Multimedia Presentation Manager Toolkit/2
Getting Started

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Note

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About This Book

This book introduces you to IBM Multimedia Presentation Manager Toolkit/2. It assists you with installing MMPM/2 and provides a brief overview of the MMPM/2 sample programs, tools, and subsystem development samples provided in the toolkit.

Who Should Use This Book

This book is for application developers who will be installing and using the MMPM/2 toolkit to design and write code for their own multimedia programs or MMPM/2 system components.

How This Book is Organized

This book contains three sections and appendices.

Chapter 1, "Introduction" on page 1, provides system requirements, and gives an overview of the MMPM/2 toolkit.

Chapter 2, "Installation" on page 5, explains the installation requirements and procedures for installing the MMPM/2 toolkit.

Chapter 3, "Overview of the MMPM/2 Toolkit" on page 7, has general information about the programs provided in the MMPM/2 toolkit.

Appendix A, "Installing on Multiple Workstations" on page 19, describes how to create and use a response file to install the MMPM/2 toolkit on workstations with a common hardware configuration.

Related Information

The IBM Multimedia Presentation Manager Toolkit/2 includes the following related information. An ASCII file of the *OS/2 Catalog* is available in the TOOLKT21 subdirectory. This file, BOOKCAT.ASC, provides ordering information and summarizes the technical publications library. You can view this file with any text editor or direct it to a printer for a hardcopy listing.

Multimedia REXX
Describes REXX functions that enable Media Control Interface string commands to be sent from an OS/2 command file to control multimedia devices. This online book is located in the Multimedia folder in the OS/2 2.1 product.

MMPM/2 Application Programming Guide **- (71G2221)**
Provides advisory information on application interfaces to help you select and implement functions for your OS/2 multimedia applications. Code examples from fully documented sample programs accompany the descriptions of the functions.

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MMPM/2 Subsystem Development Guide **- (71G2223)**
Provides guidelines for developing multimedia subsystems. Each subsystem component is described in detail in individual chapters. Models are used to complement the information provided by component sample program templates.

MMPM/2 Programming Reference **- (71G2222)**
Provides detailed information on multimedia functions, messages, and data structures to enable you to write code for your multimedia application programs and subsystems.

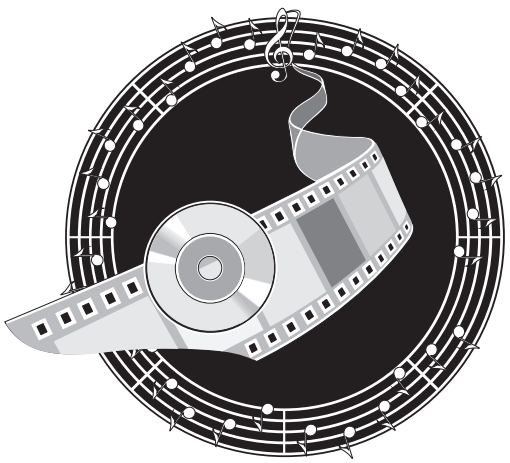
A Guide to Multimedia User Interface Design **- (41G2922)**
Describes design concepts to be considered when designing a CUA multimedia interface that is consistent within a particular multimedia product and across other products.

Chapter 1. Introduction

You can increase your productivity with the Multimedia Presentation Manager/2* (MMPM/2) 1.1 toolkit. Increased productivity begins with a simple installation from CD-ROM using the multimedia installation program.

Once installed, the toolkit sample programs illustrate the use of the comprehensive multimedia device and data handling capabilities of MMPM/2. There are working sample programs for every major function in the MMPM/2 system. As the sample code can be freely incorporated into real products, you can be immediately productive without incurring a steep learning curve. You will be able to focus on product-specific function instead of investing large amounts of time providing the multimedia enhancements. The MMPM/2 technical library provides detailed information and discussion on each sample program.

Complete online documentation provides a quick effective reference to all system APIs, messages, and features, including code examples and helpful notes.



