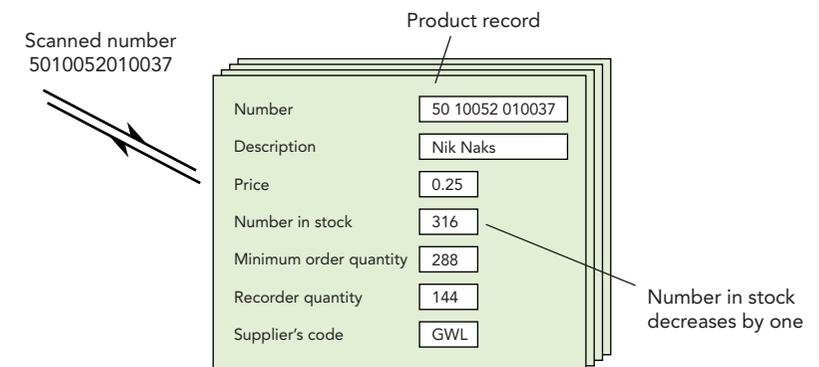
The bar code number is passed to the database from the till. The description and price of the item are then passed back to the till

Stock control

Keeping a careful check on the amount of stock in a supermarket is very important. If too many items are held in stock then valuable space is being taken up and there is also more chance of food going past its sell-by date. This is particularly important with so much fresh food now available in stores. Having too little stock can also cause problems for the store. If customers find that the goods they want are not available, they may shop in other supermarkets.

It is often the store manager's job to decide the amount of stock to hold in the store. In making these decisions, the manager will know how often new deliveries can be made and will have estimates of the number of customers likely to visit the store each day based on data from previous weeks. The manager's most important tool for controlling stock, however, is the store's computer.

As each item is scanned at the checkout, the bar code number is passed back to the database in the computer. One of the fields in the database record contains the number currently in stock. This number is decreased by one each time an item is scanned, thus giving the manager an accurate and up-to-date record of the current stock levels at any time.



The number in stock has decreased by one

There are several other fields in the record that are held to maintain the correct stock levels. With the addition of these three fields, the whole process of stock control can be automated. These are:

- **Minimum order quantity** – This field holds a number that the manager has set as the lowest number the store should hold of an item. In this case the number of Nice 'N' Spicy Nik Naks packets should not be less than 288.
- **Reorder quantity** – When the quantity of Nik Naks packets falls below the minimum order quantity, this will be the number that are reordered.
- **Supplier code** – When the goods are to be reordered, the computer will use this code to locate the supplier's details and automatically generate an order for more packets of Nik Naks. This order will be transmitted electronically over the network direct to the supplier.

13 The future

There have been many predictions about the future of ICT. The following examples illustrate some of the forecasts for developments over the next few years.

"India is set to become the next IT superpower"

In the year 2000, the Indian software industry generated \$8 billion in revenue. With 350,000 software engineers, 100,000 more than the United States, it is predicted that by 2008 the revenue from computer software will grow to \$87 billion. India's pool of talent is growing faster than any other English speaking country with more than 67,000 computer software professionals leaving college every year.



"Bluetooth set to revolutionise communications"

Bluetooth wireless technology provides short-range wireless links between equipment. The small radio module will enable digital signals to be sent between mobile phones, computers, printers and scanners without the need for wire connections. From the 11 million units fitted with bluetooth shipped in 2000 it is forecast that this will grow to 671 million units by 2005.

"Invisible computers are seen as the future!"

The speed and power of the processors in computers continues to increase without any sign of stopping. The one billion instructions per second (1000 mips) barrier has been passed and by 2005 it is expected that processors performing three billion instructions per second will be commonly available. These processors will be fast enough to process speech input so that no eye or hand contact will be needed. For example, you will be able to say "Book me a weekend in Stockholm at the best price" and the computer, using the Internet, will complete all the arrangements for you.

"Frozen chips but not for eating!"

Fridges and freezers will be developed that monitor the freshness of food. Computer chips inside these appliances will be able to suggest menus

based on the food available and will be able to reorder food using their own mobile phone Internet connections.

