SoftTree Technologies, Inc.

Getting Started

24x7 Scheduler

Version 2.3

24x7 Scheduler™ 2.3

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Preface

This Getting Started manual provides information and links to help get you started with the 24x7 Scheduler, an advanced job scheduling and automation system for Microsoft Windows 95/98/NT/2000 platforms. Information in this manual applies to the 24x7 Scheduler v2.3.0 running on all supported operating systems. Both the print and the on-line documentation assume that you have a working knowledge of standard Windows mouse and keyboard actions and understand Windows basic concepts. This manual is provided so that the reader can understand how 24x7 Scheduler functions. It also contains information on the following topics:

- Installation and configuration instructions
- Task-oriented guidelines to all interactive 24x7 Scheduler functionality

Chapter 1: Welcome

Introduction

The 24x7 Scheduler is the tool that enables you to schedule tasks (jobs) to run regularly, when it is necessary for you. The 24x7 Scheduler functions are used to submit and manage jobs to be executed at a given computer at a given time or times in future or at a given event such as arrival of one or more semaphore files, e-mail messages, other process interruptions. Jobs can be managed at remote and local computers provided schedule service is running at a given computer.

Schedule service functions were designed to extend basic functionality found in many commercial programs including native Window NT character-based "AT" command. These utilities are relatively primitive when it comes to scheduling critical production jobs, because they are limited to a single machine, require cryptic instructions, and lack any error-handling, logging, or notification capabilities.

The 24x7 Scheduler enables you to:

- Schedule a job to run based on date and time, files arrival, and/or job dependencies (managed via semaphore files) such as job success, failure , missing file, etc.
- Change the schedule for or turn off an existing job.
- Customize how a job will run at its scheduled time.
- Monitor job execution progress in a real-time as well as forecast job start.
- Organize logically related jobs into logical groups represented by folders.
- Maintain list of exception dates such as holidays.
- Manage job interdependencies.
- Send notification messages about job execution status.
- Log job execution progress and status.
- Generate detailed reports on the job definitions, dependencies, and execution status.
- Use comprehensive fault tolerance features that ensure an automatic server rollover in the event of a network/machine failure.
- Integrate the 24x7 Scheduler with third-party applications.

The 24x7 Scheduler allows you to schedule a job to run at certain times. You can specify a condition that will trigger the job start. The following trigger types can be used:

- Time watch
- File watch
- Process watch
- E-mail watch
- Log-off/shutdown watch
- User-defined triggers

To start the 24x7 Scheduler each time you start Windows and run it in the background simply add the 24x7 Scheduler shortcut to the StartUp system folder.

On Windows NT 24x7 Scheduler provides an option to install 24x7 Windows NT service. This allows you to start 24x7 automatically when Windows NT starts regardless of user logon. If setup under system account the 24x7 service will run even when the user is logged off.

When the 24x7 Scheduler is running minimized (as a scheduling service) this  icon appears on the taskbar. You can double-click the 24x7 Scheduler icon on the taskbar to open the 24x7 Scheduler. You can also use right click on the 24x7 Scheduler icon to invoke context menu from which you choose **Restore** command.

Running on network

The 24x7 Scheduler is designed to run effectively in a network environment. However, it is not recommended to run shared 24x7 executables. The program automatically finds its home directory where it stores schedule database, creates log files and other working files.

Security issues

If you are running the 24x7 Scheduler on a network server, on a computer where someone other than the system administrator may have access to, you should consider possible security risks when scheduling a program. If the 24x7 Scheduler is running on a computer only accessible to the system administrator, security is not a concern. Otherwise, consider the following security steps:

- Whenever possible, run any scheduled programs non-interactively (choose **hidden** window option).
- If a program must be run interactively, run it under a user account that has only the minimum authority needed to run the program properly.

To Start 24x7 Scheduler Each Time Windows Starts

1 Click the **Start** button, and then point to the **Settings**.
2 Click **Taskbar**, and then click the **Start Menu Programs** tab.
3 Click **Add**, and then click **Browse**.
4 Locate **24x7.EXE**, then double-click it.
5 Click **Next**, and then double-click the **StartUp** folder.
6 Type the name (such as “24x7 Scheduler") that you want to see on the **StartUp** menu, and then click **Finish**.

Running 24x7 Scheduler as a Windows NT Service

The 24x7 Scheduler can be optionally set to run as a Windows NT service. There are several important Windows NT service features that you should know and carefully consider before setting the 24x7 Scheduler to run as a service:

- The 24x7 Scheduler can start automatically whenever the computer is started and runs continuously in the background, regardless of whether a user is logged on.
- Programs run by the 24x7 schedule service inherit the security attributes of the scheduler. If the 24x7 schedule service is set to log on using local system account, the 24x7 schedule service acts as if it is part of the operating system. Therefore, all started programs get the same security permissions as the operating system. The 24x7 schedule service can be also set to using any valid Windows NT user account, so started programs will inherit the security profile of that user.

- Not all processes, applications, documents, and .bat files can be started from the 24x7 Scheduler. In order to run an interactive application, the application needs to be started with the local system account, and the "Allow service to interact with desktop" check box in Services Control Panel Applet must be checked. If the 24x7 schedule service is set to log on as the local system, scheduled jobs cannot be validated on the network so they cannot access any network resources. If you start the 24x7 schedule service with a user account, jobs can be validated on the network, but they can't have any user interface, because only the local system has sufficient privileges to allow a service to start a program on the interactive desktop. Unless 16-bit applications have access to the interactive desktop, they most likely not start as they run under Ntvdm. Therefore, you can have network access or interactivity with the system (needed by Ntvdm), but not both.

   **All these limitations are by Windows NT design, for security purposes. You do not want a regular user to be able to schedule a job that would run when the administrator is logged on, and use the administrator's credentials.**

- When the 24x7 Scheduler runs as a service, you cannot do much with it other than stop it and start it. Instead, you use the standalone version of the 24x7 Scheduler to modify job database and customize 24x7 Scheduler options.

 **Tip:** The 24x7 schedule service is not installed and configured automatically on installation. For information on installing and configuring the 24x7 Scheduler to run as a Windows NT service, see options and Installation and Uninstallation help topics.

For information on Windows NT services, see your Windows NT documentation. You may also want to visit Microsoft technical support on the Web. There you can find lots of information about Windows NT services. We recommend you to check the following Microsoft knowledge base articles:

Q124184 - Service Running as System Account Fails Accessing Network.
Q132679 - Local System Account and Null Sessions in Windows NT.
Q152451 - Applications Run from the Schedule Service Fail to Print.
Q158825 - System and User Account Difference with AT Command.

Running 24x7 Scheduler as a Windows 95/98 Service

The 24x7 Scheduler can be optionally set to run as a Windows 95/98 service application. There are several important features that you should know and carefully consider before setting the 24x7 Scheduler to run as a service:

- The 24x7 Scheduler can start automatically whenever the computer is started and run regardless of whether a user is logged on.
- A user can stop the 24x7 Scheduler service by right-clicking on the 24x7 Scheduler icon in the system tray, then selecting **Exit** command from the popup menu.
- When the 24x7 Scheduler runs as a service with "survive log off" option enabled, it can run other applications in the event of a user log-off. This can be done using jobs scheduled "on user log-off" . Such started applications run regardless of whether a user is logged on.

 **Tip:** The 24x7 schedule service is not installed and configured automatically on installation. For information on installing and configuring the 24x7 Scheduler to run as a Windows 95/98 service application, see "Options" and "Installation and Uninstallation' help topics.

Job Explorer

The 24x7 Job Explorer presents jobs as a hierarchical structure "Tree View" on the left side. This side is filled with folders and jobs. The right side displays the properties of a selected folder or job. This side is blank unless there is at least one job in the selected folder. You can use tabs on the top of right side to change **Properties** view.

Navigating through the various folders and jobs is usually accomplished by clicking individual folders and jobs with the mouse. For users more accustomed to keyboard navigation, The 24x7 Scheduler has been designed to make every feature available via the keyboard.

To change the size of either side of the window, drag the bar that separates the two sides. Use scroll bars to navigate both sides of the Job Explorer window.

You can click your right mouse button anywhere to see a menu of available commands. The appeared context menu shows the most frequently used commands for that job, folder, or tab.

Explorer "Tree View"
If a folder has been expanded, and its contents displayed in the **Properties** view area, the folder will be represented by an open folder icon  .

Collapsed folders represented by a closed folder icon  .

Folders with a "+"symbol next to the folder name mean that there are jobs beneath the folder.

Conversely, a "-"symbol next to a folder icon means that there are no further jobs beneath.

Property Pages
The first tab **Jobs** displays large icons representing all jobs from a selected folder, so that you can easily select and double-click them. Double-click the job icon to launch the Job Wizard, which will help you to change job's properties. Alternatively, you can press F4.

Click a folder on the left side of the window to display its contents on the **Jobs** tab. Click the plus signs (+) to expand a folder or alternatively, you can double-click the folder or press F5 key. Click the minus signs (-) to collapse a folder alternatively, you can double-click the folder or press F6 key. To expand / collapse all folders select Expand All / Collapse All commands from the programs View menu.

The second tab **Properties** displays detailed information about the selected job. To select a job, click on the jobs icon in the left pane or switch to the **Jobs** tab then select a job there. The **Properties** tab is disabled when there is no job selected. For example, when the current folder is empty.

The third tab **Log** displays available log records for the selected job. The job log provides a complete audit trail for all job runs. The **Log** tab is disabled when there is no job selected. For example, when the current folder is empty.

Status Bar

The status bar is a horizontal area that appears on the bottom of Job Explorer window.

The status bar provides information about the current state of what you are viewing in the window and any other contextual information.

The status bar is divided into four sections. Most left section displays contextual information and descriptions of the program's activities during its various operations.

The second section displays small resource meter that reflects free system resources. The height of the green bar is proportional to amount of free system resource. The bar becomes yellow when there is less then 15% of free resources, and eventually it becomes red when there is less then 10% resources available. You can double-click the bar or rest mouse pointer over the bar for a moment to see additional information.

The third section displays countdown for the next pending job. If there is no job pending this section shows "Off". You can rest the mouse pointer over this section for a moment to view additional information about this job. Double-click on this section to locate and highlight the first pending job.

The last section displays the current date and time. You can double-click this section bar or rest the mouse pointer over it for a moment to view additional information.

System Tray Icon

The system tray is the small panel in the lower right corner of the Windows Taskbar. Job Explorer places an icon in the system tray when it is running in the background. Job Explorer is always hidden when minimized. You can right-click on the system tray icon and a context menu will be displayed. This context menu has three menu items:

1 **Restore** - brings up the Job Explorer window
2 **Close** - closes the Job Explorer window and exits Scheduler
3 **About** - displays information about 24x7 Scheduler

Tips:

- Use CTRL TAB shortcut to switch between tabs on the right side of the Job Explorer window.

- For brief view of job descriptions, rest the mouse pointer over the job icon on the left side of the Job Explorer window. A description of that job will appear as a ToolTip next to the mouse pointer.
- Double-click on the 24x7 system tray icon to restore the Job Explorer window.

Job Types

There are three types of jobs:
- Program Files and Documents
- Database Commands
- Job Automation Scripts

Program Files and Documents

This job type includes jobs that execute operation system files. Files than can be executed are program files such as .exe, .bat, and .com files or document files such as MS Access database systems, Perl scripts, Java scripts, etc.

 Note that for jobs which execute a "document" file e.g. x:\feed\replica.mdb, the 24x7 Scheduler automatically determines which "driver" application will be used to start the process.

Database Commands

This type includes jobs that can execute one or more database commands. After establishing a database connection, the 24x7 Scheduler sends the specified SQL in one complete pass. Before using a multi-statement SQL, make sure that your database is capable of processing it.

 You must create at least one database profile before you can run jobs of this type.

Job Automation Scripts

This type includes jobs that can execute user-defined scripts. The 24x7 Scheduler parses the script, checks syntax errors, then interprets and executes the script line by line. See Job Automation Language Help for details.

The 24x7 Scheduler has a very sophisticated built-in script Editor, which you can use to develop both SQL and JAL scripts.

File Types

To create a file type:

1 Double-click the **My Computer** icon or start Windows Explorer.
2 On the **View** menu, click **Options**, and then **File Types** tab.
3 To create a new file type, click **New Type**.
4 Specify a description for the file type and the filename extension associated with this type of file.
5 Click **New** to define an action for this file type.

To modify the settings belonging to an existing file type:

1 Double-click the **My Computer** icon or start Windows Explorer.
2 On the **View** menu, click **Options**, and then **File Types** tab.
3 Select the desired type, then click **Edit.**
4 Click the command in the **Action** box that you want to modify, then click **Edit**.
5 Specify the action that you want to define, such as **Open** or **Print**, and the command that should run in order to complete this action.
6 Repeat steps 4 and 5 for as many actions as you want to define for this file type.

If you want to change which program starts when you open a file, carry out the following steps:

1 In **My Computer** or Windows Explorer, click on the **View** menu, then click **Options**.
2 Click the **File Types** tab.
3 In the list of file types, click the one you want to change.

The settings for that file type are shown in the **File Type Details** box.

4 Click **Edit**.
5 In the **Actions** box, click **Open**.
6 Click **Edit**, and then specify the program you want to use to open files that have this extension. This program is the "driver" application that the 24x7 Scheduler uses to run the scheduled document.

Tip:

- The 24x7 Scheduler uses a "driver" application default icon to represent a document in the Job Explorer.

Drag and Drop Interface

24x7 Job Explorer supports a standard drag and drop interface for managing logical job organization. When you drag a job icon in the Job Explorer tree and drop this job into another folder, the 24x7 Scheduler moves this job to the targeted folder. When you drag a folder icon and drop it in another folder, the 24x7 Scheduler moves all jobs from this folder to the targeted folder then removes the dragged folder from the database.

If you want to move a job to another folder:

1 Click on the desired job.
2 While holding down the left mouse button, drag (move) the mouse pointer to the desired folder.
3 Release the mouse button to drop the job.

When moving all jobs from one folder to another folder:

1 Click on the desired folder.

2 While holding down the left mouse button, drag (move) the mouse pointer to the desired folder.
3 Release the mouse button to drop the folder.

Support for Windows Explorer Drag and Drop

The 24x7 Scheduler can interface with Windows Explorer by using the drag and drop interface to add new events to the loaded schedule database. When you drag a valid program or document file and drop it into Job Explorer, 24x7 Scheduler will add this file as a new event to the targeted folder. When you drag a valid file folder into Job Explorer, the 24x7 Scheduler will add this folder as a new job folder. The 24x7 Scheduler can process only one file at a time.

You can add a file to the loaded schedule database by following these steps:
1 Start Windows Explorer or File Manager
2 While holding down the left mouse button, drag (move) the mouse pointer to the Job Explorer.
3 Release the mouse button to drop the file.

Semaphore Files

A semaphore file is a type of synchronization object that can be used to effectively control the flow of processes. A data file or a log file created by one process can serve at the same time as a semaphore files for other processes. The 24x7 Scheduler can use such semaphores as a reliable method of processing job interdependencies. No matter what occurs in the previous job, the next job in line will not start until all the necessary semaphore files have been created. The semaphore files mechanism guarantees that whether you restart the 24x7 Scheduler, reboot the computer running the 24x7 Scheduler, or a network failure occurred, a dependent job will start only when all the specified files exist.

There are two kinds of the semaphore files:

- **Input files**
- **Output files**

An **input file** is a “watch-file". 24x7 Scheduler checks whether this is present in order that the dependent job can start. The 24x7 Scheduler is capable of checking the presence of one more files for the every scheduled job that relies on them. When you need to specify that more than one file should be checked, make sure that you use a list of semaphore files separated by commas.

When scheduling a job, you can use the **Polling Interval** property to specify how frequently you want 24x7 Scheduler to check the input semaphore files. Carefully consider the value for the polling interval. A short polling interval allows early detection of new semaphore files, thus the dependent jobs can start almost immediately after semaphore files arrived. On the other hand, a short interval causes the 24x7 Scheduler to check for the semaphore files more often which leads to more network traffic and takes more CPU time, leaving less CPU time to other processes.