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Note: MMPM/2 now includes header files with naming conventions compatible with the standard Operating System/2* (OS/2*) format. Applications using previous versions of the MMPM/2 header files will still use those header files by default when the applications are compiled. In order to use the new (OS/2 consistent) header files in an application, define INCL_OS2MM in the program. Defining INCL_OS2MM automatically defines the following:

INCL_MCIOS2	New MCI-related include files (MCIOS2.H and MMDRVOS2.H)
INCL_MMIOOS2	New MMIO include file (MMIOOS2.H)
#define INCL_MIDIOS2	New MIDI include file (MIDIOS2.H)
#define INCL_MCDOS2	New MCD include file (MCDOS2.H)
#define INCL_CDAUDIO2	New CDAUDIO include file (CDAUDOS2.H)

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System Requirements

This section lists the system requirements for installing the Multimedia Presentation Manager/2 Toolkit.

Hardware

Intel**386 SX-based, IBM Personal System/2*, Model 55, or higher
8MB of RAM memory when used with the IBM C Developer's WorkSet/2*
Hard disk with 15MB of free disk space.
IBM M-Audio Capture and Playback Adapter*, or other adapter when supported with an OS/2 device driver.
IBM CD-ROM drive, or other CD-ROM drive when supported with an OS/2 device driver.

Notes:

1. You might need additional memory and hard disk space specific to your application needs.
2. You can install as many as four IBM M-Audio Capture and Playback adapters in your computer. However, using all four adapters simultaneously in conjunction with a high data rate (such as the data rates produced by CDs) will affect system performance and possibly cause the temporary loss of playback and record functions.

Software

IBM OS/2 2.1 installed and the OS/2 2.1 toolkit installed. (The operating system must be installed prior to installing the toolkit.)
IBM C Developer's WorkSet/2 (modifications to the language header files and sample programs may be required when used with other development environments or compilers).
C language compiler (the IBM C-Set/2* is available separately or as a part of the Developer's Workset/2).
MMPM/2 1.1

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Chapter 2. Installation

An installation program is provided that installs the MMPM/2 toolkit, and the programs and subsystems it includes from a compact disk.

OS/2 2.1 with the MMPM/2 system must be installed in your computer before the MMPM/2 toolkit can be installed. To install the toolkit:

1. Insert the *Developers' Toolkit for OS/2 2.1* compact disc in the CD-ROM drive.
2. Select the **Multimedia Install** object from the MMPM/2 folder. The MMPM/2 Installation window appears.
3. Change the source drive and path information in the upper-left corner of the main install panel to the CD drive and the \MMPM2TK path.
4. Follow the instructions on your screen.

   During installation, choices appear on your screen; you can either accept them or change them. If you want to accept the installation defaults, press Enter when each window appears. If you want to change a default choice, move the cursor to the information you want to change and select or enter a different choice.

   Need Help During Installation?

   If you require assistance while installing the MMPM/2 toolkit, do *one* of the following:

   Press the F1 key.
   Select the **Help** push button.

5. After the toolkit installation is completed, you must shut down your computer using the OS/2 Shutdown procedure and then restart it. Do the following to shut down your computer:

   Warning: You could lose information if you turn off your computer without following the Shutdown procedure.

   a. Move the mouse pointer to a position on your desktop that is clear (not over an opened window or object).
   b. Click mouse button 2 to display the Desktop pop-up menu.
   c. Select **Shut down**.
   d. Select the appropriate action from any subsequent window that is displayed.

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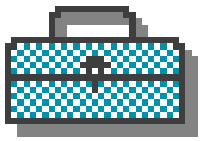
After you restart your system, the Multimedia Presentation Manager Toolkit/2 folder is created. You can start the sample applications by selecting them from the toolkit folder.



Note: For information about installing the MMPM/2 toolkit on multiple workstations, see Appendix A, “Installing on Multiple Workstations” on page 19.

Chapter 3. Overview of the MMPM/2 Toolkit

This chapter briefly describes the programs provided in the MMPM/2 toolkit, and the sample subsystem source code available to help you develop multimedia subsystems.

