Software Product Description

DESCRIPTION

System Overview

MIRA Switch Control for RSX-11M-PLUS is the software for controlling a MicroPDP-11 based MIRA System.

A MIRA System is comprised of dual MicroPDP-11 computers, each supplied from its own power source and mounted in a single cabinet, or in two cabinets for larger configurations. The configuration of each computer is normally identical, so that one computer is a backup for the other in the event of failure.

The computers are linked via Ethernet and MIRA unique hardware. The software controls the status of each computer, being either Master, Standby or Idle; it detects a computer failure and changes the status of the system accordingly.

Designated devices which were previously connected to a failed Master computer are connected to the Standby computer, whose status then becomes Master. The user can then restart applications on the new Master and continue operation.

MIRA Systems are particularly suited to dedicated control applications, rather than general purpose data processing. That is, applications that need to maintain communication with terminals and other computers, as well as full performance after a failure, or to recover without operator intervention.

The two computers operate independently; for example, process and volume shadowing are not features of MIRA. A MIRA System provides the hardware and software environment required for the development of such high availability control applications.

The Ethernet link can be utilized by the application programs to exchange status information and to back-up critical data on the Standby computer. Each computer has a unique Ethernet address and node name.

For automatic recovery, the user application is required to maintain the Standby in a state of readiness where it can assume Mastership. The user application is also required to recover communication with the devices which have been switched and for the restart/recovery of the Master application.

Switched Devices

Switched Devices are those which are configured such that they can be connected to either computer. The devices are connected to the MIRA System via a common I/O distribution panel and the hardware and software controls to which computer they are assigned at any time.

The operator specifies whether a device should be connected to the Master or Standby computer via a utility which creates the Switch Map File.

The computer with the status Master has those devices designated by the Switch Map File as Master Devices connected to it; the computer with the status Standby has Standby Devices connected.

A computer with the status Idle will have no switched devices connected.

Program and Manual Control

A two position key switch on the front panel of the MIRA System, determines the system mode.

Under Program Mode, the MIRA Switch Control software automatically reconfigures the Standby as Master if a failure is detected (System Failover) and swaps the system status at the request of the operator or a user application (System Swap).

In Manual Mode, changes in status are inhibited and can only be effected from the front panel.

Failure Detection

The MIRA Switch Control software exchanges status messages via the MIRA hardware, which includes a private communications link. If the software on either computer is unable to send its message within the user-specified period, this is detected on each computer.

If it is the Master computer who has failed to send its status message and the system is in Program Mode, then a System Failover occurs (see below).

If it is the Standby which has failed, then it is be made Idle.

digital software

System Failover Operation

In the event of a System Failover the following occurs:

- The Master switched devices are disconnected and the Master computer's status is changed to Idle.

- If the other computer is in Standby Mode, then the Standby Devices are disconnected, the Master Devices connected and its status changed to Master.

The full MIRA Switch Control software can perform a System Failover in less than two seconds. After the System Failover is complete, the user's application programs are responsible for failure recovery.

Diagnostics should then be run on the faulty computer. This can be done without affecting the application(s) running in the new Master. Repair can then be effected on the faulty system, normally without affecting the Master computer in any way.

System Swap Operation

Customer written application programs or the operator can command a System Swap. This operation can also be disabled by the operator or an application program. It is only valid from the Master when the other computer is in Standby Mode and when the system is in Program Mode.

In the event of a valid System Swap the following occurs:

- The switched devices are disconnected from both computers.

- The Master computer status becomes Standby and the other becomes Master.

- The Master Devices are connected to the new Master and the Standby Devices to the new Standby.

System Force Operation

In Manual Mode the operator can force a swap of the system, no matter what the status is of either computer. However, if one of the computers is Idle, then its status remains Idle. This is activated via the front panel.

Note: Status A and Status B differentiates the status of the two computers.

On-Line Testing

On-line tests can be invoked by the operator to test the MIRA unique hardware on a system. This tests all the MIRA hardware components without actually changing the state of a switch and thus can be used without disturbing the applications running on either computer.

Operator Commands

A set of operator commands enables the operator to control the MIRA System.

HELP	Provides the operator with descriptions of all commands which are available.
START	Starts the MIRA Switch Control software
STOP	Stops the MIRA Switch Control software
SHOW	Displays the local status of the system and the switched devices
SET [NO]ON	[NO]SWAP Disables or enables System Swap Operations Disconnects or connects switched devices
SWAP	Performs a System Swap Operation
TEST	Performs a local test of the MIRA hardware
EXIT	Exits from the MIRA command level

Chart I

Summary of the Effect of Failover, Swap and Force Operations

	Before		After	
	Status A	**Status B**	**Status A**	**Status B**
Failover	master	standby	idle	master
	master	idle	idle	idle
	standby	master	master	idle
	idle	master	idle	idle
Swap	master	standby	standby	master
	standby	master	master	standby
Force	master	standby	standby	master
	master	idle	standby	idle
	standby	master	master	standby
	standby	idle	master	idle
	idle	master	idle	standby
	idle	standby	idle	master

User Application Interface

The Application Interface provides a set of user-callable subroutines by which a user application requests functions and receives information via the MIRA Switch Control software which must be active.

The subroutines are available for MACRO-11, FORTRAN 77/RSX and FORTRAN IV/RSX and include the following functions:

MRACON	Connects the user application (maximum 8 simultaneous connections)
MRADIS	Disables System Swap Operations
MRAENA	Enables System Swap Operations
MRASWA	Requests a System Swap Operation

The user applications can also be notified, if requested, of changes in system status and thus invoke the necessary recovery procedures.

