MIRAGE

The Multi-User
Operating System
For The 68000

MIRAGE Operating System

MIRAGE is an advanced operating system written for systems utilising Motorola's powerful MC68000 family of 16 and 32-bit microprocessors and is designed to perform equally well in commercial, scientific or educational environments.

Features of MIRAGE include:

— Multi-programming
— Timesharing
— Device independence
— Terminal independence
— Dynamic disc space allocation and reclamation
— Sequential, direct and keyed access utilities
— Extension of operating system calls via BOLTONs
— File dating and locking
— Multi-directory filing system
— Password protected login
— Up to 16 Mbyte memory partitions (or 4 Gbytes with the MC68020)
— 'Roller-blind' memory modules
— Fully interrupt driven terminals and discs
— Time and date tracking
— Comprehensive set of re-entrant utilities
— Screen editor, macro assembler, linker
— Built-in networking support
— IEEE floating point package
— Background print spooler
— System serial number
— Compact internal structure
— Disc sector cache
— System calls for colour terminals

Timeshared multi-programming

MIRAGE's timesharing facilities allow several users to execute the same or different programs concurrently, e.g. one user could be running the WINDOW word-processor, while another user could be posting nominal ledger transactions, while a third user could be performing a compilation using the BASIC compiler. MIRAGE is not a swapping system — it allocates a separate memory partition to each user — an approach which makes user context switching very fast. The relative priorities of the various jobs are adjustable.

Device independence

A key area where MIRAGE's inherent flexibility shines through is its device independent filing system. It can support several varieties of disc drive simultaneously, even if those drives have different sector sizes, packing densities, tracking characteristics. For each different type of storage device it is necessary for an assembler routine to be created, known as a 'driver'. This routine translates logical commands from MIRAGE into the physical commands required by the device in question. When referencing a disc, the driver can translate requests for transfers to logical sectors into specific commands such as track number, head direction, and so on.

Terminal independence

In the case of visual display units, a terminal driver is used which can map a logical call such as one to clear the screen into the appropriate control code sequence, thus allowing screen-oriented programs to be terminal independent. This facility extends to allow colour selection on colour terminals.

Dynamic disc allocation and reclamation

Three types of file are supported by MIRAGE — sequential, direct and keyed access. Allocation of disc space to files is through the use of Bit maps. As files are deleted, the Bit map signals their availability for re-use. Sequential files can use any free disc sectors — and the sectors need not be contiguous. Direct access files permit random and sequential reads. Keyed, secure access to files is possible via the TRAP BOLTON.

Multiple-directory filing system

Multiple file directories are supported on each disc. A user is normally logged in under a specific directory but can move to another directory via a simple command. Each directory is referenced by a 1 to 4 character alphabetic name. MIRAGE doesn't use multi-level hierarchical directories (directories pointed to by other directories ad infinitum) because these can lead to unnecessary disc activity for very little gain. Thus the directory structure of a MIRAGE disc can be described as a 'bush' rather than a 'tree'.

File dating

Whenever a new file is created, its creation date is stored along with its name in the file directory. Creation dates can be displayed via the DIR utility.

Powerful command language

The programmer communicates with MIRAGE via the command language. Commands may be entered at the keyboard of a terminal, or may be batched together in command files. Command files are sequences of command lines created, normally, via the EDIT screen-oriented text editor. Facilities exist for re-directing console output to a disc file or any other device including other terminals. MIRAGE supports a feature known as 'typeahead', which means that command lines may be entered at the keyboard whilst MIRAGE is still processing a previous command.

Password protected login

Access to the system is controlled by a set of user records held in an encrypted user information file. To gain access to the system the user must enter a valid user name and an optional password. If the user name cannot be located in the user information file, or the password is incorrect, access to the system is denied. When entering the password, MIRAGE suppresses echoing of characters so that the password cannot be seen by unauthorised personnel.

Large memory partitions

Due to the advanced architecture of the MC68000 microprocessor, it is possible to directly access up to 16 Mbytes of memory. On the MC68020 this range is even higher — 4 Gbytes. Partitions can be set to sizes virtually up to the address range.

'Roller-blind' memory modules

The memory partition of a JOB can contain multiple, named, 'memory modules'. Memory modules can contain programs or data and can be transient (deleted upon returning to MIRAGE command mode) or permanent (remain in memory until explicitly SCRATCHed by the user.)

