ability to create different user profiles for use on the same computer, but when the computer system is in use it is always a single-user system.

Multi-user means the computer system can be concurrently used by several users.

Progress Check 2.4

A small office environment may require that all users have access to a central database of data for order processing etc.

Could you describe another computer application which would require multi-user access?

Network OS

Each computer on the network will have its resident operating system software. Communication across the network is provided for with another layer of software called the network operating system.

Tasks for the network OS include:

- ✓ control of access to the network (user IDs and passwords)
- ✓ management of all available resources (for example, a printer)
- ✓ management of all users' data files.

Multiprogramming

When using a stand-alone computer we almost take for granted that we can have several programs concurrently loaded. Strictly we should use the term ***'process'***. For example, there may be two copies of the word processor program loaded and the OS will treat each of these as a separate process. However, remember that there is only one processor and so – although there are several programs loaded into the main memory – the processor is only ever actually processing one of the processes at any one time.

Multiprogramming is the ability to have more than one program concurrently loaded in main memory.

- ♦ For the Windows operating system we can see the loaded programs sitting on the taskbar.
- ♦ Running the 'Task Manager' utility will display the list of processes loaded.

Don't confuse

- ♦ Multi-tasking
- ♦ Multi-processing
- ♦ Multiprogramming

Note

Some of the OS classification descriptions are not mutually exclusive.

A multi-user operating system is likely to be provided for by on a network; the operating system therefore provides both network and multi-user usage.

2.2 User interfaces

We have already stated that it is a key role of the operating system to provide the user of the computer system with an interface through which the computer hardware is made usable.

Forms based interface

Many applications are web-based and require the completion of a form for data capture. The screen shows the entry of the data for ordering a pair of spectacles on-line. The form will contain the usual 'widget' controls for data entry including:

- ✓ text boxes
- ✓ radio buttons
- ✓ check boxes
- ✓ drop-down lists.

- ♦ Why does drop-down list help with data validation?
- ♦ Note the fields marked with the star must be entered – a form of validation.

Progress Check 2.5

Do you know where it would be appropriate to use check boxes (usually square) or radio buttons?