An **output file** is a file created by the 24x7 Scheduler when a specified event is detected. You should use a list of semaphore files separated by commas when you need to specify that more than one file is to be created.

Execution Logs

About main job execution log

The 24x7 Scheduler automatically performs event logging. By default, it creates entries in the main log file only. The main log file provides a complete audit trail for all job runs. Log entries are created for the following job activities: job start, job finish, and job error. In addition, the 24x7 Scheduler logs all unexpected errors. The main log shows the date and time a job was active, the job number and name, the event severity, and the event description. The event description may include error messages produced when an error occurred.

Use the Log Viewer to view all available entries in the log file. From time to time you should clean up the main log file so that it does not grow too large (see Deleting Log in the Log Viewer

topic). Choose **View / Log** command from the menu to start Log Viewer (keyboard shortcut CTRL L).

About NT system event log

The 24x7 Scheduler can optionally log all job entries in the Windows NT Application Log. This feature is only available for Window NT and Windows 2000 platforms. For detail on the Windows NT Application Log, click the **Start** button, then choose the **Help** command from the Windows NT Start menu. You can turn on/off logging to the NT log file in the program **Options**.

To turn on/off logging in the Windows NT Application Log:
1 Select the **Tools** command then select **Options**.
2 Click on the **Log** tab.
3 Check or uncheck **Logging to the system event log enabled** option.

About Status Report

The 24x7 Scheduler is capable of duplicating main log entries in HTML report format and automatically updating this report each time a new entry is added to the log file. This report can be placed on your company Web server, where you can view it using any Web browser that supports frames. This will enable you to monitor job execution over the Internet. Alternatively, you can launch the default Web browser from the menu using **View/Status Report** command.

To enable/disable Status Report updating:
1 Select the **Tools** command then select **Options**.
2 Check or uncheck **Generate Status Report (HTML)** option on the **General** tab.

About other log files

When tracing is turned on, the 24x7 Scheduler creates other log files in which it stores various trace information. These log files can be viewed in the Log Viewer mentioned above.

To turn on/off tracing:
1 Select the **Tools** command then click on **Options**.
2 Click on the **Log** tab.
3 Check or uncheck the following options: **Trace enabled**, **Database trace enabled**, and **Job execution Statistics enabled**.

 **Tip:**

- The entries for any particular job can be viewed in the Job Explorer.
- You may want to turn off **Load log on startup** option in the program **Options**. This will save some memory and slightly improve overall performance. However, you will not be able to see past log entries for the selected jobs in the Job Explorer.

Changes to the System Time

The 24x7 Scheduler deals with changes to the system date/time in the following manner:

If the clock is set back (i.e. to an earlier date or time), the 24x7 Scheduler will not run any jobs until the original or rescheduled time is reached. If the 24x7 Scheduler is restarted (either manually, or because the system is restarted), it will adjust the scheduled time for the jobs that run repeatedly at the specified time interval.

If the clock is set forward (i.e. to a later date or time), the 24x7 Scheduler will run any jobs that were missed because of the time change and have the **Skip** option set to No. It will also run any jobs that have the **Skip** option set to Yes and the actual delay falls in the allowed interval. If the 24x7 Scheduler is restarted (either manually, or because the system is restarted), it will adjust the scheduled time for the jobs that run repeatedly at the specified time interval.

Working with Job Database

The 24x7 Scheduler stores information on scheduled jobs in the **Job Database**. The **Job Database** consists of a single file with the default name SCHEDULE.DAT. By default, this file is located in the 24x7 Scheduler installation directory. You should not attempt to edit job database files directly. If you have installed the 24x7 Scheduler in more than one directory or on two or more computers and you wish to copy information on scheduled programs between them, you can copy that file to replicate the job database. The 24x7 Scheduler also stores some configuration information in the System Registry under the registry key

HKEY_LOCAL_MACHINE\SOFTWARE\SoftTree Technologies, Inc.\24x7. This information includes all 24x7 Scheduler configuration options available through the Tools/Options menu, definitions of database profiles, and definitions of remote agent profiles. In case of system recovery you can try modifying this information directly, but it is highly recommended to use 24x7 Scheduler GUI.

Starting with the version 1.6 24x7, Scheduler supports multiple job database files. You can create, modify and save job databases similar to the way in which you create, modify and save spreadsheet files in your favorite spreadsheet program. However, the last opened job database is always the active one. So, if you have a Windows shortcut pointing to a particular 24x7 Scheduler job, always remember to update the shortcut or reopen the correct job database. This should help avoid jobs failing.

For your convenience, 24x7 includes a **Database Manager** tool. You can use this tool to copy jobs between job databases.

On startup, the 24x7 Scheduler loads the Job Database into computer memory. This significantly improves overall job processing performance when compared with slow disk access operations required for processing jobs stored on disk. For your convenience, the loaded version of the job database is broken into two parts:

1 A binary image of the database in the disk file.
2 An active job pool that consists of enabled jobs only.

When you add a new, delete, disable, enable, or simply modify an existing job, you make changes to the binary image of the database. This is similar to when you open and edit text files in Windows Notepad. The 24x7 Scheduler does not submit your changes to the active job pool until you complete all the necessary changes. You then save those changes by doing one of the following:

- Click **File** menu, then click **Save**.
- Press shortcut CTRL S.
- Click the  **Save** button on the toolbar.

On the **Save** command, the 24x7 Scheduler saves changes in the disk file then commits updated job definitions in the active job pool.

 **Tip:**

- Because there are two steps involved in the updating job definitions, you have an option of rejecting changes by restarting the 24x7 Scheduler without saving your changes first.

Sending and Receiving E-mail Messages

Overview

24x7 Scheduler supports three e-mail interfaces: standard Windows MAPI (Messaging Application Programming Interface) interface, SMTP (Simple Mail Transfer Protocol), and Lotus Notes interface utilizing Lotus Notes API. You select the desired interface in the system options. 24x7 Scheduler uses the selected interface when sending various notification messages and executing JAL (Job Automation Language) mail statements. Both MAPI and Lotus Notes interfaces support sending and receiving simple e-mail messages as well as e-mail messages that contain one or more attachments. 24x7 Scheduler supports unlimited number of attachments in a single message. However, the maximum number of attachments can be limited by your e-mail system. Please read your e-mail system documentation on this subject. 24x7 Scheduler does not support attachments of the type "embedded OLE object". SMTP interface supports sending e-mails only. When reading incoming e-mail messages, 24x7 Scheduler, by default, saves all attached files in the temporary directory. The location of the temporary directory specified by the TEMP environment variable. Make sure you delete these files from the temporary directory when you no longer need them.

 **Important Notes:**

- MAPI enables the 24x7 Scheduler to interact with multiple messaging systems across a variety of software and hardware platforms whereas Lotus Notes interface works with the following configurations only:
  1) Lotus Notes workstation v4.5 and above running on Windows NT workstation or server (Intel platforms only). There is no limitation on the Lotus Notes server version and platform.
  2) Lotus Notes server v4.5 and above running on Windows NT server (Intel platform only).
- If you have installed Lotus Notes MAPI extensions, you can still use MAPI interface to send and receive e-mail via Lotus Notes. We highly recommend using MAPI interface whenever possible, because (due to nature of Lotus Notes API) we cannot guarantee that Lotus Notes interface will be compatible with the future versions of Lotus Notes. However, we will try to release updated versions of Lotus Notes interface once new versions of Lotus Notes become available.
- For SMTP interface, the 24x7 Scheduler currently supports sending e-mail with or without attachments only. It does not support receiving e-mails. If you setup an "e-mail watch" job, 24x7 Scheduler will use the MAPI interface to check for incoming e-mails.

About Lotus Notes interface

The 24x7 Scheduler Lotus Notes interface consists of two parts:

- Notes e-mail interface library
- Notes extension manager

The 24x7 Scheduler e-mail interface library for Lotus Notes always uses default Notes mail database and mail server. Default settings are taken from Notes environment variables. When searching for incoming messages, 24x7 Scheduler always checks unread messages from the "Inbox" view.

 **Warning:**
The 24x7 Scheduler installs the Notes extension manager program. This program will intercept the Notes password prompt and supplies the password that you specified for e-mails in the 24x7 Scheduler. The extension manager will allow you to send and receive e-mail messages via Notes without you having to intervene. The extension manager program is built as a set of dynamic link libraries (DLLs). These DLLs are loaded by Lotus Notes on startup, and they behave as if they are part of the Lotus Notes software. While the 24x7 Scheduler e-mail operation is in progress, your Lotus Notes is exposed to other users and programs. This is because no password is needed when interacting with Lotus Notes software. **Before selecting Lotus Notes interface, make sure you do not have another Notes extension manager already installed on your system.** To check this, make sure you do not have EXTMGR_ADDINS key in the NOTES.INI file or that key is not initialized.

Maintenance for Holidays, Database Profiles, and Remote Agents

The 24x7 Scheduler allows you to define some information that can be shared by all scheduled jobs. This information is stored outside of the job definition database.

The following information is shared:

- Holiday list,
- Database Profile definitions,

- Remote Agent definitions.

The holiday table is stored in the HOLIDAY.TXT file. This file is loaded up by 24x7 Scheduler on startup. Definitions of database profiles and remote agents are stored in the Windows system registry. It is highly recommended that you do not modify the registry directly, but instead maintain this information using 24x7 Scheduler utilities that can be found under **Tools** menu. You should update this information on an as-needed basis. For example, when the database password expires, you should update all database profiles using this password, otherwise all jobs utilizing outdated information will fail.

Chapter 2: Installation and Uninstallation

System Requirements

Minimum Hardware Requirements
Intel-based machine running one of the following operating system:

- Windows NT 4.0 (server or workstation)
- Windows 2000 (server or workstation)
- Windows 95
- Windows 98

1 At least 16 MB RAM
2 6.5 MB disk space
3 VGA monitor

Recommended Configuration
Pentium class CPU 150 MHz or better
1 32 MB RAM or better
2 SVGA 256-color or better monitor

Fail-over Mode
1 Pentium class CPU 150 MHz or better
2 At least 32 MB RAM. For each Standby Scheduler add 2MB on the server machine
3 VGA monitor

Software Requirements
Due to the communication mechanisms between the Master Scheduler and remote Standby Schedulers as well as the Remote Agents, several standard Windows operating system services/protocols must be installed and running:
1 Remote Procedure Call (RPC) Service
2 Windows NT/2000 only: Event Logging Service
3 MAPI interface (required to support the 24x7 Scheduler ability to process "e-mail watch" jobs and send e-mail notifications using MAPI email interface)
4 Depending on the selected communication protocol for Fail-over Mode and Remote Agents, one of the following will also be needed:

- Winsock
- TCP/IP

- Named Pipes

5 Required database client software (if needed for scheduled jobs)
6 ODBC (if needed for scheduled jobs)
7 FTP interface (if needed for scheduled jobs). The following Microsoft DLLs must be installed in the Windows system directory: WININET.DLL, SHLWAPI.DLL

Installation

The 24x7 Scheduler's Setup program provides three installation modes:

- Typical,
- Compact,
- Custom.

In the "Typical" mode, Setup installs all available components by default. As a result, you will not need to answer too many questions.

In the "Compact" mode, Setup installs 24x7 Scheduler only and does not install database drivers, example jobs and other auxiliary files.

In the "Custom" mode, Setups offers a choice of components to be installed. You will need to check/uncheck components to be installed.

If you are not going to use the database features incorporated in 24x7 Scheduler, you will not need to install all of the database support. You will be able to go ahead with the "Compact" installation.

If you will be using ODBC interface, configure the data sources you will need using the ODBC Administrator.

Windows NT specifics

Before installing the program, make sure that you are logged-on using an account that is a member of the local Administrators group.

Optionally, the 24x7 Scheduler can be setup to run as a Windows NT system service.

As always, there are both advantages and disadvantages associated with running the 24x7 Scheduler as a service rather than as a standalone application. The advantages include the following:

- The 24x7 schedule service can be configured to start automatically whenever the computer is started and it can run continuously in the background, regardless of whether a user is logged on or not.
- Programs run by the 24x7 service inherit the security attributes of the 24x7 service. This gives them the same security permissions as the operating system.
- Due to Windows NT security restrictions, the 24x7 Scheduler, while running as a service, is not able to interact with the Desktop. So you can't do much with it other than stop and start the service. Since 24x7 Scheduler is normally setup to start automatically whenever the computer is restarted, you will not normally have any dealings with it. Instead, you should use the standalone version of the 24x7 Scheduler to manage scheduled jobs.
- You will not be able to see any error or warning messages on the screen. However, if you enable the "Logging to the system event log" option, you will be able to use the Windows NT Event Viewer to see these messages in the Windows NT system event log.

You can reconfigure the 24x7 schedule service to a certain extent using the Control Panel services applet. Before you make any changes, make sure you understand the Windows NT service concepts. You should refer to the following Microsoft knowledge base articles for more information:

Q124184 - Service Running as System Account Fails Accessing Network.
Q132679 - Local System Account and Null Sessions in Windows NT.
Q152451 - Applications Run from the Schedule Service Fail to Print.

To enable or disable the Windows NT service, carry out the following:

1 Select the **Tools/Options** menu. The **Options** dialog will appear.
2 Select **Service** tab page.
3 Check "Run as a Windows NT service" .
4 Specify the desired settings for the 24x7 Scheduler Windows NT service.
5 Click the **OK** button.
6 Restart your computer.

 You must restart your computer before new service related settings will take effect.

Windows 95/98 specifics

Optionally the 24x7 Scheduler can be setup to run as a Windows 95/98 service application. This option allows 24x7 Scheduler to start automatically whenever the computer is started and it can run continuously in the background, regardless of whether a user is logged-on or not.

To enable or disable the Windows 95/98 service application:
1 Select the **Tools/Options** menu. The **Options** dialog window will appear.
2 Select **Service** tab page.
3 Check "Run as a Windows 95/98 service" .
4 Specify the desired settings for the 24x7 **schedule service**.
5 Click the **OK** button.
6 Restart your computer.

Installing Remote Agents

There is no difference between installing a regular 24x7 Scheduler and a 24x7 Remote Agent. However, you must manually replicate Database Profiles and Holiday List settings in order to synchronize Remote Agent settings with the Master Scheduler. See Remote Agents topic for information on configuring Remote Agents.

Automating the Installation Process

If you plan to install the 24x7 Scheduler using the same installation settings on a large number of computers, you can record the installation process on one computer and then play it back on to the others. This allows you to run the Setup program on the other computers automatically, without user input ("silent" installation).
A silent installation does not prompt the user for input. A silent installation receives its user input from the InstallShield Silent Response File (.ISS file).

To automate the installation process:

1 Start the setup program using the -r command-line option (e.g. SETUP -r).
2 Go through the installation process, selecting the options that you want to use for the automated installation.

3 After the installation process is complete, you will have a file called SETUP.ISS in your Windows (or WinNT) directory. Copy this file to the directory on your network with the rest of the setup files.
4 To run the automated setup on another computer, run the setup program with the command-line option -s (e.g. SETUP -s).
5 The setup program will now run silently and without user interaction.

If you are installing the 24x7 Scheduler on several servers, you may want to put the same configuration information on all of them.

To copy configuration information:

1 Install the 24x7 Scheduler on the first computer, recording the installation as described above.
2 Configure the 24x7 Scheduler using the **Tools/Options** menu.
3 Using the Registry Editor (REGEDT32.EXE), export the HKEY_LOCAL_MACHINE\SOFTWARE\SoftTree Technologies, Inc.\24x7\ registry key to a file with the extension .REG.
4 Copy this .REG file to the directory that contains the 24x7 Scheduler setup files.
5 Use the Registry Editor on the destination computer to import registry keys from the .REG file.
6 Restart the 24x7 Scheduler on the destination computer.

Uninstallation

The 24x7 Scheduler supports a standard uninstallation mechanism for removing program files from the computer.
To uninstall the 24x7 Scheduler:
1 Click the Windows **Start** button.
2 From the Start Menu select **Settings**, then **Control Panel**.
3 Double-click **Add/Remove Programs**.
4 Select the **24x7 Scheduler** item in the programs list, click the **Add/Remove** button
5 Delete all files remaining in the 24x7 Scheduler home directory. Delete the home directory.