The Driver Interface

The Driver Interface communicates with the MIRA Hardware via the Q-BUS. It provides a number of functions which can be requested using system directive calls and QIOs and thus enable an application to control the failure detection and switching mechanism itself.

The interface gives access to the full capabilities of the MIRA hardware. Users may choose not to use the full MIRA Switch Control software but to perform this control from within their own applications. This requires a fuller understanding of the MIRA hardware and is normally only appropriate when a high level of real-time control is required by the application.

Clock Synchronization

The two computer clocks can be synchronized to within a few milliseconds. This feature is only available via the Driver Interface.

MINIMUM HARDWARE REQUIRED

Any valid MicroPDP-11 system with

- DS-1x3Qx-Ax configuration
- TK50 Tape Cartridge distribution media

Refer to the RSX-11M-PLUS SPD (14.70.xx) for processor support.

Block Space Requirement: (Block Cluster = 1):

Disk space requirements for installation: 3000 blocks

Disk space requirements for use (permanent): 1000 blocks excluding event log.

These counts refer to the disk space required on each system disk. The sizes are approximate; actual sizes may vary depending on the user's system environment, configuration and software options selected.

GROWTH CONSIDERATIONS

The minimum hardware requirements for any future version of this product may be different from the minimum hardware requirements of the current version.

OPTIONAL HARDWARE

Any valid MIRA System option may be used. For details see the MIRA Systems Information Sheet.

PREREQUISITE SOFTWARE

For each MicroPDP-11 (Two per MIRA System):

RSX-11M-PLUS Operating System

Refer to the RSX-11M-PLUS Optional Software Cross Reference Table (SPD 20.99.xx) for the required versions.

OPTIONAL SOFTWARE

None

SOFTWARE WARRANTY

Warranty for this product is provided by DIGITAL with the purchase of a license for the product as defined in the system warranty addendum of this SPD.

INSTALLATION

This software product can be installed by the customer using the step-by-step documentation available for this product. Optionally, you can purchase DIGITAL Installation Services which provide for the installation of the software product by an experienced DIGITAL Software Specialist.

Courtesy Installation Service

This software product will be installed by DIGITAL at no additional charge if you purchase it concurrent with a Startup Service Package that includes installation service. Both the host operating system and this product must be installed concurrently.

ORDERING INFORMATION

Single-Use licensed software is furnished under the licensing provisions of DIGITAL's Standard Terms and Conditions of Sale, which provide, in part, that the software and any part thereof may be used on only the single CPU on which the software is first installed, and may be copied, in whole or in part (with the proper inclusion of DIGITAL's copyright notice and any proprietary notices on the software) for use on that same CPU.

You will need a separate license for each CPU on which you will be using the software product (except as otherwise specified by DIGITAL). Then, Materials and Service Options are selected to utilize the product effectively. **THE LICENSE OPTIONS ARE DESCRIBED BELOW. IF YOU ARE NOT FAMILIAR WITH THE SERVICE OPTIONS, YOU MAY OBTAIN THE APPROPRIATE SOFTWARE PRODUCT SERVICE DESCRIPTION(S) FROM YOUR LOCAL DIGITAL OFFICE.** If you are already familiar with these options, you may obtain the ordering information directly from the Software Options Chart.

Note: Two licences are required for a MIRA System; one per MicroPDP.

LICENSE OPTION

Single-Use License Option

The Single-Use License is your right to use the software product on a single CPU.

For your first installation of this software product you must purchase as a **minimum:**

- Single-Use License Option, and
- Distribution and Documentation Option

The license gives you the right to use the software on a single CPU and the Distribution and Documentation Option provides the machine-readable software and related documentation.

To use this software product on additional CPUs, you must purchase for each CPU as a **minimum:**

- Single-Use License Option

In addition to the right to use, the license gives you the one-time right to copy the software from your original CPU installation to the additional CPU. Therefore, the Distribution and Documentation Option is not required, but optional.

Distribution and Documentation Option

The Distribution and Documentation Option provides the machine-readable software and the basic documentation. You must have, or order, a Single-Use License to obtain this option. You will need this option to install the software for the first time. When revised versions of this software product become available, they may also be obtained by purchasing this option again.

Software Revision Right-To-Copy Option

The Right-To-Copy Option allows a customer with multiple CPUs to copy a revised version of a software product from one CPU to another. Each CPU must be licensed for that product. You first install the revised software on one CPU; then you can make copies for additional CPUs by purchasing the Right-To-Copy Option for each additional CPU.

Documentation-Only Option

The Documentation-Only Option provides one copy of the basic documentation.

Software Product Services

A variety of service options are available. For more information on these or other services, please contact your local DIGITAL office.

SOFTWARE OPTIONS CHART

The distribution Media Codes used in the Software Options Chart are described below. You specify the desired Media Code at the end of the Order Number, e.g., QJZDM-H5 = binaries on TK50 Tape Cartridge.

5 = TK50 Tape Cartridge
Z = No hardware dependency

Note: **The availability of these software product options may vary by country. Customers should contact their local DIGITAL office for information on availability.**

OPTIONS	ORDER NUMBER
LICENSE OPTIONS: A LICENSE IS REQUIRED FOR EACH CPU.	
Single-Use License	QJZDM-UZ
MATERIALS AND SERVICE OPTIONS:	
Distribution and Documentation Option	QJZDM-H5
Software Revision Right-To-Copy Option	QJZDM-HZ
Documentation-Only Option	QJZDM-GZ