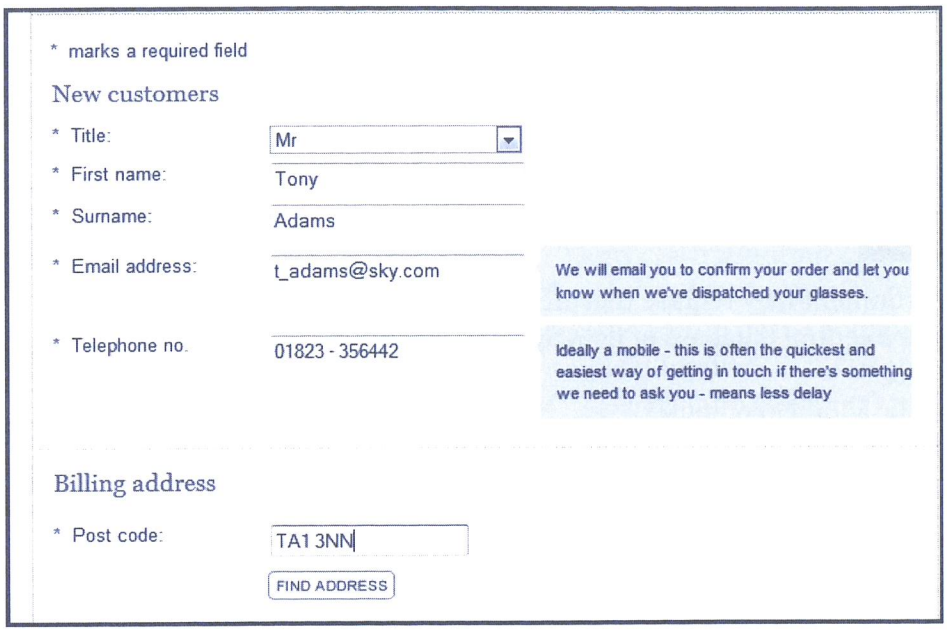

Figure 2.1

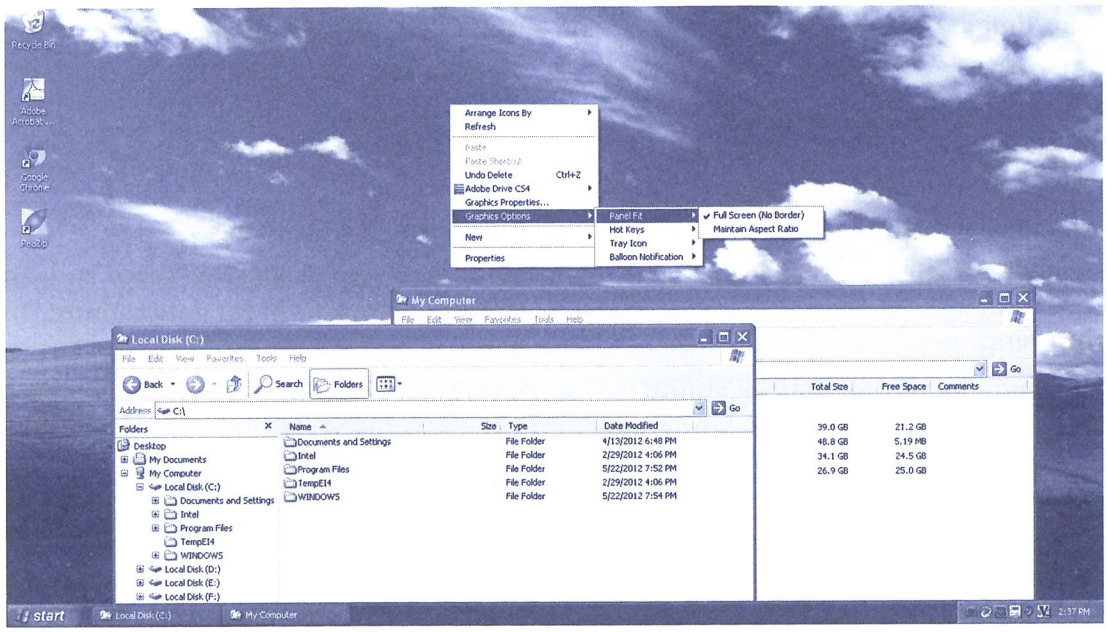

Figure 2.2

Graphical User Interface (GUI)

A GUI uses:

- ✓ windows (This means a 'program window' and not the Windows operating system)
- ✓ icons
- ✓ menus
- ✓ pointing device (for example, a mouse).

Hence a graphical user interface is called a 'WIMP' interface. This screen illustrates all these points. The Windows Explorer program uses multi-level menus (see screenshot). The desktop and taskbar has *icons* to represent various programs.

A more recent trend is to organise the menu selections using ribbons and tabs. This is illustrated with the Articulate Quizmaker software (Figure 2.3).

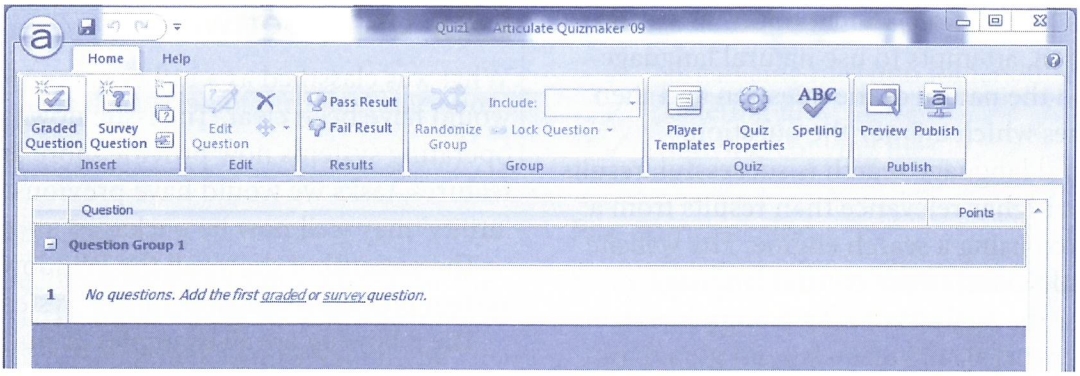

Figure 2.3

```
C:\Users\Tony>dir
 Volume in drive C is OS
 Volume Serial Number is 18AB-1B57

 Directory of C:\Users\Tony

19/11/2009  21:05    <DIR>          .
19/11/2009  21:05    <DIR>          ..
19/11/2009  21:06    <DIR>          Contacts
28/12/2009  11:17    <DIR>          Desktop
06/01/2010  11:17    <DIR>          Documents
02/12/2009  08:40    <DIR>          Downloads
05/01/2010  17:26    <DIR>          Favorites
24/11/2009  08:41    <DIR>          Links
19/11/2009  21:06    <DIR>          Music
16/10/2009  22:43    <DIR>          My Backup Files
19/11/2009  21:06    <DIR>          Pictures
19/11/2009  21:06    <DIR>          Saved Games
21/11/2009  13:52    <DIR>          Searches
06/01/2010  07:46    <DIR>          Tracing
09/12/2009  18:37    <DIR>          Videos
20/10/2009  16:52           191,200 Widescreen Amended size.potx
               1 File(s)        191,200 bytes
              15 Dir(s)  364,665,655,296 bytes free

C:\Users\Tony>
```

Figure 2.4

Command-line interface

The user is presented with a command line prompt. The user must learn and then use the commands. The traditional command-line interface on the PC was the early MS-DOS operating system from Microsoft.