Chapter 3: Database Interfaces

The 24x7 Scheduler uses database profiles when connecting to various databases. You must define at least one database profile for each database you want the 24x7 Scheduler to connect to. A profile is set of database connection parameters that the 24x7 Scheduler uses when connecting to your database.

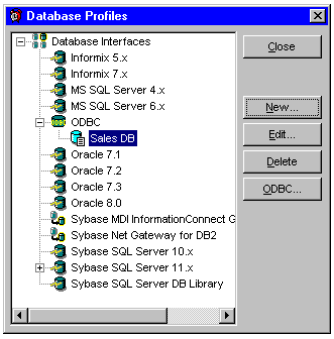
Database Profiles Dialog Box

Description

The database profiles dialog box lists the installed database interfaces and configured database profiles defined for each interface. It will enable you to create, edit, test, and delete database profiles. In addition, you will be able to access the Configure ODBC dialog box and create, edit, or delete an ODBC data source definition.

You will find it easy to display or hide the list of configured profiles for a particular interface.

- To display or hide the list of installed database interfaces, double-click **Database Interfaces**.
- To display the list of database profiles defined for a particular interface, click the plus sign (+) preceding the interface name or double-click on the interface name itself.
- To hide the list of database profiles for a particular interface, click the minus sign (-) preceding the interface name or double-click on the interface name itself.



New

This will display the Database Profile Setup dialog box for the selected interface and create a new database profile. Select an interface name and click **New** to display the Database Profile Setup dialog box for that interface.

Edit

This will display the Database Profile Setup dialog box for the selected profile. You will be able to use this dialog to edit the profile. Select a database profile name and click **Edit**. This will display the Database Profile Setup dialog box for that profile.

Delete
This will delete the selected database profile from the Database Interfaces list. Select a database profile name and click **Delete.** This will remove it from the interface list.

ODBC
This function launches the ODBC Driver Manager and displays the Configure ODBC dialog box, which will enable you to create, edit, or delete an ODBC data source definition. For details see ODBC Driver Manager help topics.

Database Profiles

Database Profile Setup
In the Database Profile Setup dialog you can edit database connection options for the chosen database profile.

The database profile setup includes the following connection options. You must supply these in order to access your database:

- **Profile Name** - The name of your database profile.
- **Database** - The database name. You can leave this property blank if your database does not have a name.
- **Server** - The server name or server connect descriptor specifying parameters that your database driver uses to connect to the database server. For ODBC data sources, specify the data source name.
- **Login ID** - A valid login ID for your database server.
- **Password** - The login password of your database server. The password you type in will be displayed as asterisks (*).
- **Isolation Level** - For those DBMS and database interfaces that support the use of lock values and isolation levels. The Lock preference sets and activates the isolation level when connecting to the database. In multi-user databases, transactions initiated by different users can overlap. If these transactions access common data in the database, they can overwrite each other, or collide. To prevent concurrent transactions from interfering with

each other and compromising the integrity of your database, certain DBMS allow you to set the isolation level when you connect to the database. Isolation levels are defined by your DBMS, and specify the degree to which operations in one transaction are visible to operations in a concurrent transaction. Isolation levels determine the way in which your DBMS isolates or locks data from other processes while it is being accessed. You can leave this property blank if your database does not require it.

- **AutoCommit** - For those DBMS and database interfaces that support it, AutoCommit controls whether 24x7 Scheduler issues SQL statements outside or inside the scope of a transaction. When AutoCommit is unchecked, 24x7 Scheduler issues SQL statements inside the scope of a transaction. When AutoCommit is checked, 24x7 Scheduler issues SQL statements outside the scope of a transaction.
- **Asynchronous Operations** - When checked, this will allow you to perform asynchronous operations on your database. Unlike synchronous calls (which force the database client software to wait until processing is completed), asynchronous calls free the client (and 24x7 Scheduler in turn) to do other work while the server handles requests. Not all databases support asynchronous operations.
- **Number of Seconds to Wait** - When you turn on Asynchronous Operations you can specify the number of seconds you want 24x7 Scheduler to wait for a response from the DBMS. If this parameter is set to zero, the 24x7 Scheduler waits indefinitely for a DBMS response. In other words, the request never runs out of time. If the Number of Seconds to Wait value expires before the response from the DBMS, your request is automatically canceled. If your database supports asynchronous processing, you can use this parameter to prevent run-away queries.

Testing the connection to your database

Use the **Connect** button to test your profile settings. The Connect button connects, then immediately disconnects, the 24x7 Scheduler from the database. A connection status message is displayed after this operation.

 **Important Notes:**

- You must have database client software installed on your computer before you can establish a database connection.

- In some databases, such as SQL Server, you must turn on the AutoCommit in order to run stored procedures executing SQL DDL statements. DDL statements include: CREATE INDEX, SELECT INTO temporary table, DROP TABLE and so on.

ODBC Interface

The 24x7 Scheduler Open Database Connectivity (ODBC) interface accesses any ODBC data source for which you have installed an ODBC-compliant driver. This interface communicates with your driver through the ODBC Driver Manager to access the data you need.

The 24x7 Scheduler supports access to a data source through any Level 1 or higher 32-bit ODBC 1.x, 2.x or 3.0 driver obtained from SoftTree Technologies or from another vendor. In most cases, other drivers will work with the 24x7 Scheduler. However, SoftTree Technologies has not tested all drivers on the market and is unable to verify whether they will work with the 24x7 Scheduler.

You can start the ODBC Driver Manager from the Control Panel or, alternatively, you can click the **ODBC** button on the **Database Interfaces** dialog box

Chapter 4: Scheduling Jobs

Job Wizard

The Job Wizard is the tool you use to simplify the process of scheduling a new job or updating properties of an existing job. The Job Wizard consists of a series of dialog windows. The Job Wizard asks you questions and then, using your answers, updates the job properties. The 24x7 Scheduler uses different job properties for the different job types. The Job Wizard shows only properties appropriate to the job type you have selected.

You can change job properties, including job type, at any time. Use the **Next** and **Back** buttons displayed at the bottom of the Job Wizard window to move between the property pages. You can apply changes and close the Job Wizard at any time by clicking the **Finish** button. To cancel changes, click the **Cancel** button. Alternatively, you can use the following keyboard shortcuts:

- **Next** - ALT+N or CTRL+TAB
- **Back** - ALT+B or SHIFT+CTRL+TAB
- **Finish** - ALT+F
- **Cancel** - Escape or ALT+C

Tips:

- You can enter and modify SQL commands and 24x7 scripts directly in the edit box of the Job Wizard window. To edit scripts using a full-featured Editor with syntax highlighting, click the **Edit** button, next to the edit box.
- To copy and paste text while in the one of editable property fields, right-click on the field, then select the desired command from the pop-up menu.

Job Properties

General Properties

Job ID
The Job ID provides a unique descriptor for each job definition in the job database. The 24x7 Scheduler automatically generates a new job ID for each new job added to the database. The 24x7 Scheduler uses that ID to refer to the job in the job event log records.

Job Name
The Job Name provides a descriptive title for the job. For example, “Production Server Backup.” A unique name is not required for each job, however we highly recommend that you use unique job names. For complete job description and additional comments, you can use the **Description** property.

Description
The program provides a facility for you to enter in a job description, comments, and instructions. For your convenience, Job Explorer shows a few lines of the job description when you rest the mouse pointer over the job. Double-click the job in Job Explorer to start the Job Wizard. This will enable you to view and modify the full text if necessary.

Status
This term refers to job status. The status can be one of the following:
- **Active** - the job is enabled and waiting for the specified job start conditions to be met
- **Running** - the job is currently running
- **Disabled** - the job is disabled

Job Execution Properties

Job Type
This specifies job type. The type can be one of the following:
- **Program** – used to execute a program or a document file

- **Database command** – used execute SQL script
- **24x7 script** – used to execute JAL script

Program Name
The program name indicates the full or partial path and filename of the module to be run. The module may be a .COM, .BAT, .EXE, or associated file type. If a partial name is specified, the current drive and current directory are used by default. The module name must be the first white space-delimited token in the Program name field. The specified module can be a Win32-based application, or it can be some other type of module (for example, MS-DOS or OS/2) if the appropriate subsystem is available on the local computer. If the path or filename includes spaces you must use double quotes as module name delimiters. For example: "C:\Program Files\Daily Jobs\DataLoad.bat."

If the filename does not contain an extension, .EXE is assumed. If the filename ends in a "."with no extension, or the filename contains a path, .EXE is not appended. If the filename does not contain a directory path, Windows searches for the executable file in the following sequence:
1 The directory from which the 24x7 Scheduler loaded.
2 The current directory.
3 The 32-bit Windows system directory. The name of this directory is SYSTEM32.
4 The 16-bit Windows system directory. The name of this directory is SYSTEM.
5 The Windows directory. The name of this directory is WINDOWS or WINNT.
6 The directories listed in the PATH environment variable.

You should always include the full path. Do not rely on the PATH environment variable. The PATH value may be different at the time of the program run, depending on which account the program is being run under. Remember that other programs can modify the PATH environment variable as well.

The program name can be followed by **command line parameters**.

You can use **macro-parameters** inside the **program name** and command line parameters string to pass dynamic information (such as the current month) on to the scheduled program.

Start In
The working directory is the directory in which the program executable finds the associated files it needs to run the program. Most programs do not require an entry in this field. Occasionally however, a program will not run properly unless it is specifically told where to find other program files. The 24x7 Scheduler will change to this directory when running the program or document.

You can use macro-parameters inside the **Start in** string to use dynamic information (such as the current month) as the start directory for the scheduled program.

Window Type
This property tells the 24x7 Scheduler how the program (or document) needs to be started - maximized, minimized, normal, or hidden.

If a **hidden** window type is chosen, the program, once started, will be invisible and as a result, will not be able to interact with the Desktop. One of the reasons why you may want this facility is to prevent other users from seeing or interacting with the program. However, this can lead to problems of its own. Since the program is running invisibly, you will not be able to interact with it if you do need to intervene. You should therefore, only use this option for programs that are designed to run without user interaction and themselves automatically.

Host (Remote Agent)
This specifies the name of the remote agent running on the host computer that will run the job.

Backup Host (Backup Remote Agent)
The name of the remote agent running on the host computer that will run the job in the event of the main host being unavailable. You can specify multiple hosts for this property using a comma separated list. The 24x7 Scheduler always attempts to submit the job to the main host first and if the host is not available, it attempts to submit the job to the first available Backup Host. Backup Hosts are tried in the order they appear in this property.

Restart Windows
This property tells the 24x7 Scheduler logs off all active network connections, shuts down and restarts the system after the job is complte. During a shutdown or log-off operation, applications (if any are still running) that are going to be shut down, are allowed a specific amount of time to respond to the shutdown request. If the time expires, Windows normally displays a dialog box that allows the user to forcibly shut down the application, retry the shutdown, or cancel the shutdown request. The 24x7 Scheduler always forces applications to close and does not display the dialog box.

Asynchronous Process
For program and document file jobs:

24x7 Scheduler starts the specified program by taking advantage of Windows multi-tasking features. Otherwise, when a synchronous process is requested, 24x7 Scheduler starts the

specified program (i.e. process) and enters an efficient wait state until this process finishes or until the time-out interval elapses. In the later case, 24x7 Scheduler forcedly terminates the process. See also **Timeout** property.

New process inherits the Environment block from 24x7.

In order to run a document, its extension must be registered. For example: if you want to start MDB files that have the *AutoExec* macro, you must have the .MDB file extension registered as a MS Access database application.

For JAL scripts and SQL database jobs:

The 24x7 Scheduler runs the job in the background using a separate thread, taking advantage of Windows multi-tasking features. Otherwise when a synchronous process requested, 24x7 Scheduler will execute the job using its main thread. This ensures that other jobs will not start until the current job processing is finished.

Timeout

Timeout defines the time interval, in minutes that the job is allowed to run before being terminated. Once time-out occurs, 24x7 Scheduler will terminate the process. If zero is specified, the interval never occurs, therefore the process can run on to infinity. This means that 24x7 Scheduler will continue with other job processing only after this job finishes. This property makes sense for synchronous processes (program executions) only.

Send Keystroke

24x7 Scheduler allows you to define and send keystrokes to the program run by the job. You are able to simulate those keystrokes that you might need to further automate this program. The **Send Keystroke** option determines whether to send the keystroke to the program or the document.

Keystroke

These are the actual keystrokes that are sent to the program or document.

Init. Timeout

This term refers to the time that the 24x7 Scheduler will wait before sending a keystroke to the program or document it has started.

Delay
This is the maximum allowed delay for a late job. If the actual delay is greater than this parameter, then 24x7 Scheduler will skip a late run.

Caution: When scheduling daily tasks, make sure that the start time + maximum delay falls on the same day as the start time. Otherwise, a late job may be skipped because of the day shift.

Skip Job if Delay is Over <n> minutes
This instructs the 24x7 Scheduler to skip the late job where the delay is longer than the specified **Delay** interval. You use the **Delay** property to specify the maximum allowed delay (see above).

Script
This term refers to the JAL script text that the 24x7 Scheduler executes. This parameter applies to the “24x7 Script" job type.

Profile
The term “Profile” refers to the database profile name that describes the connection parameters for the database job. The specified profile must exist at the time that the job is being run. This parameter applies to the “Database command" job type.

SQL
This refers to the SQL script text that the 24x7 Scheduler executes. This parameter applies to the “Database command" job type.

Logging Enabled
“Logging Enabled “ instructs the 24x7 Scheduler whether it should log job execution statuses.

Ignore Errors
This term instructs the 24x7 Scheduler to continue running a job regardless of job run-time errors.
Examples:
A JAL script will continue to run even if the "division by zero" error occurred.

A job notification action will be attempted even if the database job itself failed while executing SQL script.
A semaphore file assigned to the job will be deleted (using the "delete after run" rule) even if the launched program terminated abnormally.

Retry After Error
This term instructs the 24x7 Scheduler to retry the job if it fails. The job will be restarted after the specified **Retry Interval** You should use the **Number of Retries** property to specify how many times you want the 24x7 Scheduler to retry a failing job before it marks that job as unsuccessful.

Retry Interval
This parameter is the number of seconds that the 24x7 Scheduler will wait before restarting the failed job. This parameter makes sense only if the job has the **Retry After Error** property enabled.

Caution: For jobs with time-based schedules, the total retry interval should not exceed the time interval between regular job runs. For jobs having file, process, or e-mail watch schedules, the total retry interval should not exceed the **polling interval**. To calculate the total retry interval, multiply the **Number of Retries** by the sum of the **Retry Interval** and the estimated job run time.

Number of Retries
This refers to the maximum number of attempts the 24x7 Scheduler makes to run the job. The job is considered as failed only after all attempts fail. This parameter makes sense only if the job has the **Retry After Error** property enabled.

Job Schedule and Triggers

A job schedule can be based on a condition that must be met before the job is executed. The 24x7 Scheduler supports six pedefined types of conditions:

- **Time watch** – a time condition tests for a specified time.
- **File watch** – a file condition tests for the presence of a specified file or group of files.
- **Process watch** – a process condition tests for the presence or absence of other programs running at the same time.

- **E-mail watch** – an e-mail condition tests for the presence of a specified e-mail message.
- **User watch** – a user condition tests for a user activity (you can control the user activity threshold via the settings on the currently selected Screen Saver.
- **System watch** – a system condition tests for a user log off or system shutdown

User-defined conditions: You can also check your own conditions using Job Automation Language commands in jobs of 24x7 Script type.

The following parameters are used to specify job conditions:

Repeat Every
This is the interval at which 24x7 Scheduler will rerun the job.

Start Date
This is the first date you want the job to run. This parameter is used in combination with the **Start Time**. The 24x7 Scheduler will not allow an invalid date such as 1/32/95. The required format is **mm/dd/yy**. The 24x7 Scheduler uses the following rule to convert a 2-digit year to internal date format: If the number is equal to or less than 50 then it falls into the 21st Century, otherwise it belongs to the 20th Century. You can also use the up and down arrows to increase/decrease the days, months, and years.

Start Time
This is the first time whe you want the job to run. This parameter is used in combination with the **Start Date**. The required format is **hh:mm**. You must use the 24-hour time format. You can also use the up and down arrows to increase/decrease the hours and minutes.