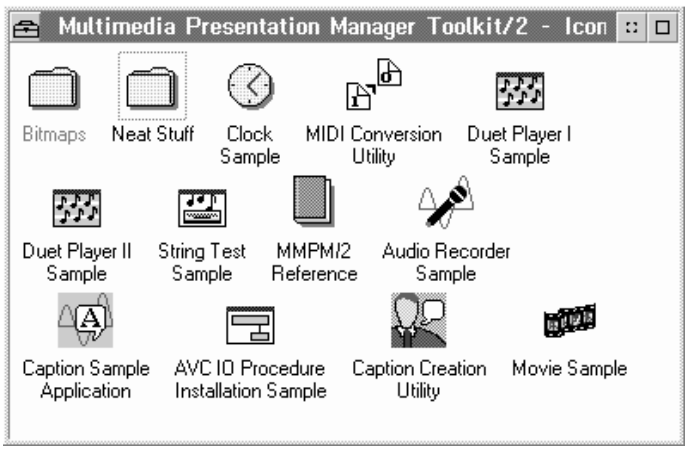
The toolkit includes sample programs, source code, library and header files, and online information to help you incorporate multimedia in your Presentation Manager* (PM) applications, and assist your development of MMPM/2 subsystems.

Refer to the online help information for assistance in using the toolkit programs.

Application Programming Samples

The Multimedia Presentation Manager Toolkit/2 provides practical examples and source code to illustrate using multimedia controls and functions to create multimedia applications and develop systems to support multimedia devices.

After you have installed the toolkit, you can start the sample programs by opening the Multimedia Presentation Manager Toolkit/2 folder and selecting them. The folder contents are displayed.



Each sample program serves as a template that you can easily modify to suit your own purposes. These programs let you investigate the best way to implement your own multimedia requirements.

Some of the sample programs require specific hardware devices. When appropriate, the hardware is listed following the program descriptions.

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Without these devices, you can still compile and run the sample programs; however, you might not receive the full effect of the program. For example, if a sample program has audio, you will not hear it unless you have an audio adapter supported by MMPM/2 and speakers installed.

String Test Sample

The String Test Sample program illustrates the use of the interpretive string interface provided by the Media Control Interface subsystem of MMPM/2. You can enter string commands to control multimedia devices installed on the system. You can also view notification messages posted to the application as a result of the string commands you enter, and select the types of notification messages you want to display.

Another way to send string commands involves a batch file of string commands. In addition to executing a batch file from a command prompt, you can execute a batch file from the String Test Sample program.

In addition to being a sample program of what the string interface can do, the String Test Sample program also serves as a powerful testing and debugging tool for developers writing media drivers and other subsystem components. It enables developers to control their own media devices interactively, instead of having to write multiple test programs.

Specific Hardware Devices: None

Clock Sample

The Clock Sample program illustrates the use of the memory playlist feature of MMPM/2. This feature lets applications dynamically manipulate multimedia data to produce a variety of effects. Using looping and branching instructions, the program dynamically creates audio chimes for the application's clock.

The Clock program also checks the setting of the MMPM/2 captioning flag to provide augmented function to you on demand. Setting the captioning flag causes the image of a bell to swing back and forth whenever the clock chimes.

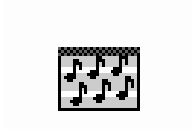
Specific Hardware Devices: An audio adapter supported by MMPM/2 and speakers

AVC I/O Procedure Installation Sample

The AVC I/O Procedure Installation Sample program illustrates the use of installable input/output (I/O) procedures. The multimedia I/O (MMIO) subsystem provides a standard interface that insulates applications from underlying file formats. An I/O procedure generally provides function for identifying and manipulating data of a particular file format (for example, opening, reading, writing, and closing a file).

Applications issue APIs to the MMIO subsystem and the MMIO manager routes the requests to the particular I/O procedure for processing. The I/O procedure is installed as a reference for the MMIO manager when a call for the file format supported by the I/O procedure is made to the standard MMIO interface.

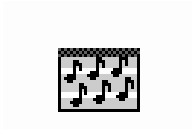
Specific Hardware Devices: None



Duet Player I Sample

The Duet Player I Sample program illustrates the concept of creating and controlling multiple multimedia devices in a device-independent manner, hence the term “duet.” This program controls a group of multimedia data-streaming devices that lets you play, pause, resume, stop, or change the volume of a song. You can play three duets with the sample program. Each of the duets consists of two files that are grouped together as a single unit. Duet Player I Sample program also illustrates how to incorporate audio data in a application's help information. The program plays an audio help file in response to a help request.