One such command is 'dir' which displays a list of all the folders and files in the current folder/directory. Command line interfaces have the advantage that once the commands have been learnt an expert user can quickly use the computer system.

Natural language interface

Natural language processing is the ability to communicate with the computer system using ***natural language***. This is one step on from simply carrying out a keyword search.

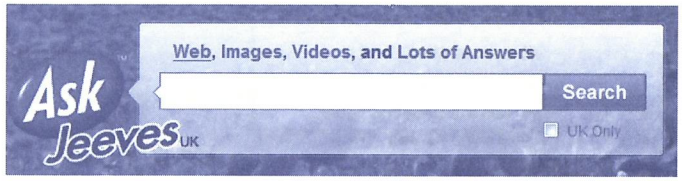

Figure 2.5

> **Note**
>
> There's an interesting paradox here in that natural language, the system that is easiest for humans to learn and use, is the hardest for a computer system to master and implement!

Consider a search for the text 'Which city in England has the largest population outside London'. A keyword search would only focus on

the keywords 'population' and 'London'. A natural language search, attempts to use natural language to understand the nature of the question and then return matches which answer the question.

If the natural language search is successful, results should have a higher relevance than results from a keyword search using a search engine. The website Ask.com would claim to use natural language processing for the analysis of search engine text.

Menu-driven Interface

The majority of windows-based applications software is menu-driven. That is the user is presented – in various possible forms – with a number of menu choices. Making a selection may result in a second or more set of choices being presented.

The following screenshot is taken from the MediaFace software.

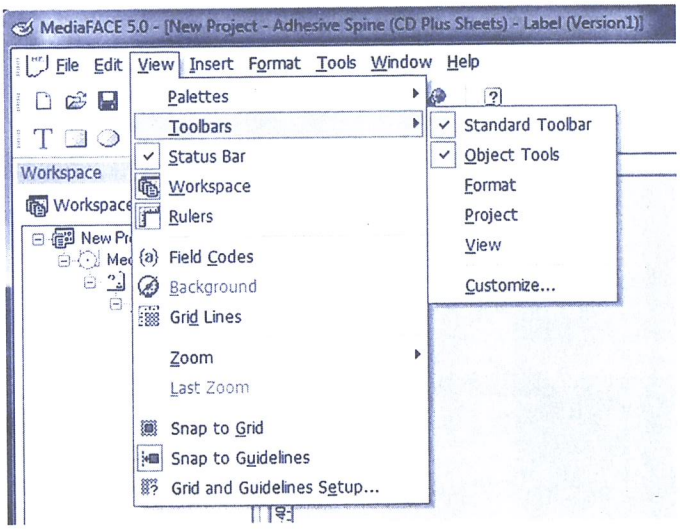

Figure 2.6

The user is presented with a horizontal menu with eight choices.

Selecting the 'View' menu choice opens up a further 13 choices (of which two are greyed-out to indicate unavailable) and finally the user has selected the Toolbars to be made visible.

> **Look Back**
>
> To Figure 1.2 in Chapter 1 to see where utility software fits in the general classification of software.

2.3 Utility software

What was classified as a utility some 15 years ago would have been clear. The issue now is that, as operating systems now provide more and more features, tasks we would have previously labelled a 'utility' may well now be packaged as part of the OS.

The screenshot shows all the Windows 7 operating system programs available under 'System Tools'.

The following are all examples of a utility program.

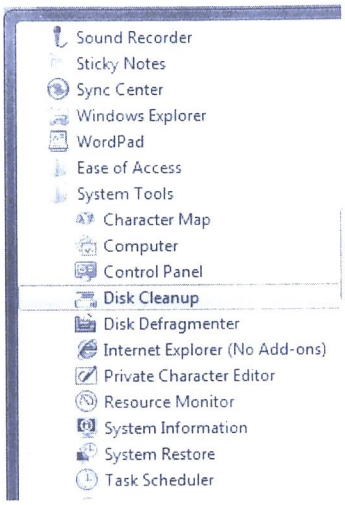

Figure 2.7

Disc formatter program

Formatting a disc requires the setting up of the block markers on each track. The screenshot shows the format of a pen-drive with Windows 7 and the screen shows the size of the blocks which the ***FAT*** filing system will use. The size of all blocks written to the disc is 16 kilobytes.

A disc must be formatted before it can be used.

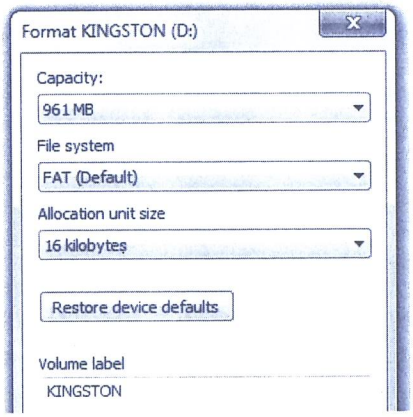

Figure 2.8