End Date
This is the last date after which you do not want the job to run. This parameter is used in combination with the **End Time** parameter. The 24x7 Scheduler will not allow an invalid date such as 1/32/95. The required format is **mm/dd/yy**. The 24x7 Scheduler uses the following rule to convert a 2-digit year to internal date format: If the number is equal to or less then 50 then it falls into the 21st Century, otherwise it belongs to the 20th Century. You can also use the up and down arrows to increment/decrement the days, month, and years.

End Time
This is last time after which you do not want the job to run. This parameter is used in combination with the **End Date**. The required format is **hh:mm**. You must use the 24-hour time format. You can also use the up and down arrows to increase/decrease the hours and minutes.

Daily and Weekly Schedule
These are the days of the week when the job is scheduled to run. Select the desired days of week by placing checkmarks in the appropriate boxes.

Monthly Schedule
This is the day of the month when the job is scheduled to run. Choose the desired day of month by day number (for example, the 2nd day of every month) or by day name (for example, 1st Monday of every month) or by day type (for example, last weekday of every month).

Skip Job On Holiday
This parameter instructs the 24x7 Scheduler to skip the job on the scheduled day if that day is a holiday.

Slide Job On Holiday
This parameter instructs the 24x7 Scheduler to skip the job on the scheduled day if that day is a holiday and then run the job on the next non-holiday.

Semaphore File
This is the name of the semaphore file that the job will “watch" i.e. file condition. A file condition tests for the presence of the specified file or group of files. The job starts after the 24x7 Scheduler finds the file. You may specify more that one file. Use comma to separate multiple semaphore files. For example, you could specify the following file names securities.dat, holdings.dat, accounts.dat. You may also use standard wildcard characters in file names. For example: c:\data*.rbc, c:\data\an??b.rb?.

Semaphore Process
This is the name of the main process module that the job will “watch" i.e. process condition. A process condition tests for the presence or absence of another running program or process. The job starts after the 24x7 Scheduler finds the process (if the criteria is set to check for

presence of the process) or after it does not find the process (if the criteria is set to check for absence of the process). For example, if you want to take some actions when your Oracle database is not running, you would enter oracle80.exe as the process name. Sometimes this kind of job is called “server watch" .

Polling Interval
Use this property to specify how often you want the 24x7 Scheduler to check for the specified file, process, or e-mail message. You can specify this parameter in minutes See **Semaphore Files** and **Semaphore Process** parameters described above.
Caution: The 24x7 Scheduler can check for a file or group of files every second. However, frequent checking may cause high CPU utilization and heavy network traffic when verifying network files.

Delete Semaphore File Rule
This property allows you to specify post-execution or pre-execution action for a “file watch" job. Three actions are supported:

- Delete the semaphore file (or group of files) before the job is run.
- Delete the semaphore file (or group of files) after the job has been run.
- Do not delete the semaphore file (or group of files). The 24x7 assumes that the job itself takes care of the semaphore files. If the job leaves those files alone, the 24x7 Scheduler starts the same job the next time it checks for the files again. The file check frequency is specified by the **Polling Interval** parameter (see above).

This parameter makes sense only for the “file watch" jobs.

Account
This is the e-mail account name that the 24x7 Scheduler will use to check an e-mail message. This parameter is only valid for the “e-mail watch” jobs. The value for the e-mail account may be different for different e-mail interfaces. For the MAPI interface you should use the name of the MAPI profile that you use when logging-into the e-mail system. For Lotus Notes you should use the name of the user (or ID) that you use when logging-in to the Lotus Notes. For SMTP intreface you should you your email address.

Password
This is the e-mail password that the 24x7 Scheduler will use to check an e-mail message. This parameter is only valid for “e-mail watch" jobs.

Message Text
This is the e-mail message text that the 24x7 Scheduler uses for comparison when checking an e-mail message. It is only valid for for “e-mail watch" jobs only.

Subject
This is the e-mail message subject that the 24x7 Scheduler uses for comparison when checking an e-mail message. It is only valid for for “e-mail watch" jobs only.

Save Attachments
This instructs the 24x7 Scheduler to save attachments found in the e-mail message that triggered the job. This parameter is only valid for “e-mail watch" jobs.

Notification Events and Actions

Job Notification Options

A job may issue a notification at a given event such as job completion or job execution error. This option may be used to:

- Notify system administrators and operators of events. This is especially convenient for controlling critical processes and may be used to page operations personnel in the event of a job failure. This enables operations personnel to respond rapidly to and correct any production issues.
- Create conditional e-mail reminders.
- Create semaphore files used for job interdependencies so that depended jobs can start as soon as they detect this semaphore file(s). This allows linking multiple jobs in one logical batch process as well as invoking jobs on demand such as “fix it" jobs. The 24x7 Scheduler allows very flexible job interdependencies. It even allows you to link jobs on multiple local and remote computers provided the 24x7 schedule service is running at that particular computer.

Notification Events

The following notification events are supported:

- **Start** – occurs immediately after a job has started successfully.

- **Finish** – occurs immediately after a job has finished successfully.
- **Not found** – occurs when the specified program file or document has not been found resulting in a job not starting.
- **Error** – occurs when a job fails.

You can specify more than one event to be processed. However, you cannot specify different notification actions for different events of the same job. Alternatively, you can, with JAL script, create customized error handlers that will give you greater control and allow different notification processing for different events.

Notification Actions

The following actions can be performed on the notification events:

- **Send e-mail –** Sends an e-mail message to the specified e-mail address. The message subject is fixed - “Message from 24x7 Scheduler". The message text depends on the triggered notification event and may be one of the following:
  1 “Job <name> started.”
  2 “Job <name> finished.”
  3 “Job <name> execution error: <error description>.”
  4 “Job <name> execution error: Program not found.”

  The <name> parameter is substituted with the actual job name that the job was given. The <error description> parameter is substituted with the actual error text. Should an error occur and logging is switched on, the error is automatically written into the log file. For more information on error types and the error log, see Logging Job Execution topic.

  For this action type you must specify:
  1 E-mail profile (account) to use for sending the notification message. For example: *Exchange Settings*
    The actual value may be different for different e-mail interfaces. For MAPI interface you should use name of the MAPI profile that you use when logging-on to the e-mail system. For Lotus Notes you should use the name of the user (or ID) used when logging-on to Lotus Notes. For SMTP interface you should use your e-mail address.
  2 E-mail password.
  3 E-mail recipient. Use comma (,) to separate names of recipients.

- **Execute SQL command(s)** – Executes one or more specified SQL commands using the specified database profile.

For this action type you must specify:
1 Name of database profile to be used when executing the notification message.
2 SQL script to send to the back-end database.

- **Create semaphore file(s) –** Creates one or more specified semaphore files on the specified local or network drives. The file contents depend on the triggered notification event and can be one of the following:
  1 “Job <name> started.”
  2 “Job <name> finished.”
  3 “Job <name> execution error: <error description>.”
  4 “Job <name> execution error: Program not found.”

  The <name> parameter is substituted with the actual job name that the job was given. The <error description> parameter is substituted with the actual error text. If an error occurs and logging-on is enabled, the error is automatically written in the log file. For more information on error types and error log, see Logging Job Execution topic.

  For this action type you must specify:
  1 Full name of the file to be created, including path to the file. Use comma (,) to separate multiple files.

Macro-parameters

Macro-parameters provide a way to replace specific values at run time. Macro-parameters can be used in the following areas:
- Semaphore file names
- Program names and directories
- SQL commands
- SQL notification messages (messages sent by executing one or more database commands)
- Job automation scripts

The @ sign is used as an escape character for macro-parameters. If you need a literal @ sign (for example, in a program name specification) you must double it, for example, “@@somename”.

Parameter Substitution
The 24x7 Scheduler always applies macro-parameters before checking the job conditions and running the job.
Some macro-parameters consist of two parts: the parameter identifier and the format mask. You must use double quotes around masks in order for the parameter to be interpreted correctly. The following tables list the supported parameters and masks.

Identifier	Meaning
@W	An integer (1-7) representing the current day of the week. Sunday is day 1, Monday is day 2, and so on.
@T" <mask>"	Current date and time. The actual representation depends on the mask.
@Q	An integer (1-4) representing the current quarter of the year.
@D<number>"<mask>"	The date of a specified day number of the current week. The actual representation depends on the mask. The number can be anything from 1 to 7, where Sunday is day 1, Monday is day 2, and so on.
@DP" <mask>"	The date for the previous calendar day. The actual representation depends on the mask.
@DN" <mask>"	The date for the next calendar day. The actual representation depends on the mask.
@DL" <mask>"	The date for the last business day. The actual representation depends on the mask.
@DB" <mask>"	The date for the next business day. The actual representation depends on the mask.
@ML" <mask>"	The date for the last calendar day of the month. The actual representation depends on the mask.
@MF" <mask>"	The date of the first calendar day of the month. The actual representation depends on the mask.
@ME" <mask>"	The date for the last (ending) business day of the month. The actual representation depends on the mask.

@MS" <mask>"	The date for the first (starting) business day of the month. The actual representation depends on the mask.

Format Masks

Character	Meaning	Example
d	Day number with no leading zero.	9
dd	Day number with leading zero, if appropriate.	09
ddd	Day name abbreviation.	Mon
dddd	Day name.	Monday
m	Month number with no leading zero.	6
mm	Month number with leading zero, if appropriate.	06
mmm	Month name abbreviation.	Jun
mmmm	Month name.	June
yy	Two-digit year.	97
yyyy	Four-digit year.	1997

Colons, slashes, and spaces appear as they are specified in the mask.

Two-digit years

If you specify a two-digit year in a mask, where the year is greater than or equal to 50, the 24x7 Scheduler will assume that the date is in the 20th Century, If the year is less than 50, the 24x7 Scheduler will assume it is the 21st Century. For example:

1/1/85 is interpreted as January 1, 1985. 1/1/40 is interpreted as January 1, 2040.

Examples:

The following table shows how the date Friday, Jan. 30, 1998, displays when different format masks are applied:

Format	Displays
mmddyy	013098
mmyyyyy	011998
d-mmm-yy	30-Jan-98
dd-mmmm	30-January
mmm-yy	Jan-98
dddd, mmm d, yyyy	Friday, Jan 30, 1998
dddd	Friday

Adding New Job

To schedule a new task

1 In the Job Explorer, select the folder in which you want to create a new job.
2 Select **File** menu, then select **New**, and then choose **Job** (shortcut CTRL N). Alternatively you can click the toolbar button 

3 Follow the instructions in the Job Wizard.
4 You must save changes in the job database in order to apply them to the active job pool.

 **Notes**

- Make sure that the system date and time for your computer are accurate. The 24x7 Job Scheduler relies on this information to know when to run scheduled tasks. To check or change the date and time, double-click the time on the status bar.

Deleting Job

To delete a scheduled job

1 In the Job Explorer, select the job want to delete.
2 Select **File** menu then select **Delete** command. Alternatively you can click the toolbar button 

3 You must save changes in the job database in order to apply them to the active job pool.

Tips:

- You can also right-click on the job in the Job Explorer then select **Delete** command from the context menu.
- Deleting a scheduled job removes the job definition from the job database. The program file is not removed from the hard drive.
- If you deleted a job by mistake, you can quit 24x7 Scheduler without saving changes. Then restart 24x7 Scheduler and it will reload the job database from the disk file.

Disabling/Enabling Job

A job state is either disabled or enabled. You can toggle the job state by setting the on/off state of the **Disabled** property.

To temporarily disable a scheduled job

1 In the Job Explorer, select the job you want to delete.
2 Select **File** menu, then select **Disabled** command. The 24x7 Scheduler will disable the job. A checkmark will appear next to the **Disabled** menu item. Alternatively, you can click the toolbar button 

3 You must save changes to the job database in order to apply them to the active job pool.

To enable a previously disabled job

Repeat the steps described above.

Tips:

- You can also right-click on the job in Job Explorer, then select the **Disabled** command from the context menu.
- Disabling a scheduled job does not remove the job definition from the job database, it does remove this job from the active job pool.

Modifying Job Definition and Schedule

To rename a job

1 Right-click on a job in the Job Explorer.
2 Select **Rename** command
3 Type new job title; press **Enter** key.

To disable/enable a job

See Disabling/Enabling Job topic above for detailed instructions.

To change all other job properties

You can use the Job Wizard to modify most job properties. To run **the Job Wizard** double-click the job in the Job Explorer or highlight the job then press the F4 key.

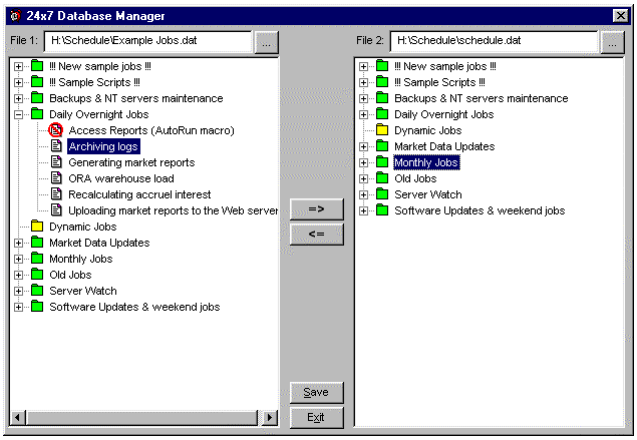
Moving Job to Another Folder

Use drag-and-drop to perform this operation. See Drag and Drop Interface topic for details.

Copying Job to/from Another Database

You can use the Database Manager tool to copy jobs between two different job databases. Select the File/Database Manager menu item to start Database Manager.

1. Type in the **File 1** field the name of the first job database that you want to display in the left-hand part of the screen. Alternatively, you can press the ... button to activate the **File Open** dialog box.
2. Type in the **File 2** field the name of the second job database that you want to display in the right-hand part of the screen. Alternatively, you can press the ... button to activate the **File Open** dialog box.
3. Click on the source job that you want to copy then click on the destination folder in another database where you want to place the copied job. Select the desired source folder to copy all jobs from this folder.
4. Press the appropriate **Arrow Right/Left** button to perform the copy operation. You can also use drag-and-drop to achieve the same result.
5. When you have finished copying jobs, press the **Save** button to save changes. Click the **Exit** button to close Database Manager.



Notes:

- If one of the modified databases was the same as the current database, you must reopen it by using **File/Open** command from the 24x7 Job Explorer menu.
- When copying a job, Database Manager copies all job properties with the exception of the job ID. A copied job is allocated the next job ID available in the destination database. That is why it is a good idea to use job names instead of job IDs when referring to a job from other jobs.

Protecting/Unprotecting Job

24x7 Scheduler provides several ways of restricting access to a job. You can do any of the following:

- assign a password to modify the job. This will prevent unauthorized users from modifying, deleting or disabling the job, but allows them to view job properties and scripts as well as execute the job.
- assign a password to view and modify the job. This allows others to execute the job but not to modify, delete or disable/enable the job.
- assign a password to execute, view, and modify the job. This does not allow others to execute, modify, delete or disable/enable the job.

 **Caution:** If you assign password protection to a job and then forget the password, you can not remove protection or recover data from it. It is a good idea to keep a list of your passwords and their corresponding job names in a safe place.

To protect/unprotect a job:

1 Select the desired job in **Job Explorer**.
1 Select **File/Protect Job** command. The job protection dialog box will appear.
2 Type your password then click the **OK** button.

 **Notes:**

- "Execute" protection does not prevent the job from starting on schedule or from being started by another job. It simply does not allow unauthorized users to execute the job by clicking on the **Run Now** button or by clicking the **File/Run Now** menu item. You can prevent unauthorized access to the 24x7 Scheduler by using existing Windows security mechanisms and policies.
- Jobs copied using the **Database Manager** tool retain their protection features.