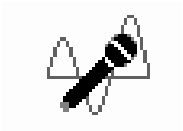
Specific Hardware Devices: An audio adapter supported by MMPM/2 and speakers



Duet Player II Sample

The Duet Player II Sample program is almost identical to the Duet Player I Sample program except for minor differences in how the hardware devices are controlled. The difference is that Duet Player II Sample program demonstrates how one of the devices in the multimedia device group can be a nonstreaming device, such as a CD-ROM. The media drivers and stream handlers manage hardware-dependent functions.

Specific Hardware Devices: An audio adapter supported by MMPM/2, speakers, and a CD-ROM drive



Audio Recorder Sample

The Audio Recorder Sample program illustrates the process of recording audio data. It allows you to record a new file, or to record into an existing file. It will also allow you to set device characteristics, such as the input mode and the input level. In addition, the program allows you to configure the audio format of the waveform file being recorded, such as the sampling rate and sample size.

Specific Hardware Devices: An audio adapter supported by MMPM/2 and speakers

Caption Creation Utility

The Capture Creation Utility program is one part of MMPM/2's sample captioning system. It allows you to synchronize the display of a text file with the play of an audio file. You select the moment in the audio when the text scrolls to display the next line of text.

The captioning system also includes the Caption DLL file, which provides APIs that enable an application to display, manage, and hide a caption window, and the Caption program, which shows programmers how to use the APIs.

Specific Hardware Devices: An audio adapter supported by MMPM/2 and speakers

Caption Sample Application

The Caption Sample Application illustrates how to use APIs provided by the Caption DLL, and all their associated commands and data structures. Using these APIs, the Caption Sample Application will display a “caption” window inside its main window.

This window contains text that scrolls in sync with a playing audio file. You can turn the caption window on and off (to display it or not display it) and set features of the caption window such as background color, text color, and window position.

Specific Hardware Devices: An audio adapter supported by MMPM/2 and speakers

Movie Sample

The Movie Sample Program provides a demonstration of video playback done by software rather than video decompression hardware. The program enables you to play a movie in a predefined window or an application-defined window. You can pause, seek, and stop within the movie.

Specific requirements:

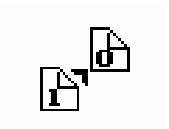
8 MB memory
VGA display (preferably SVGA or XGA)
An audio adapter supported by MMPM/2
speakers
25 MHz - 386 machine

Control File Templates

This sample shows you how to write a control file, which installs an application and adds it to a folder on the desktop. The control file uses the MINSTALL program to provide a consistent installation process.

Tools

The MMPM Toolkit/2 provides you with the following supported tool:



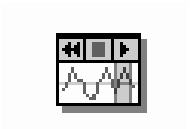
MIDI File Format Converter Tool

The MIDI Conversion Utility program lets you convert a MIDI format 1 file to a MIDI format 0 file through the use of an installable I/O procedure. (A MIDI format 0 file has only one track of music; a MIDI format 1 file has multiple tracks of music.)

NeatStuf Folder

This package also includes a NeatStuf folder which is provided to you solely for the purpose of assisting you in the development of your application programs and subsystems.

Note: The concept of the NeatStuff folder is innovative. The tools in it are "unsupported" tools. They were not thoroughly tested using the quality control process used for the rest of the MMPM/2 toolkit. Although they were not fully tested, they were thought so useful that the tools were provided for your benefit anyway.



WaveDoctor

The WaveDoctor provides a mechanism for creating different versions of an audio file. It is capable of changing the sample frequency, bits per sample, and the number of channels (mono or stereo) used to represent the data. The Wave Doctor also uses special effects to alter an audio file such as echoing and reverberation. The tool uses digital signal processing algorithms to actually manipulate the data, not simply change the header information and displays an estimate of the output audio length for users interested in the compaction ratio.

P2STRING Tool

The P2STRING script processing tool is used to test MMPM/2 subsystems through the media control interface string commands in the MMPM/2 environment. The P2STRING tool processes script files (containing string commands and tool directives) to test the behavior of subsystems in MMPM/2. P2STRING extracts the strings from the script files and processes the commands through the mciSendString function. Messages and error conditions of the processes included in the scripts are logged to an output file and displayed in windows.

P2STRING provides subsystem developers with an effective testing tool because it alleviates the need for extensive test code to be written. Developers can write script files to test all relevent scenarios, and it also aids in debugging using log files. (Refer to the Readme file in the P2STRING subdirectory for information about how to use P2STRING and how to create script files that P2STRING can process.)