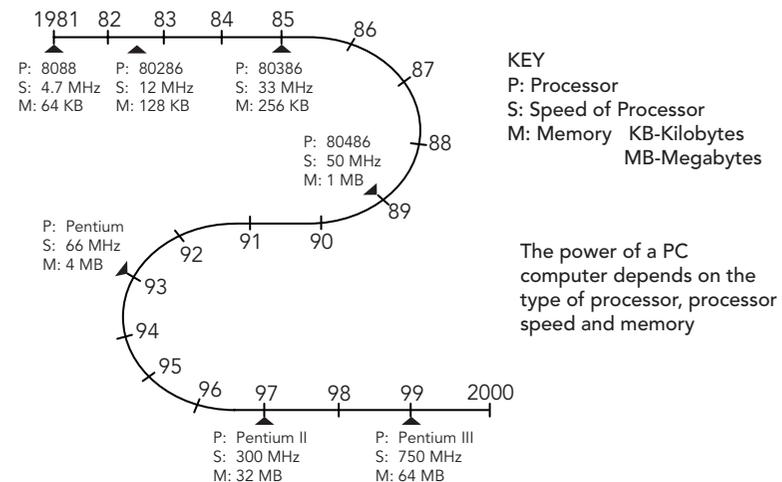
"Switched on clothes"

Shoes, especially thick-soled trainers and platforms, are seen as the ideal article of clothing to house a computer. They have plenty of room for a chip and lithium-polymer batteries. Polymer screens will be sewn onto sleeves and data will flow through electro-active threads. A person's clothes will become a personal area network.



"Moore's law runs out"

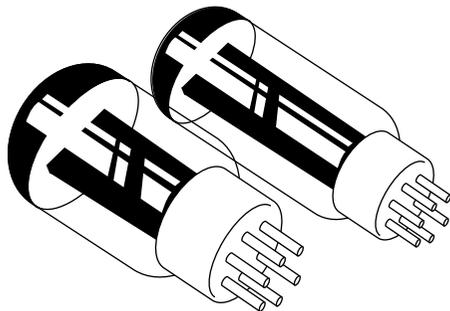
In the 1960s, Gordon Moore stated that the power of computers doubled approximately every 18 months. At the time, he was not predicting the future but making an observation on the development of computers since the 1940s. As computer power has continued to follow the same growth pattern up until the present day his statement has become known as Moore's Law. Of course, for computers to develop in this way there have been fundamental changes in the hardware technology. Modern computers use integrated circuits but before this transistors and vacuum valves were used. As there is a physical limitation on the silicon integrated circuits in today's computers it is forecast that his law will end around 2010 unless a new technology is invented.



Summary of computing events from 1950

1950

- 1950 Mauchly and Eckert started the first company to sell computers to business.
- 1951 A computer, using 5000 vacuum tubes, was the first to store data on magnetic tape.
- 1952 The first hearing aids appeared on the market using transistors.
- 1953 A computer using thousands of tiny iron rings that could be magnetised and used to store data was introduced.
- 1954 The first silicon transistor was developed.
- 1955 Bill Gates, founder of Microsoft was born in Seattle, Washington. The first computer was built using transistors instead of vacuum tubes.
- 1956 The first hard disk was used to store data (5 megabytes).
- 1957 Plans were discovered in early correspondence for the first mechanical calculator, dating back to 1623.
- 1958 Thomas Watson, the founder of IBM (International Business Machines), forecast that there was a world need for only five computers! The integrated circuit was developed, the basis of all modern computers.
- 1959 The programming language COBOL, which is used for writing business programs, was invented.



1960

- 1960 A computer was developed that, for the first time, used a keyboard and monitor.
- 1961 IBM constructed a computer using over 169,000 transistors.
- 1962 The first robots used on the assembly line of an American car manufacturer.
- 1963 Police – the first computer used by the Metropolitan Police for pay and crime statistics.
- 1964 IBM developed the first Computer Aided Design (CAD) system.
- 1965 The first low cost (\$18,000) computer with 4 kilobytes of memory sold.
- 1966 Computer data transmitted for the first time on light beams in strands of glass (fibre optic cables).
- 1967 The idea of a computer network first proposed.
- 1968 The first computers to be built using integrated circuits instead of transistors and the first computer mouse demonstrated.
- 1969 On 1 October two computers were networked together for the first time. Birth of the Internet with four computers linked to the network by the end of the year. Banks – the first cash machines (ATMs) were installed in the United States (not networked).