Testing Job Execution

You can test a job without waiting for the scheduled event to happen. One of the following options can be used to start the job immediately:

- Right-click the job you want to start, and then click **Run Now**.
- Click on job you want to start, and then select the **File**/**Run Now** command from the menu (shortcut CTRL R), alternatively you can click on the toolbar button 

 **Important Note**:
When an error occurs in the **Run Now** mode, 24x7 Scheduler will display modal message boxes that require input from the user. You should always close these messages as they can, potentially, prevent other jobs from starting in time.
Normally, the 24x7 Scheduler displays non-modal message boxes only. These non-modal message boxes will close by themselves after a few minutes. This allows 24x7 Scheduler to work unattended. You can also close these messages manually by clicking on the desired message box button.
You can use system options to set display times for a non-modal message box (click **Tools** menu, click **Options** menu, then specify the desired display time in minutes in the **Maximum error message box display time** field).

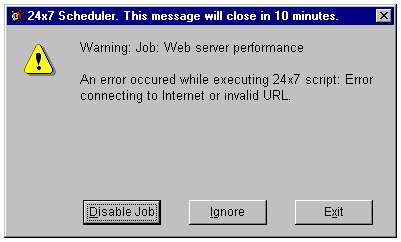
 **Tips**:

- You can stop the job using Windows Task Manager. Launch Windows Task Manager by pressing once on CTRL+ALT+DELETE (If using Window NT, after that click on **Task List** button to start the Task Manager), then select the task and click the **End Process** button.
- If a task should have run but did not, check the log to see why. Select the job in the Job Explorer, then click the **Log** tab.

Error Messages

When an error occurs in the **Run Now** mode, the 24x7 Scheduler will display modal message boxes that require input from the user. You should always close these messages as they can, potentially, prevent other jobs from starting in time.

Normally, the 24x7 Schedule displays non-modal message boxes only. These non-modal message boxes will close by themselves after a few minutes. This allows 24x7 Scheduler to work unattended. You can also close a non-modal message manually by clicking on the desired message box button. See error message box example below.



Button description:

Disable Job - disable job that caused the error and close the message box.

Ignore - Ignore error and close the message box.

Exit - Shutdown the 24x7 Scheduler.

Tip:
You can use system options to set the display time for a non-modal message box. Click **Tools** menu, click **Options** menu, then specify the desired display time in minutes in the **Maximum error message box display time** field.

Stopping Job Execution

To stop a scheduled job that is currently running

You can stop a particular job by using Window Task Manager. To launch Windows Task Manager press once CTRL+ALT+DELETE (if using Window NT, click on the **Task List** button to start the Task Manager), then select the task and click the **End Process** button.

Note:
- If a scheduled program starts another program, the stop procedure described above stops only the scheduled program, not the secondary program. You should repeat the same procedure for the secondary program.

Creating Job Shortcut

Executing a single job from the DOS command line

You can start a single job by executing the following command from the DOS system prompt:
24x7 /JOB <job id>

This command starts 24x7 Scheduler. The scheduler, in turn, starts your job, waits for the job to complete, and then terminates as soon as the job is finished.

Executing a single job from the Windows Start Menu

You can create a Windows shortcut to every a job by using the 24x7 Scheduler with the following parameters: /JOB <job id>

This shortcut can be placed anywhere in the Windows Start or Programs menu so that a job can be started by selecting the appropriate menu item. If you place a shortcut to the **Startup** folder, it will be executed every time Windows starts. You can also place a shortcut to the Windows Desktop. This means that you can start your favorite jobs simply by double-clicking on their Desktop icons.

 **Notes:**

- While running a single job specified in the command line parameters, the 24x7 Scheduler does not process other events and jobs. The specified job is always processed synchronously.
- If a program being executed in the single job mode starts another program, the second program may keep running even after both the first program and the 24x7 Scheduler terminate.
- If a script being executed in the single job mode starts a program asynchronously by using the Run statement, the started program may keep running even after both the script and the 24x7 Scheduler terminate.

Sending Keystrokes To Other Programs

You can define a series of keystrokes, which can be sent automatically as part of the job execution process. Only use the **Send Keystroke** functions to operate other applications when there is no alternative, and even then use it with caution. You should test sending a keystroke under a variety of conditions to avoid unpredictable results, data loss, or both.

The following table lists non-character keys, which can be sent:

Key	**Code**
Tab	{TAB}
Enter	{ENTER} or {CR} or {RETURN}
Esc	{ESCAPE} or {ESC}
Backspace	{BACKSPACE} or {BS} or {BKSP}
Break	{BREAK}
Caps Lock	{SCROLLLOCK} or {SCROLL LOCK}
Caps Lock	{CAPSLOCK} or {CAPS LOCK} or {CAP}
Del	{DELETE} or {DEL}
Down Arrow	{DOWN}
End	{END}
Help	{HELP}
Home	{HOME}
Ins	{INSERT}
Left Arrow	{LEFT}
Num Lock	{NUMLOCK} or {NUM LOCK}

Page Down	{PGDN} or {PAGE DOWN} or {PAGEDOWN}
Page Up	{PGUP} or {PAGE UP} or {PAGEUP}
Print Screen	{PRTSC} or {PRINT} or {PRINT SCREEN}
Right Arrow	{RIGHT}
Up Arrow	{UP}
F1...F12	{F1}...{F12}
Ctrl	{CTRL}
Shift	{SHIFT}
Alt	{ALT}
Numpad 0...Numpad 9	{NUMPAD0}...{NUMPAD9} or {NUMPAD 0}...{NUMPAD 9}
Numpad +	{NUMPAD+} or {NUMPAD +}
Numpad -	{NUMPAD-} or {NUMPAD -}
Numpad *	{NUMPAD*} or {NUMPAD *}
Numpad /	{NUMPAD/} or {NUMPAD /}
Numpad .	{NUMPAD.} or {NUMPAD .}
Numpad Enter	{NUMPADENTER} or {NUMPAD ENTER} or {NUMPAD RETURN} or {NUMPAD CR}

To send a key combination that includes SHIFT, ALT, or CTRL, use the following methods:

- When sending a special key with a single character, precede the character code with one of the special keys: {CTRL} for Ctrl, {SHIFT} for Shift and {ALT} for Alt. For example: to send the key combination **Alt M** use **{ALT}m**
- When sending a special key with a group of characters, use parentheses to group the characters and precede the group code with one of the special keys: {CTRL} for Ctrl, {SHIFT} for Shift and {ALT} for Alt. For example: to send the key combination **Alt M** then **Alt G** then **Alt X** use **{ALT}(mgx)**

If you want to send braces and parentheses **{, }, (,)** as a literal text, enclose the character in braces. For example, to send a open parenthesis use **{(}**.

Note:

- When sending key combinations that include the ALT key, make sure to send them in lowercase characters. For example, to open the File menu **ALT F**, use **{ALT}f**. Using **{ALT}F** is the equivalent of pressing **ALT+SHIFT+F**.

Example:

123 A. {SHIFT}(:"):"{ENTER}{ALT}{F4}N
The keystroke above is equivalent to pressing keys 1, 2, 3, space, A, period, :, ", ;, ', Enter, Alt+F4, N

Troubleshooting Job Execution

If the job you schedule does not run when you expect it to, double-click the job in the Job Explorer to open the Job Wizard.

1 If the job depends on one or more semaphore files, verify that the specified files exist.
2 Make sure the job is **Enabled**.
3 Make sure the schedule is set correctly.
4 If a scheduled program does not run correctly, you may need to supply command arguments for it. To find out more about a program and its arguments, try one of the following: if the program has online help, look up that help. Try typing the following at a command prompt, where *program* is the name of the program: *program* /?
5 If a scheduled database command does not run, check the setting for the database profile. Make sure the database is available. Try connecting to the database from other programs.
6 If you are using Windows NT you can gather job execution statistics (see “Collecting job execution statistics” for more details). Check them to make sure the job has enough system resources to run successfully.

Job Execution Statistics

When running other programs, 24x7 Scheduler is capable of capturing those programs' execution statistics. These can be used to measure program performance as well as the amount of various system resources required to run these programs. **These statistics are available on the Windows NT platform only**. You can use these statistics to help you better understand the behavior of scheduled programs, such as processors and memory usage, run-time duration and delays. All this information is added to the STAT.LOG file after each program run. A sample entry from this file is illustrated below. Note that some memory load statistics may not be completely accurate as the system memory is shared among all the processes and Windows NT, as a multi-tasking system, is capable of running multiple parallel tasks simultaneously. However, analysis based on a long historical period can provide you with a good understanding of how the system is being used and the kinds of requirements needed for the scheduled programs. The collected information may also help you when troubleshooting those jobs that are causing problems or anomalies.

Sample entry from the statistics file

Job No: 25 Job Name: Loan Interest Change
Process ID: 189
Creation Time: 28-Oct-1998 5:00:03:0002 Exit Time: 28-Oct-1998 5:00:33:0004
Duration: 30 seconds
Kernel Time: 0:00:00:0000 User Time: 0:00:00:0000
Exit Code: 65535

Free Resource:	Before: 57.784%	After: 57.384%
Memory Load:	Before: 0%	After: 0%
Available Physical Memory:	Before: 44875776	After: 43266048
Available Virtual Memory:	Before: 1981403136	After: 1981394944
Available Page File Size:	Before: 102236160	After: 101527552

Disabling Timer

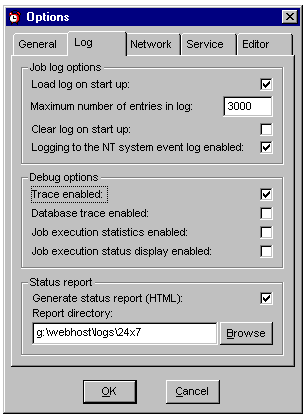
If you should have difficulties starting the 24x7 Scheduler or modifying job schedules, you can start it with the /NOTIMER option. To do this, run the 24x7 Scheduler using the following

command line: 24x7 /NOTIMER. This will disable the timer used by the Event Processor and as a result it will halt all job processing until the 24x7 Scheduler is restarted without the /NOTIMER option. All other 24x7 Scheduler features and functions will continue to operate.

Trace Features

The tracing features allow you to collect and analyze information about the execution of the 24x7 Scheduler. The collected information can help you identify problem areas.

When tracing is turned on, the 24x7 Scheduler records all activity in the selected area in a log file. This information is also placed in the console window. You can use the Log Viewer to analyze the complete trace log.



There are seven areas in which you can collect trace data:

- 24x7 Master/Standby Scheduler communication session
- 24x7 Remote Agent session
- Internal commands that 24x7 Scheduler performs while communicating with your database
- ODBC API calls made by 24x7 Scheduler while connected to an ODBC data source
- JAL script execution
- JDL script execution
- External interface session

To enable tracing for:

- 24x7 Master Scheduler session (on the Master Scheduler's computer)
- 24x7 Standby Scheduler session (on the Standby Scheduler's computer)
- 24x7 Remote Agent session (on Remote Agent's computer)
- JAL scripts execution tracing
- JDL script files execution tracing
- External interface session

you will need to do the following:

1 Select **Tools** menu, and then click **Options**. The system options dialog appears.
2 Click **Fail-over** tab.

3 Check **Trace enabled** option.
4 Click **OK** button.

To enable tracing for a 24x7 Remote Agent session (on the main Scheduler's computer while connected to the Remote Agent):

1 Select **Tools** menu, then click **Remote Agents**. The Remote Agent profiles dialog box appears.
2 Select the desired Agent, click **Edit**. The Agent Profile settings dialog box appears.
3 Check **Trace enabled** option.
4 Click **OK** button.
5 Click **Close** button.

To enable database tracing:
1 Select **Tools** menu, and then click **Options**. The system options dialog box appears.
2 Click **Fail-over** tab.
3 Check **Database trace enabled** option.
4 Click **OK** button.

To enable ODBC API Call tracing:
1 Select **Tools** menu, and then click **Database Profiles**. The Database Profiles dialog box appears.
2 Click **ODBC** button. The ODBC Driver Manager dialog box appears.
3 Click **Tracing** tab.
4 Specify desired tracing options, then click **OK** button.
5 Click **Close** button.

Chapter 5: Job Interdependencies

Overview

You may need to setup a job whose run depends on the success or failure of other scheduled jobs. In other words, a program run may be based on the outcome of other programs. The most reliable and proven mechanism is to use file dependencies. The 24x7 Scheduler provides all the necessary tools to implement this semaphore file-based linked program run.

You can have a job dependent on more than one job/file by creating multiple dependencies. To setup a dependent job, you need to choose a "file watch" condition for that job. When setting up a "parent" job, you will need to select a "notify file" option for that job.

The 24x7 Scheduler includes the easy-to-use graphical Job Dependencies Editor, which allows you to create new, or modify and delete existing dependencies with just a few mouse clicks.

Graphical Dependencies Editor

The Dependencies Editor presents all available jobs as a hierarchical structure "Tree View" on the left side of the screen. This side is filled with folders and jobs. The right side of the screen displays the dependencies diagram. This side is blank unless there is at least one created dependency. The Dependencies Editor automatically recognizes all existing dependencies

To change the size of either side of the window, drag the bar that separates the two sides. Use scroll bars to navigate both sides of the Dependencies Editor window.

"Tree View"

If a folder has been expanded, and its contents displayed in the **Properties** view area, the folder will be represented by an open folder icon  .

Collapsed folders are represented by a closed folder icon .

Folders with a "+"symbol next to the folder name mean that there are jobs beneath the folder.

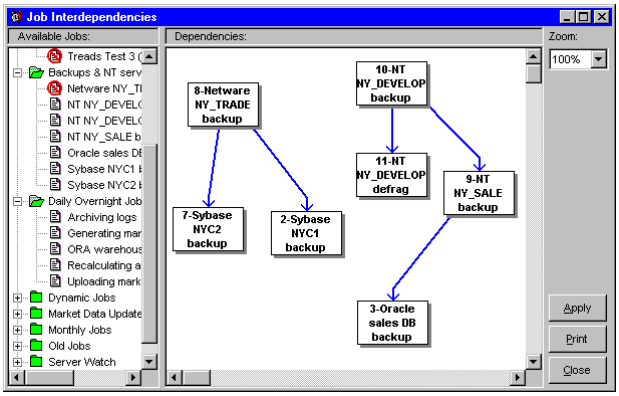
Conversely, a "-"symbol next to a folder icon means that there are no further jobs beneath.

Navigating through the various folders and jobs is usually accomplished by clicking individual folders and jobs with the mouse. Click the plus sign (+) to expand a folder, or you can double-click on the folder itself. Click the minus sign (-) to collapse a folder, or you can double-click on the folder itself.

Dependencies Diagram

All "child" and "parent" jobs are drawn as rectangles with a number and text within it. The number is the job ID and the text, the job name.

Job dependencies are represented by a blue line ending with arrow going from the "parent" job to the dependent "child" job.



Use the zoom feature for customizing the dependencies view.

Important: After you have made all the changes you want to the dependencies diagram, you should click the **Apply** button to apply them to the job database. The file image of the Job Database, however, will not be updated until you click the **Save** button on the Job Explorer toolbar. If you want to discard changes, click the **Close** button or, if you have already closed the Dependencies Editor, exit the 24x7 Scheduler without saving changes.

Tips:

- To view the job description, rest the mouse pointer over the job's icon on the left side of the Dependencies Editor; information about the job appears as a ToolTip under the mouse pointer.
- Avoid "dead" (circular) dependencies - a case when Job A depends on Job B and at the same time, Job B depends on Job A.

Adding New Job to Dependencies View

The Job Dependencies Editor supports standard drag and drop interface for moving jobs in and out of dependencies diagram.

When you drag a job icon from the Dependencies Editor tree on the left side and drop this job on the dependencies view (right side), the 24x7 Scheduler creates an object on the right side that represents this job. Alternatively, you can double-click a job icon in the Dependencies Editor tree on the left side. When you drag a folder icon and drop it on the Dependencies View, the 24x7 Scheduler creates objects on the right side that represent every job from this folder. The number of created objects matches the number of jobs in the folder.

The 24x7 Scheduler will not create a second job object If a job object already exists on the right side. Therefore, it will ignore all jobs that already have an object created.

To add a job to the Dependencies View:

1 Click on the desired job.
2 While holding the mouse button down, drag (move) the mouse pointer to the desired location on the diagram pane.
3 Release the mouse button to drop the job.

To add all jobs from one folder to the Dependencies View:

1 Click on the desired folder.
2 While holding the mouse button down, drag (move) the mouse pointer to the desired location on the Dependencies View.
3 Release the mouse button to drop the folder.

If necessary, use drag and drop on the right side to adjust object position.