Subsystem Development Samples

The toolkit also establishes a basis for developing new subsystems that extend the capabilities of MMPM/2. MMPM/2's extendable architecture makes it possible to add new functions, devices, and data types as multimedia technology advances. Following are brief descriptions of the subsystem code provided. Refer to "Subdirectory Structure" on page 18 to find the subdirectories where the sample programs are located.

Media Control Driver Template

Use this sample to show you the basics of what functions need to be included when writing a media control driver — dynamic link libraries that implement the function of a media device.

Waveform Audio Media Control Driver

Use this sample to show you how to write a media control driver (MCD) for a streaming device. *Streaming* devices, such as the waveform audio MCD, use the services of the Sync/Stream Manager (SSM) to control the data stream from a source location to target location. For example, the M-Audio adapter used in Duet Player I is a streaming device, which plays back waveform audio files stored on the user's hard disk.

CD Media Control Driver Sample

Use this sample to show how to write an MCD for a non-streaming device, which streams data within the device. The CD Media Control Driver typically has no data flow associated with it since most CD audio devices process data internally. A device that streams data internally does not need to use buffered I/O because the source and destination of the data is within the device. Therefore, a non-streaming device does not require the use of the Sync/Stream Manager. For example, the CD-ROM device used in Duet Player II is a non-streaming device. When the CD media control driver receives a PLAY, PAUSE, or STOP command from the program, it issues the appropriate IOCtls to the CD-ROM device to perform the function. The hardware does all the work, relaying the digital information off the disc, translating it into an audio signal, and piping it to a port such as a headphone jack.

Media Control Driver Command Tables

Use this sample to create a custom command table when writing a media control driver. Command table resources allow the Media Device Manager (MDM) string parser to interpret command strings for media control drivers (MCDs). This provides string command interface support for your MCD. For example, a program or mciRxInit command uses the mciSendString function to pass a string command to the MDM. In turn, MDM calls its string parser to interpret the string command, change it into the equivalent procedural command, and then route it to the appropriate MCD.

File System Stream Handler Sample

Use this sample to show you how to write a stream handler DLL. The file system stream handler is a DLL because all file system I/O functions are available as Ring 3

OS/2 API, and service all file system devices. This eliminates the need to build a specific stream handler PDD for every device the file system can access.

The file system stream handler DLL transports data to or from file system devices (local or remote) on behalf of a real-time application. This handler also utilizes the MMIO subsystem to interface to a very wide variety of device, such as hard disk driver, diskette drives, CD-ROM, and so on.

Stream Handler Resource File Sample

Use this sample to create a stream handler resource file, which is used when installing a stream handler. This sample contains source code from the MMPM/2 stream handlers shipped with OS/2 2.1. It shows the stream protocol control block (SPCB) information that has been "tuned" to be the most efficient with several types of data. A stub source C file and makefile are also provided for creating the DLL file.

Toolkit Control Files

This sample contains the control files used to install the toolkit sample programs. Use these files as templates to to create and install your own applications and subsystems using the Multimedia Installation Program (MMINSTALL).

Case-Converter I/O Procedure

The Case-Converter I/O Procedure serves as a working template of what you need to consider when writing a file format I/O procedure.

M-Motion I/O Procedure Sample

Use this sample to write a custom I/O procedure, which isolates applications and subsystems from data-specific processing. Source code is provided for the M-Motion I/O procedure, which serves as a working template of what you need to consider when writing a file format I/O procedure.

File conversion is simply a combination of loading from one file and saving to another. The M-Motion I/O procedure allows you to convert from an M-Motion file format (.VID) to the standard presentation format (OS/2 bit map) and vise versa.

Ultimotion I/O Procedure Sample

Use the Ultimotion* I/O Procedure Sample to show you how to write a file format I/O procedure that reads and writes data to and from movie files. This is a fully-functional sample that you can compile. It implements additional MMIO messages (MMIOM_MULTITRACKREAD and MMIOM_MULTITRACKWRITE) and uses the new MMPM/2 CODEC interface API for compression.