Fully interrupt driven

MIRAGE supports multi-level vectored interrupts from serial input/output boards, disc controllers, tape controllers, clock/calender boards etc. Servicing of interrupts is performed by the peripheral drivers and occurs asynchronously with job execution. After servicing an interrupt, the interrupted task is resumed. MIRAGE is very flexible in its approach to hardware. Where the hardware does not permit interrupt driven operation, polled mode may be used instead.

Time and date tracking

The system time and date are instantly available to all users on the system.

Comprehensive set of re-entrant utilities

All of the utilities which run under MIRAGE are re-entrant, i.e. the same copy of a utility may be executed by two or more users simultaneously with no contention. Utilities exist to copy files, display the disc directory, dump files on the screen etc. Commonly used utilities are built into MIRAGE and a range utilities to monitor system performance is available.

Shared memory capability

MIRAGE permits the concurrent use by several jobs of modules stored in 'shareable memory', e.g. the WINDOW wordprocessor placed in shared memory allows each user access to a single shared copy of WINDOW, reducing memory usage and disc accesses. Shareable modules may contain programs or data or both.

Screen-oriented text editor

MIRAGE supports a powerful screen editor (EDIT) which the user can employ for the creation of source programs including Assembler, BASIC, Pascal, FORTRAN and also command files. EDIT supports string search/replace, block operations, disc file writes/includes. EDIT takes advantage of the terminal-independent facilities provided by MIRAGE, hence no 'customising' is required to be performed on the editor prior to its use or when you change terminals.

Macro Assembler and Linker

The Macro Assembler and relocating Linker allow the user to assemble and link MC68000 assembly language programs. The Assembler features user-definable macros, redefinable equates, library copy directives and IEEE floating point support.

Operating system extension via BOLTONs

Mirage allows the system designer to extend the capabilities of the operating system via the concept of BOLTONs — custom-written system calls can be bolted onto the operating system. Specialised calls can be added, and also modules which are not required on every site need not be held in memory.

TRAP BOLTON

The TRAP transaction processor is a record management subsystem which allows the user to create and maintain keyed-access data files. Features of TRAP include: Record access by key; Multi-user concurrent access; File and record locking; Multi-section files; Buffering of disc sectors in memory; Full integration of TRAP with Swifte-BASIC and other high-level languages; Guaranteed file integrity.

Floating Point BOLTON

Floating point applications are catered for by the IEEEFPAK BOLTON. This provides software floating point routines, and can be replaced by an alternative BOLTON which calls hardware floating point routines, if available. Single and double precision floating point operations are performed using the IEEE floating point standard. The use of this standard means that there is now a mechanism for passing floating point values between different computer systems.

Networking support

The MIRAGE filing system allows filing operations to be carried out across a network of MIRAGE-based systems. Interface to each type of network is via a Node Driver, which handles hardware specific details. This hardware independent approach allows a network to be built up using different types of network, e.g. both Ethernet and IEEE-488 at the same time.
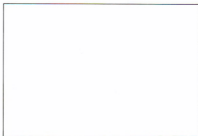
Background print spooler

Users may issue requests to the MIRAGE print spooler to queue specified files for printing on the system line printer. The print spooler operates as a background task thus freeing the user's terminal for other activities. Facilities exist for suspending, resuming and aborting the printing of specified print files and for the output of a banner page at the start. The user may also command the spooler to delete a specified print file automatically after the file has been printed.

System serial number

Each system on which MIRAGE runs must have a unique system serial number associated with it. This serial number can be accessed by any program which wishes to make sure that it is being run on the machine for which it is licensed.

System internals

MIRAGE was written in MC68000 Assembly Language. This ensures that MIRAGE is extremely compact and fast. MIRAGE can run on systems with under 128k of memory and only one floppy disc. The small size of MIRAGE also adds to its simplicity of operation.

Language processors

Swifte-BASIC — a powerful compiled BASIC

Swifte FORTRAN-77 — a Full ANSI-77 compiler

Swifte-PASCAL — an ISO compatible compiler

APL.68000 — an extensive implementation of the powerful APL language, available from MicroAPL Ltd. for MIRAGE-based systems.

The MIRAGE Operating System was written by Swifte Computer Systems Ltd. and is exclusively marketed worldwide by Sahara Software Ltd.

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