Deleting Job from Dependencies View

To delete a job from Dependencies View:

1 Open Dependencies Editor.
2 Click on the **job object** rectangle.
3 Press the **Delete** button on the keyboard. A message box will appear asking you to confirm this operation.
4 Click **Yes** to confirm the deletion.

Arranging Jobs on Dependencies View

To arrange job object rectangles on the job Dependencies View:

1 Click on the desired job object rectangle.
2 While holding the mouse button down, drag (move) the mouse pointer to the desired location on the Dependencies View.
3 Release the mouse button to drop the job object. The 24x7 Scheduler will update the object position. It will also arrange all the lines that represent this object's dependencies, if it has any.

Adding New Dependency

To add a new job dependency:

1 Open Dependencies Editor.
2 On the right side of the Dependencies Editor window right-click on the desired "parent" job object rectangle.
3 While holding down the **right** mouse button, move the mouse pointer towards the desired "child" job rectangle.

4 Release the **right** mouse button to complete this operation. The 24x7 Scheduler will add the new dependency to the Dependencies View.

Deleting Dependency

To delete a job dependency:

1 Open Dependencies Editor.
2 Click on the line that represents the desired dependency.
3 Press the **Delete** button on the keyboard. A message box will appear asking you to confirm this operation.
4 Click **Yes** to confirm the deletion.

Printing Dependencies

To print the job dependencies diagram:

1 Open Dependencies Editor.
2 Click the **Print** button.

Using Zoom Tool

The Zoom options on the Dependencies Editor window let you view the dependencies diagram at different magnification levels. You will be able to increase the zoom value and magnify the diagram, decrease the zoom value and reduce the size of the diagram.

 **Tip:**

- When you print a diagram, the Zoom option is not ignored. The diagram will be printed at the specified magnification. To print the diagram at normal magnification, change Zoom to 100%.

Chapter 6: Fail-over Mode

About Fail-over Mode

The "Fail-over Mode" is a “crash protection" mode in which the 24x7 Scheduler ensures high availability and error-recovery, reducing possible system downtime that can impede important processing functions, and even stop time-critical computing that is vital to your business.

The 24x7 Scheduler can run on two or more machines simultaneously, eliminating a single point-of-failure. However, only one scheduler at a time can serve as the Master Scheduler. All other schedulers run in Standby mode. When "Fail-over Mode" is activated, all information written to the Master Scheduler's job database is mirrored in the Standby Scheduler's database using sophisticated synchronization techniques. If the Master component becomes unavailable, the 24x7 Scheduler will perform an unattended rollover to the first Standby Scheduler to respond. This Standby Scheduler then becomes the new Master Scheduler. This architecture ensures that jobs will run on time in the event of a machine failure and that jobs will continue processing without interruption.

Optionally you can setup both Master and Standby Schedulers to run on the same machine. This will ensure continued processing should the Master Scheduler fail.

To enable "Fail-over Mode" :

1 Click **Tools** menu, then click **Options**. The 24x7 Scheduler options dialog box appears (see image below).
2 Select **Network** tab.
3 Check **Multi-instance synchronization enabled** option.
4 For the Standby Scheduler specify **synchronization interval** parameter, which tells the 24x7 Scheduler at what interval you want the Standby Scheduler to connect to the Master Scheduler and request fresh job database snapshot. Note that a zero interval will disable multi-instance synchronization.
5 Enter connection parameters for distributed service.
6 Check **Trace enabled** option if desired. This option is used to troubleshoot Standby/Master Scheduler connections. When tracing is enabled, 24x7 Scheduler logs all activity between the Standby and the Master components to the STANDBY.LOG and MATER.LOG files as appropriate. This internal information can be helpful in debugging, including memory usage, an internal call trace, and the types and values of passed parameters are also

stored. In addition, 24x7 Scheduler logs all activity to a console window. This helps simplify the troubleshooting process.

7 Restart 24x7 Scheduler.

 Tips:

- Be careful about selecting the synchronization interval at which the Standby Scheduler connects to the Master Scheduler and requests a job database snapshot.

Connection Parameters for Fail-over Mode and for Remote Agents

Driver - The communications driver that will be used for the connection. Values are:

- WinSock
- NamedPipes
- Local

Port/Service - Meaning of this parameter is different for different communication drivers. For details refer to the following table:

Driver	Parameter value
Winsock	Specify either of the following: • The port number for the 24x7 Master Scheduler or Remote Agent (for example, 10099). Each server application requires a unique port number on the server machine. If you specify a port number, select a number that is greater than 4096 and less than 65536. • The service name for the 24x7 Master Scheduler. The service name is an indirect reference to the 24x7 Scheduler 's port number. The mapping of the service name to the port number is specified in the TCP/IP services file. Normally, this file (SERVICES.) is located in the Windows directory for Win95/98 and in the

	C:\WINNT\SYSTEM32\DRIVERS\ETC directory for WinNT. You may need to edit this file manually to add the 24x7 Scheduler Port or Service.
NamedPipes	Specify the application portion of the pipe name. The combination of the Location and Application values forms the pipe name. The pipe name is constructed as follows: *location**PIPE**application.* The Application must be unique for the Location you specify.
Local	This property is ignored.

Location - This specifies the location of the 24x7 Master Scheduler. The value of this parameter is different for different communication drivers. For details refer to the following table:

Driver	**Parameter value**
Winsock	Specify either of the following: • The IP address (for example, 199.99.99.91) • The host name of the remote computer (network computer name in workgroup) • LocalHost (This tells the 24x7 Standby Scheduler that the 24x7 Master Scheduler resides on the local machine.)
NamedPipes	Specify the location portion of the pipe name. The combination of the Location and Application values forms the pipe name. The pipe name is constructed as follows: *location**PIPE**application*. If no location is specified, a local pipe name is constructed using a dot (.) in the machine name portion.
Local	This property is ignored.

Options - This specifies one or more additional communications options. If you want more than one option, you will need to separate the options with commas. This property is ignored for the **Local** driver.

BufSize=n	Sets the connection buffer size to the value specified.
MaxListeningThreads=n	Determines the maximum number of listening threads available on the Master Scheduler and Remote Agents.
MaxRetry=n	Specifies how many times the Standby Scheduler will try to connect when the Master Scheduler's listening port is busy. Applies to the **WinSock** driver only.
NoDelay=1	Specifies that each packet be sent without delay. Corresponds to the TCP_NODELAY option. Setting this option may degrade performance significantly. Do not use this option unless you thoroughly understand its implications. Applies to the **WinSock** driver only.
RawData=1	Specifies that raw data be passed over the network. By default, the **WinSock** driver obscures the data that is passed over the network. Setting this option to 1 overrides the default behavior. Both the Standby and Master Schedulers must have the same setting. If there is a discrepancy between the Standby and Master Scheduler's settings, the communication will fail. Setting this option to 1 may improve performance slightly. Applies to the **WinSock** driver only.

Testing Connection to Master Scheduler

After setting up the connection parameters for both Master and Standby Schedulers, you will be able to test how well they communicate with each other:

1 Make sure both computers running Master and Standby Schedulers have been connected to the network.

2 Enable **Tracing** in the Program options on both systems.
3 Start 24x7 Master Scheduler. Activate the console window created by the Master Scheduler.
4 Start 24x7 Standby Scheduler. Activate the console window created by the Standby Scheduler.
5 Read messages on the Standby console. If you do not see the message "Connection successful", change the connection parameters on the Standby Scheduler and try again. If necessary, change parameters on the Master Scheduler.

If the intercommunication process succeeded, most GUI elements of the Standby Scheduler window become disabled and grayed out. The program title should have changed to reflect the "Standby" mode.

1 Shutdown the Master Scheduler computer.
2 Keep an eye on the Standby Scheduler. After the specified **synchronization interval** elapses, the Standby Scheduler will try connecting to the Master Scheduler. As a result, the connection will fail and the Scheduler will switch to the Master mode.

If the process succeeds, all previously disabled GUI elements of the Standby Scheduler become enabled. The program title should change to reflect the switch to the "Master" mode.

You may also want to watch for the Master Scheduler's console window during the connection process to see if there are any "Request rejected" messages.

 **Tips:**

- The console window cannot have a vertical scrollbar due to Windows® limitations. The number of visible lines (visible buffer size) is based on the font settings for the console window. You can change the font using the console window's control menu, **Properties** item.
- To see the entire intercommunication log, select **Tools** menu, then click **Log Viewer**. The Log Viewer window will open. See messages on **Master** and/or **Standby** tabs.

Starting Master and Standby Schedulers

When starting up in Fail-over Mode, the 24x7 Scheduler on start up attempts to connect to the Master Scheduler. If that connection fails, the 24x7 Scheduler will immediately switch to the Master Scheduler mode, otherwise it will then request a snapshot of the Master Scheduler's job database then switch over to the Standby Scheduler mode.

Connection troubleshooting:
Make sure that you have checked the **Enable multi-instance synchronization** option in the system Options for both Master and Standby Schedulers. Also make sure you have setup the **Distributed Service Configuration** properly for both Master and Standby Schedulers. Make sure that both configurations use the same communication **Driver, Port** number and that the Standby Scheduler in the **Location** field points to the Master Scheduler. Click **Tools/Options** menu, click **Network** tab page to verify the configuration.

 **Tip:**
To implement cyclical Master/Standby switching and ensure uninterrupted job processing, you can point the Master Scheduler to the Standby Scheduler. To do this, in the system Options of the Master Scheduler specify the **Location** of the Standby Scheduler. Doing this means that in the event of the Master Scheduler software or hardware failure, the Standby Scheduler will switch to the Master mode. If you restart the original Master Scheduler, it will find the new Master Scheduler and will switch to Standby mode.

Restricting Access to Master Scheduler

To restrict the list of Standby Schedulers that can connect to and take over a Master Scheduler:

1 In the 24x7 Master Scheduler installation directory create a text file called RESTRICT.LST.
2 Edit this file in Notepad or any other text editor. Enter a list of 24x7 Scheduler serial numbers that can be used to access this Master Scheduler. Each serial number must appear on a separate line.

To allow any 24x7 Standby Scheduler to connect to a Master Scheduler:

1 Delete RESTRICT.LST file from the 24x7 Master Scheduler installation directory.

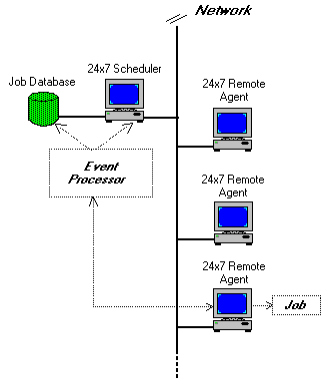
 **Important Notes**:

- Each installed copy of the 24x7 Scheduler must have a unique serial number. Please see license agreement for details.
- The list of allowed requestors RESTRICT.LST is also used to restrict 24x7 Schedulers that can submit jobs to a Remote Agent. You will need to remember this when switching between Master Scheduler and Remote Agent modes.

Chapter 7: Remote Agents

About Remote Agents

The 24x7 Scheduler supports remote jobs. This means that you can run the main 24x7 Scheduler on one computer and execute jobs on a different computer connected to it via local or global network.



The 24x7 Scheduler Remote Agent provides a way to execute jobs on remote computers. The Remote Agent must be installed on each computer that you want processing to occur. Remote Agents are important parts of the 24x7 Scheduler distributed features. The 24x7 Scheduler distributed architecture allows a job created on the main scheduler computer to be executed by the Remote Agent on the remote computer. All job maintenance and event processing remain on the main 24x7 Scheduler computer. This allows you to have a single point of administration and scheduling for all distributed jobs.

Important Notes: Before starting a 24x7 Remote Agent for the first time you should run the 24x7 Scheduler on the remote machine to configure the 24x7 Scheduler network properties and communication parameters. See **Setting Connection Parameters** topic for details.

What happens when it is the time to execute a remote job?

The main 24x7 Scheduler (event processor) will attempt to connect to the 24x7 Remote Agent whose name is specified in the job properties. If the Remote Agent is not installed or it is not running on the selected computer, an error will occur and the job will fail. The error code and text will be written to the job log. If the connection succeeded, the main 24x7 Scheduler will submit the job definition to the Remote Agent. If this job has the **asynchronous** option turned

off, the main 24x7 Scheduler will wait while the job is being executed by the Remote Agent on the remote computer. If the job has the **asynchronous** option turned on, the main 24x7 Scheduler will post the job for asynchronous execution on the remote computer and immediately after that, continue normal job processing.

Starting Remote Agent

To start the 24x7 Remote Agent from the command line:

1 Change the current directory to the 24x7 Scheduler directory. For example: *CD "C:\Program Files\24x7"*
2 Run the command **24x7 /AGENT**. The 24x7 Remote Agent will then start.

To create a shortcut on the Desktop:
Alternatively, you may want to create a shortcut to start the 24x7 Remote Agent.

1 Right-click anywhere on the free area of the Desktop. A context menu will appear.
2 Click **New**, then click **Shortcut**.
3 Type the command line for the 24x7 Scheduler ending with the /AGENT parameter. The command line must include the full path to the **24x7.EXE**. For example *"C:\Program Files\24x7\24x7.EXE" /AGENT*.
4 Click the **Next** button.
5 Type the name for the newly created shortcut. For example: *24x7 Agent*.

Double-click on the shortcut icon. This will start the 24x7 Remote Agent.

 **Important Notes:** Before you start the 24x7 Remote Agent for the first time you should run the 24x7 Scheduler on the remote machine to configure 24x7 Scheduler network properties and communication parameters. See **Setting Connection Parameters** topic for details.

To start the 24x7 Remote Agent each time Windows starts:

1 Click the **Start** button, and then point to the **Settings**.
2 Click **Taskbar**, and then click the **Start Menu Programs** tab.
3 Click **Add**, and then click **Browse**.
4 Locate **24x7.EXE**, then double-click it.
5 Press **End** button on the keyboard, then type **/AGENT**.
6 Click **Next**, and then double-click the **StartUp** folder.
7 Type the name (such as “24x7 Agent") that you want to see on the **StartUp** menu, and then click **Finish**.

Restricting Access to Remote Agents

To restrict access to a Remote Agent:

1 In the 24x7 Remote Agent installation directory, create a text file called RESTRICT.LST.
2 Edit this file in Notepad or any other text editor. Enter a list of 24x7 Scheduler serial numbers that can be used to access this Remote Agent. Each serial number must appear on a separate line.

To allow any 24x7 Scheduler to connect and submit jobs to a Remote Agent:

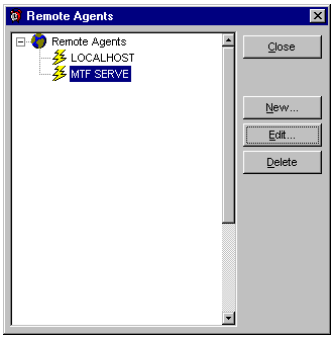
1 Delete RESTRICT.LST file from the 24x7 Remote Agent installation directory.

 **Important Notes**:

- Each installed copy of the 24x7 Scheduler must have a unique serial number. Please see license agreement for details.
- The list of allowed requestors RESTRICT.LST is also used to restrict 24x7 Standby Schedulers able to connect to the 24x7 Master Scheduler. Remember this when switching between Remote Agent and Master Scheduler modes.

Remote Agent Profiles

Before a job can be submitted to the 24x7 Remote Agent, the Remote Agent profile must be created on the main 24x7 Scheduler. The main 24x7 Scheduler uses profile information when connecting to the Remote Agent. Each agent requires a separate profile.

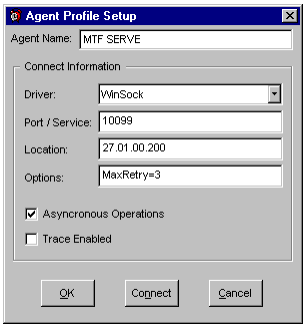


To add, modify, and delete Remote Agent profiles, click the **Tools** menu, and then click **Remote Agents**. The remote agent profiles dialog box will appear.

To add a new profile:

1 Click the **New** button.
2 Enter Remote Agent connection information.
3 If the specified Remote Agent is running, click the **Connect** button to verify the connection parameters. If the connection fails, modify the connection information and try again.
4 Click the **OK** button.