Device Driver Source Kit for OS/2

If you want to write an audio physical device driver (PDD) and associated virtual device driver (VDD), subscribe to the *Device Driver Source Kit for OS/2*. This kit contains

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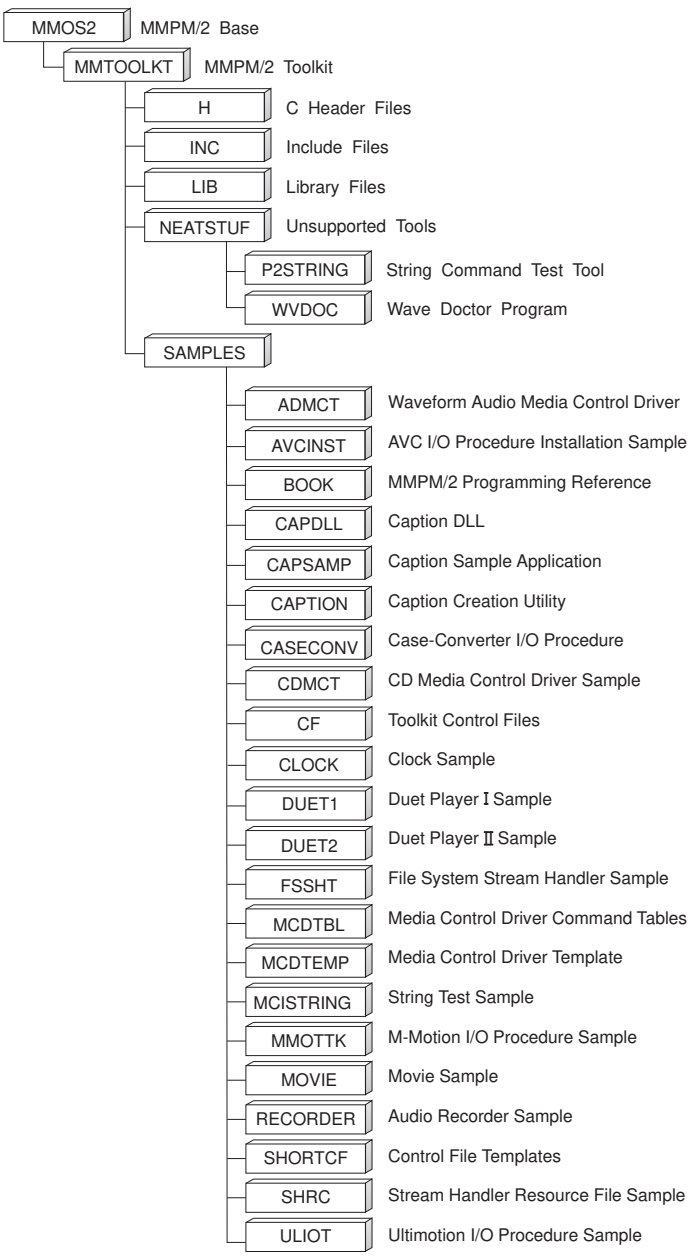
documented source code and detailed information on how to build device drivers for OS/2 and MMPM/2.

The kit covers the complete range of OS/2 physical and virtual device drivers, from printers, displays, SCSIs and CD-ROM drives, to device drivers for PenPM and MMPM/2. Comprehensive descriptions of all the device driver interfaces and system services are included.

Subdirectory Structure

The Multimedia Installation program installs the following subdirectory structure for the toolkit:



Appendix A. Installing on Multiple Workstations

Note: The information in this appendix is for individuals who are responsible for installing the MMPM/2 toolkit on multiple workstations.

This appendix describes how to create and use a response file to install the MMPM/2 toolkit on multiple workstations. A response file contains responses to the prompts that appear during the installation procedure and is used to perform unattended installations. It also lets you standardize installations for a group of workstations with a common hardware configuration.

To install the MMPM/2 toolkit on multiple workstations:

1. Create a response file.
2. Use a response file to run the installation procedure on a workstation.

Creating a Response File

To create a response file:

1. Type the following at the command prompt:

   MINSTALL /C:*drive*:*path**filename*

   Where:

   /C: indicates that you want a response file to be created.

   ***drive*:** is the letter designation of the drive where the response file is to be created. This entry is optional.

   path is the path on the drive where the response file is to be created. This entry is optional.

   filename is the name of the response file you are creating.

   For example, if you wanted to:

   Create a response file called RESP, and
   Place it in the D:\MPMPACK directory with the installation package files

   you would type:

   MINSTALL /C:D:\MPMPACK\RESP

2. Press Enter and respond to the prompts in the Installation program.
3. When the installation is complete, go to "Running a Response File."