To modify an existing profile:



1 Select the desired profile in the **Remote Agents** list (see remote agent profiles dialog box above).
2 Click the **Edit** button.
3 Modify Remote Agent connection information.
4 If the specified Remote Agent is running, click the **Connect** button to verify the connection parameters. I if the connection fails, modify connection information and try again.
5 Click the **OK** button.

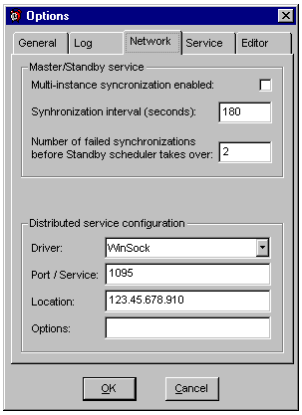
To delete a profile:

1 Select the desired profile in the **Remote Agents** list (see remote agent profiles dialog box above).
2 Click the **Delete** button.

Sample Remote Agent Setup

This is a sample setup for Remote Agent connection using TCP/IP protocol.

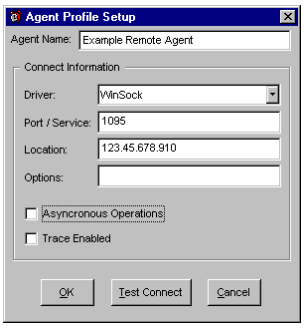
On the 24x7 Remote Agent computer:



1 Run the 24x7 Scheduler (normal mode).
2 Click Tools/Options menu, after the Options dialog box appears, select Network tab page.
3 Select Winsock driver. Enter 10095 for Port.
4 Click OK, choose No when prompted to restart the Scheduler then exit the Scheduler.
5 Start the 24x7 Remote Agent. The agent is now ready to accept requests.

You can now setup new Remote Agent profiles on the computer installed with the main 24x7 Scheduler

On the main 24x7 Scheduler computer:



1 Run the 24x7 Scheduler.
2 Select Tools/Remote Agents menu, after Remote Agents dialog box appears, click New button. The Agent Profile dialog box will appear.
3 Enter the desired Remote Agent name (any text up-to 30 characters long).
4 Select Winsock driver. Enter 10095 for port.
5 In the Location field specify IP address of the Remote Agent computer. Or, click Test Connect button to test connectivity to the Remote Agent.
6 Click OK, then click Close button on the Remote Agents dialog box.
7 Modify properties of the jobs that you want to execute on the remote computer. From the Host drop-down list select the

name of the Remote Agent created earlier.

Synchronous and Asynchronous Connections

The 24x7 Scheduler supports both synchronous and asynchronous communications between the main 24x7 Scheduler and 24x7 Remote Agents. For remote jobs, the 24x7 Scheduler chooses the communication mode that matches the execution mode specified in the job properties. If the job needs to be executed asynchronously, the main 24x7 Scheduler will communicate with the Remote Agent using asynchronous calls, otherwise it will call the Remote Agent synchronously. The Remote Agent will then also run the submitted job also synchronously.

Unlike synchronous calls (which force the main 24x7 Scheduler to wait until job processing has completed on the Remote Agent computer), asynchronous calls free the main 24x7 Scheduler to do other work while the Remote Agent processes the request.

When the Remote Agent receives a synchronous call, it executes the request immediately. The main 24x7 Scheduler will wait until processing has completed.

When the Remote Agent receives an asynchronous call, it adds the submitted job to a queue and performs the job processing at a later point in time. Meanwhile, the main 24x7 Scheduler will continue with other work while the Remote Agent handles requests.

All asynchronous requests are executed by the Remote Agent in the order they are received. However, the exact timing of the job execution cannot be guaranteed. If the Remote Agent receives a synchronous call after several asynchronous calls have been made, it will process the synchronous call as soon as possible. Therefore, queued asynchronous jobs will be processed after all synchronous jobs have been completed.

Chapter 8: Database Jobs

The 24x7 Scheduler allows you to create jobs that can access various database systems. The 24x7 Scheduler also provides easy access to corporate information stored in a wide variety of databases.

The 24x7 Scheduler can connect to a database through the ODBC interface or through a native database interface. The 24x7 Scheduler software includes a number of native database interfaces as well as numerous ODBC drivers. If you cannot find an appropriate ODBC driver, you can install and use one of the drivers included to standard 24x7 installation package.

Before connecting the 24x7 Scheduler to your database, you will need to do some preparatory steps. The following are the basic steps you should follow when preparing the 24x7 Scheduler to work with your database:

1 Get ready to use your database (start database server, start database listener, etc…)
2 (Optional) Install the ODBC driver or native database driver.
3 (Optional) Define the ODBC data source.
4 Create the database profile.
5 (Optional) Troubleshoot the database connection.

Preparing to use your database

Preparing the database ensures that you will be able to access and use your data. The requirements differ for each database but, in general, preparing a database involves the following steps:

1 If network software is required, make sure it is properly installed and configured at your site and on the client machine.
2 Make sure the required database server software is properly installed and configured.
3 Make sure the required database client software is properly installed and configured on the client workstation. (Typically, the client workstation is the one running the main 24x7 Scheduler or the 24x7 Remote Agent.)

Important: You must install the appropriate client software for your database server version and operating system platform. See your database vendor for information.

Installing the ODBC driver or native database driver

To connect the 24x7 Scheduler to your database, you must install the ODBC driver or native database interface that accesses the database. Select the desired driver or database interface when prompted to do so by the Setup program.

Important: If you are installing an ODBC driver, make sure you also install the ODBC interface on your computer. The ODBC interface is installed by default with 24x7 Scheduler.

Defining the ODBC data source

Data that you access through an ODBC driver is referred to as an ODBC data source. An ODBC data source consists of the data and associated DBMS or file manager, operating system, and (if present) network software. When you define an ODBC data source, you provide information about the data source that the driver needs to connect to it. (Defining an ODBC data source is also referred to as configuring the data source.) You can use the ODBC Manager software to create and modify ODBC data sources. To start the ODBC Manager you will need to do either of the following:

From the 24x7 Scheduler

1 Click **Tools** menu, then click **Database Profiles**. The Database Profiles dialog box will appear.
2 Click the **ODBC** button.

From Windows Control Panel

1 Click the Windows **Start** button.

2 Select **Settings** menu, then select **Control Panel**. The Control Panel window will appear.
3 Double-click the **ODBC** icon.

Completing the ODBC setup dialog box

Define an ODBC data source by completing the ODBC setup dialog box for the ODBC driver you have previously selected to access the data source. The content and layout of the ODBC setup dialog box will vary for each driver, but most ODBC setup dialog boxes require you to supply the following information:

- Data source name and location,
- Data source description (optional),
- Other DBMS-specific connection parameters.

After you have created a data source, you can use it in the database profile already created in the 24x7 Scheduler.

Creating database profiles

To create a new database profile:
1 Click **Tools** menu, then click **Database Profiles**.
2 Follow instructions described in the Database Profiles topic.

Troubleshooting the database connection

The 24x7 Scheduler provides two tools for tracing database connections in order to troubleshoot problems:

- **Database Trace** - The Database Trace tool records the internal commands that the 24x7 Scheduler performs while communicating with a database. Database Trace writes its

output to a file named PBTRACE.LOG located in the Windows home directory. You can view the contents of the log at any time by using the Log Viewer. To enable database tracing, select **Database Trace** options on the 24x7 Scheduler's options dialog (Select **Tools** menu, then click **Options.** An Options dialog box will appear.)

- **ODBC Driver Manager Trace** - The ODBC Driver Manager Trace tool records information about the ODBC API calls made by the 24x7 Scheduler while connected to an ODBC data source. The ODBC Driver Manager Trace writes its output to a file named SQL.LOG (by default) located in the Windows home directory or to a log file that you specify. You can view the ODBC Driver Manager Trace log at any time by using any text editor.

Chapter 9: Job Automation Scripts

The 24x7 Scheduler provides you with a robust scripting language called 24x7 Script or Job Automation Language (JAL). This language gives you the ability to customize the behavior of any scheduled job. Using JAL you can create very complex conditions for the job triggers, implement powerful error-checking and error-handling, create customized Notification Events and Actions. For example, if you want to setup a job that runs every 15 minutes on workdays only, you can create a job in 24x7 Script and schedule this job to run **all day** every 15 minutes. In the job script, you would code the condition that checks whether the current time is between 9:00 AM and 5:00 PM and the day is a workday. If these conditions have been satisfied, you will launch the desired process, otherwise you will exit the script.

Another typical example of using JAL is to search common error messages in a log file created by the previously executed program.

The 24x7 Scheduler also provides you with a powerful integrated editor that features JAL and SQL syntax highlighting, bookmarks, search and replace, context help for JAL statements and much more...

Chapter 10: Logging Job Execution

Logging job execution is optional, however, it is highly recommended for mission-critical jobs. The job log provides a complete audit trail for all job activities. You can use the information stored in the log to troubleshoot incorrect or “not on-time” job execution, and resolve scheduling conflicts between different jobs.

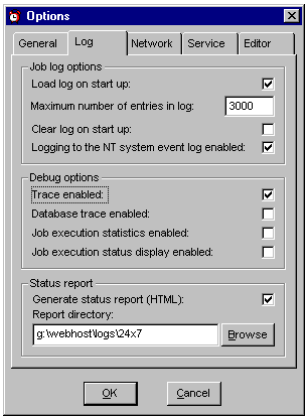
The 24x7 Scheduler writes to the log the date and time at which an event occurred, the event severity, job ID, job name, and event description. For an error event, the description includes job status, error code and complete error message. All errors fall into four categories:

- **Operating System errors –** These errors are most likely to occur while running external programs and documents. They are reported by the Operation System. Refer to Windows documentation for a complete description of Operation System errors.
- **Database errors –** These errors occur while performing database operations. They are reported by the DBMS. Refer to your database documentation for a complete description of database errors.
- **Program errors –** These errors occur while running external programs and documents. They are reported by the scheduled programs. Refer to the program documentation for a description of program errors.
- **Scheduling errors –** These errors occur because of incomplete or invalid job definitions. They are detected and reported by the 24x7 Scheduler job execution engine. Check and correct invalid job definition if these errors occur.

Contact SoftTree Technologies Technical Support for assistance If you are unable to resolve the error you are experiencing.

Chapter 11: Status Report

The 24x7 Scheduler allows you to generate real-time HTML reports that you can use to check historical job activity and monitor the status of currently running jobs. Moreover, you can configure the 24x7 Scheduler to automatically update and upload these reports to a Web server (via Intranet or Internet). A Web browser can then be used to view these reports from virtually anywhere.



To enable generation of the Status Reports:

1 Select **Tools** then **Options** menu.
2 Check the **Generate status report** option.
3 Type the destination directory in the **Status report directory** field. Alternatively, you can click the **Browse** button to select the desired directory. If you leave the field blank, the 24x7 Scheduler will save reports in the installation directory.
4 Click the **OK** button

Tips:

- For the **Status report directory,** you can choose the directory on your Web server. In this case, all status report changes will be available immediately (real-time) to Internet users. Alternatively, you may want to setup a job that will upload created HTML files to the desired Web server. That job can be run every 30 minutes or at another specified interval providing near real-time reporting over the Internet.
- You should setup some security restrictions on your Web server if you do not want the report to be available to all Internet users.

Using Web Browser to See Status Report

To launch the default Web browser with the Status Report in it, click the **View** menu then select **Status Report**. If you have configured the 24x7 Scheduler to update Status Reports on your Web server, you will also be able to browse them on the Web server.

You can use the Web browser "find" feature to find the job you are looking for.

You can also use the Web browser to print the Status Report.

Chapter 12: Exception Dates

The 24x7 Scheduler allows you to specify some “exception” dates (e.g. holidays) when you do not want a job to run. This option only affects jobs set to run daily, weekly, or monthly. If the job is triggered by another event, such as the arrival of certain files or e-mail message, it will run even if the event was triggered on a holiday.

When scheduling a job that must not run should it happen on a holiday, make sure to select the **Skip Holidays** option in the job’s properties. For example, if the program is scheduled to run every Friday and this option is checked, the program will not run on holiday Fridays such as Independence Day.

Alternatively, you may want to select the **Slide Holidays** option (monthly jobs) which instructs the 24x7 Scheduler to avoid running this particular job when it falls on a holiday and postpone the job’s execution until the next workday. For example, if the program is scheduled to run every Friday and this option is checked, the program will not run on a Friday if it falls on Independence Day and will run it the following Monday instead.

The holiday list can be altered to suit your needs. It may include any dates that you want to exclude from normal processing. The holiday list is shared by all jobs. If you want to have a different list for a job or group of jobs, you can install a second copy of the 24x7 Scheduler to a different directory. The holiday list is stored in the HOLIDAY.TXT file located in the 24x7 Scheduler installation directory. Another way of having different exception days for different jobs is to use jobs written in 24x7 Script. Check out examples of this kind of schedule provided with the standard 24x7 installation package.

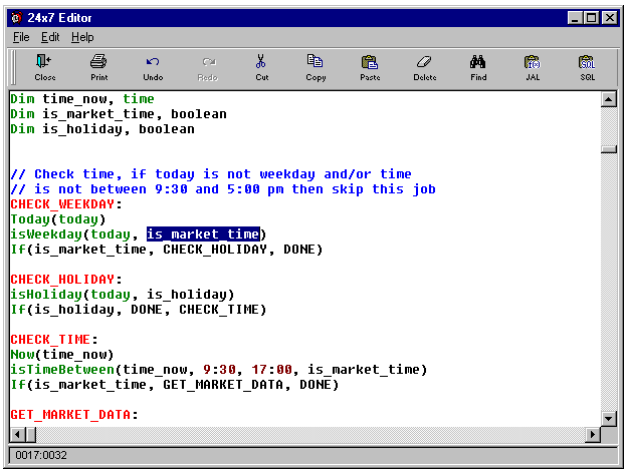
If you want to modify the list of holidays, you will need to use the Holiday Editor. To launch the Holiday Editor, select **Tools** menu, and then click **Holidays**. Not all holidays have fixed dates. You should update the holiday list every year or fill out this list for a few years ahead.

Chapter 13: Editor

Description

The 24x7 Scheduler incorporates a powerful editor that enables you to edit your JAL and SQL scripts efficiently. It includes important editing features such as: syntax highlighting, Paste JAL and Paste SQL syntax, search and replace, virtually unlimited number of Undo and Redo levels, setting bookmarks, as well as other standard editing functions.

You can use the Editor to write JAL scripts for 24x7 Script jobs. The Editor can also be used to write SQL commands for Database-type jobs. The editor will automatically provide appropriate syntax highlighting.



Using the Editor

To create or modify a script for a job, open the Job Wizard for that job then click the **Next** button. Click the **Editor** button.

Entering JAL and SQL scripts

You can enter a script in three ways:
- pasting the text from the clipboard,
- typing the text in the Editor's workspace,
- importing a file containing the script.

Searching in Scripts

1 Click the  **Find** button on the Editor window toolbar or select **Edit/Find** command from the menu. The **Find** dialog box will open.
2 Type your search string in the **Find What** edit box.
3 Specify the direction of the search operation by selecting either the **Up** or **Down** radio-button.
4 If you want to perform a case-sensitive search, then activate the **Match Case** check box.
5 If you want to search for whole words only, then activate the **Match Whole Word Only** check box.
6 Click the **Find Next** button to start the search. The 24x7 Scheduler will highlight the first instance of the search string it finds. To continue searching, click the **Find Next** button again.

Replacing in Scripts

1 Select the **Edit/Replace** command from the Editor's menu. The Replace dialog box will open.
2 Type your search string in the **Find What** edit box.
3 Type the replacement text in the **Replace With** edit box.
4 If you want to perform a case-sensitive search, then activate the **Match Case** check box.
5 If you want to search for whole words only, then activate the **Match Whole Word Only** check box.
6 To start the search and replace operation:
   - If you want to scroll through the script and examine each instance of the search string before placing it, click the **Find Next** button. The 24x7 Scheduler will highlight each search string that it finds. To replace the search string, you must click the **Replace** button. To continue searching and replacing, you must repeat the steps above for each search hit.