Running a Response File

To install the MMPM/2 system on a workstation using the installation package and response file:

1. At the workstation, select **OS/2 System**.
2. Select **Command Prompts**.

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3. Select either **OS/2 Full Screen** or **OS/2 Window**.
4. Access the network that contains the installation package and response file, for example, J:.
5. Change to the network directory that contains the installation package and response file.
6. Specify the drive, path, and filename of the response file you want to use. You can also indicate the drive and path for the installation package containing the MMPM/2 source files. Type the following at the command prompt:

   MINSTALL /R:*drive*:*path**filename optional parameters*

   Where:

   /R: specifies that you want to use a response file to install the MMPM/2 system.

   ***drive*:** specifies the drive letter where the response file is located. This entry is optional.

   path specifies the directory containing the response file on the drive. This entry is optional.

   filename specifies the name of the response file.

   optional parameters provides additional information for installing with a response file. They are:

   /L:*drive*:*pathfilename***
   specifies the drive, path, and file name given to the MINSTALL.LOG file when it is copied to the network after the installation is complete on the workstation.

   /S:*drive*:*path*
   specifies the drive and path to the MMPM/2 source files. These files can exist anywhere on the network.

   /T:*drive*:
   specifies the target drive where the MMPM/2 files will be copied on the OS/2 workstation.

Notes:

a. A MINSTALL.LOG file is created in the \MMOS2\INSTALL directory of the target drive on the workstation.

b. If a copy of the MMPM/2 system is already installed on a workstation, the /T parameter is ignored and the new installation is placed in the same directory as the old.

For example, if you wanted to:

Use the response file in the J:\MPMPACK directory on the network
Use the installation package in the J:\MPMPACK directory on the network as the source
Install the MMPM/2 system to the C drive on the workstation
Place a copy of the MINSTALL.LOG file in the J:\LOGS directory on the network and name the file 1.LOG,

you would type:

```
MINSTALL /R:J:\MPMPACK\RESP /S:J:\MPMPACK /T:C:/L:J:\LOGS\1.LOG
```

7. Press Enter.
8. When the installation is complete, check the MINSTALL.LOG file for information about whether the installation was successful.
9. Repeat steps 1 through 8 on each workstation.

Glossary

analog sound. A sound wave represented by an electrical signal. Analog sound must be converted to digital form before it can be stored or processed by a computer.

audio file. A file used for digital audio sounds on a waveform device.

bitmap graphics. A form of graphics in an area of computer memory or storage that can be displayed as an image.

compact disc. A disc with information stored in the form of pits along a spiral track. The information is decoded by a compact disc player and interpreted as digital data which most computers can process.

CD-ROM. High-capacity read-only memory in the form of an optically read compact disc.

CD-ROM XA. Compact disc read-only memory that has been enhanced to handle a special format that combines audio, video, and other information.

device driver. A software program that enables the computer to communicate with a specific peripheral device; for example, a printer, a videodisc player, or a CD-ROM drive.

digital audio. Audio data that was converted from an analog signal to a digital data stream, where each number represents the intensity of the audio signal at a given point in time.

digital sound. A variable signal used by almost all computer systems. Digital signals can be represented as a series of numeric values, which can be represented by binary numbers that are used by computers.

hard disk. A data storage device that contains permanently installed rigid magnetic recording disks.

image. A still picture or one video frame.

MIDI file. A file used for audio sounds on a sequencer device.

multimedia. The combining of different elements of media (for example, text, graphics, audio, and still images) for display and control from a personal computer.

Musical Instrument Digital Interface (MIDI). A protocol that allows a synthesizer to send signals to a computer, or a computer to a musical instrument, or a computer to another computer.

sequencer device. A device that uses MIDI files (a digital tape recorder).

subsystem. In the IBM MMPM/2 system, any of the items displayed in the main MMPM/2 Installation window that can be selected for installation.

videodisc. A disc with information stored in the form of pits along a spiral track. The information is decoded by a videodisc player and converted to an analog signal.

videodisc player. A device that plays videodiscs. Because a videodisc player is an analog device, it can play images and sounds.

wave file. A file used for digital audio sounds on a waveform device.

waveform device. A device that uses digital audio files.

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