- If you want to replace all instances of the search string without pausing, then click the **Replace All** button.

Go to Command

To go to a line:
1 Select the **Edit/Go to Line** command from the Editor's menu. The Go to Line dialog box will open.
2 Type the line number in the edit box.
3 Click the **OK** button to jump to the specified line.

To go to a previously set bookmark:
1 Select the **Edit/Go to Bookmark** command from the Editor's menu. The 24x7 Scheduler moves the edit caret to the line where the bookmark was set

Importing and Exporting Scripts

The 24x7 Scheduler stores all scripts in the job database. You can use Import and Export features to save and read scripts as ASCII files.

To export a script:
1 Select the **File/Export** command from the Editor's menu. The Save As dialog box will appear.
2 Specify the name of the file in which you want to save the script.
3 Click the **OK** button.

To import a script:
1 Select the **File/Import** command the Editor's menu. The File Open dialog box will appear.
2 Specify the name of the file from which you want to load the script.
3 Click the **OK** button.

Warning: The contents of imported file will completely replace the current script in the Editor.

Printing Scripts

To print a script:

1 Click the  **Print** button on the Editor window toolbar. The Print dialog box will open.
2 Select the **Printer** from the drop-down list. It should contain a list of local and network printers that you can access. If you do not see any listed, then your computer is not configured for any printers.
3 Specify the desired print properties.
4 Click the **OK** button to print the script.

Copying, Pasting and Cutting Text

The Editor supports standard edit function such as Cut, Copy and Paste commands that move selected text to and from the Windows clipboard.

To copy and paste text:
1 Highlight the text inside the Editor window.
2 Click the  **Copy** button on the Editor's toolbar. This action causes the selected text to be copied to the clipboard.
3 Place your cursor at the place where you want to paste the text. Click the  **Paste** button. The text will be copied onto the script.

To cut and paste text:
1 Highlight the text inside the Editor window.
2 Click the  **Cut** button on the Editor's toolbar. This action causes the selected text to be copied to the clipboard and removed from the script.
3 Place your cursor at the place where you want to paste the text. Click the  **Paste** button. The text will be copied onto the script.

Deleting the text

To delete the text:
1 Highlight the unwanted text inside the Editor window.
2 Click the  **Delete** button on the Editor's toolbar. The 24x7 Scheduler will remove the highlighted text from the script.

Undo/Redo Changes

The Editor supports up to 256 levels of undo/redo actions. The Undo action cancels the last edit, restoring the text to the content before the last change.

To undo a change:

1 Click the 

Undo button on the Editor's toolbar.

To repeat the last undone change:

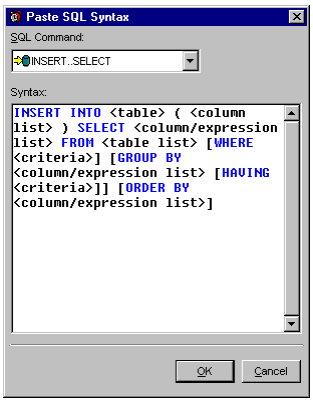
1 Click the 

Redo button.

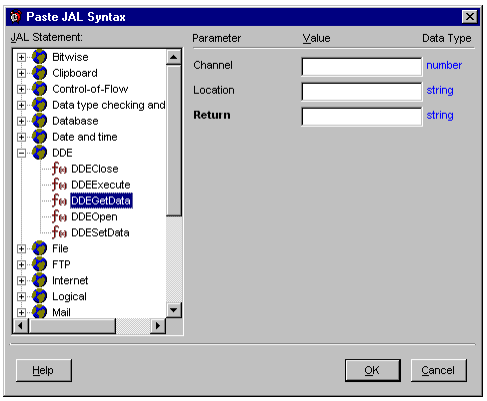
Pasting SQL Syntax

1 Click the 

Paste SQL button on the Editor's toolbar. The Paste SQL Syntax dialog box will open.
2 Select the command that you want to paste from the drop-down list of available SQL commands. The syntax will appear in the Syntax box.
3 Click the **OK** button. The 24x7 Scheduler will paste the selected syntax into the script. You must complete the command by replacing the placeholders in the sample syntax and designating options, as applicable.



 **Note:**
The 24x7 Scheduler provides syntax for commands available in most popular database systems. However, the list of valid SQL commands is not limited by the commands shown in the drop-down list. **You can use any valid SQL syntax supported by your database.**



Pasting JAL Syntax

1 Click the  **Paste JAL** button on the Editor's toolbar. The Paste JAL Syntax dialog box will open.
2 Select the statement that you want to paste from the tree list of supported JAL statements.
3 Fill in, if applicable, the statement parameters displayed in the right pane of the dialog window.
4 Click the **OK** button. The 24x7 Scheduler will build the syntax and paste it into the script.

Chapter 14: Log Viewer

The Log Viewer is the tool you can use to monitor job events and view trace information, if tracing is enabled. With Log Viewer, you can also troubleshoot various job execution problems. The logging for the job execution is performed automatically, all other tracing information is collected according to the selected options in the 24x7 Scheduler preferences. For details, see **General** and **Network** tabs.

Start the Log Viewer by clicking the **View** menu then selecting **Log**, or simply by pressing the Ctrl L shortcut.

The Log Viewer consists of the six following tab pages:

- **Job Log** - displays the full event log stored in the SCHEDULE.LOG file for all scheduled jobs. See Execution Logs topic for details.
- **Master** - displays the tracing information stored in the MASTER.LOG file for the last Master session. See Fail-over Mode topic for details.
- **Standby** - displays the tracing information stored in the STANDBY.LOG file for the last Standby session. See Fail-over Mode topic for details.
- **24x7 Script** - displays the tracing information stored in the SCRIPT.LOG file for the last executed JAL script. See Job Automation Language topic for details.
- **Interface** - displays the tracing information stored in the INTFACE.LOG file for the last external interface session. See External Interface topic for details.
- **Database** - displays the tracing information stored in the PBTRACE.LOG file for the last database session. See Database Interfaces topic for details.
- **Statistics** - displays the job execution statistics log stored in the STAT.LOG file. This information is available on Windows NT platform only. See Job Execution Statistics topic for details.

When you first open a log, the Log Viewer displays the current information for that log. That displayed log records are not refreshed while you are viewing. The view is refreshed the Log Viewer is reopened. The log is automatically updated only for the job event log.

You should periodically review the main job event log to check for possible job execution problems. The depth of the job history in the log is limited by the **maximum number of entries in the log** parameter. You can change this parameter in the 24x7 Scheduler preferences. The 24x7 Scheduler, for performance reasons, keeps the log loaded in the computer memory. Therefore, the amount of memory required depends on how many records you have in that log.

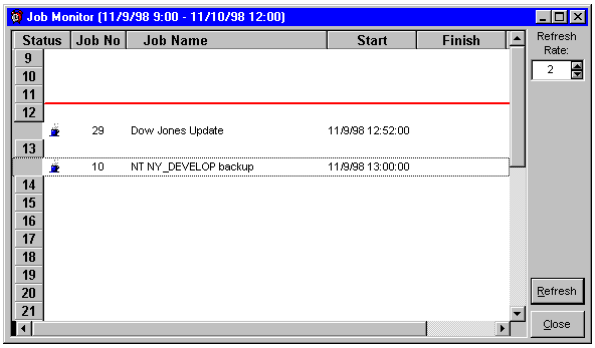
Under normal circumstances, you should let the 24x7 Scheduler to capture the job history for at least a week. This will allow you to view the historical status of your jobs. If, however, you created a job that runs frequently, such as once each minute, you should not allow large logs, unless you have set the **maximum number of entries in the log** parameter to a reasonable value.

 **Tips:**

- The Log Viewer displays the most recent log entries first. To see the oldest entries, scroll to the end or click anywhere inside the log text area, then press the Ctrl+End shortcut.
- If you would like to search for text in any particular log described above, you may want to open the log file using Windows Notepad then use the Search command.
- When the **Trace** option is enabled (see system preferences) the 24x7 Scheduler captures all trace information available. This process will slow the overall system performance, but will provide important information that may help you in troubleshooting scheduled jobs.

Chapter 15: Job Monitoring

The 24x7 Scheduler includes a real-time monitor that you can use to monitor currently running jobs and produce a forecast of the processing scheduled over the next 24 hours. Use the **Time Scale** options if you would like to customize the scale of the length of forecasted period.



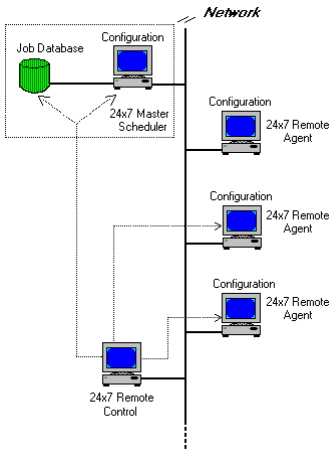
By default, the view is refreshed every two seconds. You can change the refresh rate by using the **Refresh Rate** field. Enter zero to disable the automatic refresh function.

Note:
The Job Monitor cannot forecast jobs with non-time based schedules such as "file watch", "process watch" , and "e-mail watch" , as it does not know when the specified conditions will be met.

Chapter 16: 24x7 Remote Control

About 24x7 Remote Control

The 24x7 Scheduler software supports various configurations including networked components that can be installed on remote computers and/or network, database and application servers that can be placed in locked rooms and closets. The 24x7 Remote Control allows developers, system and network administrators' easy access to such components without leaving their desks. This means that you can run the main 24x7 Scheduler or 24x7 Remote Agent on one computer and access it from another computer connected to it via a local or global network. The 24x7 Remote Control provides a way to manage jobs and configurations on remote computers without roundtrip to the every remote computers. The 24x7 Remote Control utilizes the 24x7 Scheduler's built-in distributed features and thus eliminates the need to purchase and install third party remote access software.



The 24x7 Remote Control has been designed with management and security in mind. It simplifies enterprise job administration by making it easy for the administrator to configure all remote 24x7 components centrally from a **single** workstation. At the same time many people can **simultaneously** use 24x7 Remote Control to manage jobs on the remote 24x7 components. These features are due to 24x7 Scheduler's true client-server architecture.

Important Notes: Before accessing remote 24x7 Scheduler components, make sure they are running either in the **Master Scheduler** or **Remote Agent** mode. The 24x7 Remote Control can be used for manipulating remote or local 24x7 Scheduler components, it cannot be used for manipulating other software.

24x7 Remote Control supports the following functions:

- maintaining jobs and folders on remote 24x7 Master Schedulers,
- maintaining Script Libraries on remote 24x7 Master Schedulers and 24x7 Remote Agents,
- maintaining Holiday Lists on remote 24x7 Master Schedulers and 24x7 Remote Agents,
- maintaining Remote Agent profiles on remote 24x7 Master Schedulers and 24x7 Remote Agents,
- maintaining Database profiles on remote 24x7 Master Schedulers and 24x7 Remote Agents,
- downloading and displaying log files from remote 24x7 Master Schedulers and 24x7 Remote Agents.

Managing Remote Jobs and Configurations

You can use 24x7 Remote Control to control 24x7 Master Schedulers and 24x7 Remote Agents running on remote computers. The 24x7 Remote Control will work properly if all components are version 2.2.0 or later.

Before you connect to the remote host for the first time, you must create a new remote host profile. This profile will describe the connection parameters. You create remote host profiles in the same way that you create **remote agent profiles**.

To add, modify, and delete profiles:

1 Start 24x7 Remote Control.
2 Click the **File** menu, then click **Attach to Remote Host** menu item. The Remote Hosts Profiles dialog box will appear. This dialog box will also appear automatically when you start 24x7 Remote Control.
3 This dialog box is similar to the Remote Agent Profiles dialog box. See **remote agent profiles** help topic for instructions on how to create, delete or change profiles.

To change definitions of remote jobs, view remote logs, and configure remote components:

1 Select the **File/Attach to Remote Host** command from the menu. The Remote Hosts Profile dialog box will appear.
2 Select the desired profile then click the **Connect** button. The 24x7 Remote Control connects to the selected host, synchronizes with the remote job database and downloads remote logs and configuration for the connected component.
3 You can now make changes in the job and folder definitions, create new jobs and folders and delete those jobs not needed. You can also review remote logs using the **Log Viewer** and/or maintain definitions of **Holidays, Database Profiles**, and **Remote Agents** on the connected remote host.
4 You can change jobs, holidays, database profiles, and remote agent profiles the same way as you would if you were using the standalone version of the 24x7 Scheduler.
5 When the changes are completed, select the **File/Save to Remote Host** command. This will update the remote host. You can also click the **Save Remote** button on the Job Explorer toolbar.

 **Tip:** Keep in mind that 24x7 Master Scheduler is a true server application therefore many users can simultaneously attach and make changes in the Master Scheduler job database. If a job was changed or a new job was created after you attached to the 24x7 Master Scheduler you would not see the changes until you refreshed your local snapshot of the job database. To receive new changes made by other people, you will need to reattach to the remote host using the **File/Attach to Remote Host** menu.

Starting 24x7 Remote Control

To start the 24x7 Remote Control from the command line:
1 Change current directory to the 24x7 Scheduler directory. For example: *CD "C:\Program Files\24x7"*.
2 Run the command **24x7 /RCONTROL**. The 24x7 Remote Control will now start.

To create a shortcut on the Desktop:
You may prefer creating a shortcut to start the 24x7 Remote Control.
1 Right-click anywhere on the free area of the Desktop. A context menu will appear.
2 Click on **New**, then click **Shortcut**.
3 Type the command line for the 24x7 Scheduler ending with /RCONTROL parameter. The command line must include the full path to the **24x7.EXE**. For example "*C:\Program Files\24x7\24x7.EXE" /RCONTROL*.
4 Click the **Next** button.
5 Type the name for the newly created shortcut. For example: *24x7 Remote Control*.

Double-click on the shortcut icon to start the 24x7 Remote Control

Chapter 17: Testing and Debugging

Sometimes a 24x7 script type job does not behave the way you think it will. Perhaps a variable is not being assigned the value you expect, or a script does not do what you want it to do. In such situations, you can debug the script by using the following options:

1 Using the **Debugger,** run your script in debug mode. This allows you to monitor your script execution; evaluate and change variables, and trace the call stack.
2 Call the **MessageBox** statement within the script to display the value of a variable.
3 Call the **DatabaseDescribe** statement within the script to get definition of the database result set that was created when preparing for data retrieval.
4 Enable the **Trace** features then execute the job. The 24x7 Scheduler writes detailed tracing information into the SCRIPT.LOG file, which you can examine using the **Log Viewer**.
5 Enable the **Database Trace** features then execute the job. The 24x7 Scheduler writes detailed tracing information for all database calls into the PBTRACE.LOG file. You can examine this using the **Log Viewer**.
6 Use the **TelnetConfig** statement to show the Telnet terminal window, which displays all Telnet session messages, sent between the 24x7 Scheduler and the remote host.

After you have found and fixed the problems in your scripts, you should remove all MessageBox statements, so that the job can run without user intervention. You should also disable all tracing features to allow this and other jobs to run at optimum speed without performance hit caused by the tracing.

Chapter 18: Technical Support

Your questions, comments, and suggestions are welcome.

For technical support, e-mail to support@softtreetech.com or use the on-line support form at http://www.SoftTreeTech.com/Support.htm.

When reporting problems, please provide as much information as possible about your problem. Be sure to include the following information:

1 Is the problem reproducible? If so, how?
2 What version of Windows are you running? For example, Windows 95, Windows NT 4.0, etc.
3 What version of the 24x7 Scheduler are you running?
4 If a dialog box with an error message was displayed, please include the full text of the dialog box, including the text in the title bar.
5 If the problem involves an external program, provide as much information as possible about this program.
6 Make sure you include the serial number for your copy of 24x7 Scheduler . Use the **Help/About** menu to look up the correct numbers. Registered users have priority support.

For registration information, purchasing or other sales information, please contact our sales department: sales@softtreetech.com.

For general information, software updates, the latest information on known problems and answers to frequently asked questions, visit the 24x7 Scheduler home page on the Web: http://www.SoftTreeTech.com/24x7/.

We are happy to help in any way we can, but if you are having problems, please check the troubleshooting section first to see if your question is answered there.

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