

Paper 276-27

While You Were Sleeping - Scheduling SAS® Jobs to Run Automatically

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ABSTRACT

If you are tired of running the same jobs over and over again, this paper is for you. The Windows operating system is often viewed as strictly interactive in that a job is expected to run immediately when it is submitted. However, there are several options for scheduling SAS® jobs to run at a later time and on a repetitive basis. This paper will discuss how to use these options and how they differ according to the Windows version being used. Scheduling from within Data Warehouse Administrator will also be discussed. This part of the discussion is also relevant to the Unix environment; however, the primary focus of the discussion will be within the Windows operating system.

By using one of the scheduling options discussed, you will no longer have to remember to submit a job at the proper time or get up in the middle of the night to start your jobs. Let Windows take care of all that for you, while you are sleeping.

INTRODUCTION

You've just converted your mainframe SAS to PC SAS. Production numbers are input every night at eleven, at the end of the night shift. The boss wants an up-to-date production report on his desk when he arrives at 7:30 each morning. You are not looking forward to getting up an extra hour earlier so you can run that report. But what else can you do?

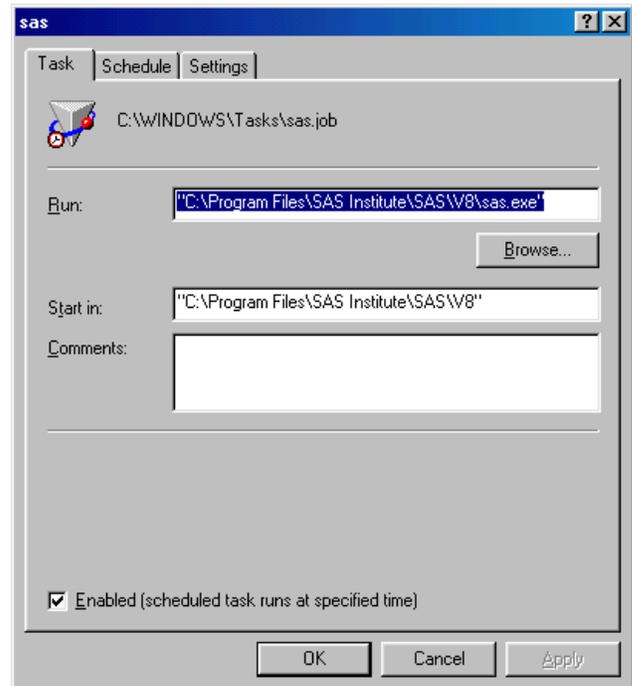
In the mainframe environment, it is standard procedure to submit a job to a queue and wait in turn for it to run. This inherently gives a certain amount of control to put the job on hold and schedule it to be released at a later time. If only Windows provided this level of control. Hit the snooze button one more time. There are some utilities native to Windows that give you the ability to schedule your PC SAS jobs.

WINDOWS 9X

In Windows 95, the scheduling utility was called System Agent. The executable file was named Sage.exe. Apparently, System Agent was provided with the Plus pack for Windows 95 and may not have been installed with other releases. However, with Windows 98, the Scheduled Task Wizard is automatically installed when you install Windows. The executable file, Mstask.exe, is located in your \Windows\System folder. The functionality is the same regardless of whether you are running on Windows 95 or Windows 98.

To schedule jobs, first double-click on My Computer. Double-click on the Scheduled Tasks folder and then double-click on the Add Scheduled Task icon. When the Task Wizard appears, you will be prompted to click Next to continue. Be aware that after you click next it may take several seconds for the wizard to search your computer for applications that are available for scheduling. Scroll down the list until you find "The SAS System." If you do not see SAS listed click on the Browse button and locate the SAS executable (SAS.exe) that you will be using to execute your program. After SAS has been selected and you have clicked Next, you will see a screen that allows you to configure the task. Start by changing the name of the task to something more specific to the task. This is especially significant if you plan to schedule more than one SAS job on your computer. Select the frequency at which the task is supposed to be performed and click Next to continue with the configuration. The next screen allows you to provide additional time and date parameters for when the job will run. On the final screen that appears, there is a check box labeled, "Open advanced

properties for this task when I click Finish." Be sure to check this box as it will take you directly to a screen that allows you to specify your specific SAS program. A window similar to the one below should appear:



If you selected SAS from the list, the text in the Run box may also include a parameter that points to your SAS configuration file. Use a single mouse click to get a cursor at the end of all the text in the Run box. Make sure none of the text is highlighted before you begin to type. Add a space and then the word `-sysin`. Follow this with another space and the complete path to your SAS program inside quotes. For example:

```
-sysin "C:\My Documents\SAS programs\Production Report.sas"
```

The `sysin` switch tells SAS what program to run when it is launched by the scheduler. The quotes are essential or the scheduler will interpret spaces in the path as delimiters between commands. You could also add the switches `-log` and `-print` to redirect the log and output respectively; however, this makes the command line extremely long and cumbersome. It is recommended instead to use `proc printto` and other options inside the SAS program whenever possible.

Use the settings tab of this advanced properties window to configure other controls such as whether the computer should wake up to run the program. Clicking OK will close the window and add an icon for the job in the Scheduled Tasks folder.

WINDOWS NT

In the Windows NT family, the task scheduler is lovingly referred to as the AT command. While the AT command is a powerful tool, it does have its shortcomings. Unlike its Windows 9x counterpart, the AT command does not come with a wizard. Instead, it is configured completely from the DOS command prompt. It also does not support long path names. A third drawback is a 255 character limitation on the length of the

command that is submitted. These shortcomings can all be overcome and the result is worth the effort.

A DOS command prompt window can be opened by clicking on Start, then Run, typing the word **command** in the open text box, and clicking OK. Simply type in AT and press enter to get a listing of all of the jobs that are currently active. Typing in the command shown below will display all of the options available for the AT command:

```
AT /?
```

In order to use the AT scheduler, it is essential to understand how Windows converts long folder names to 8 character names for backwards compatibility. First, the spaces are removed from the name. Then the name is shortened to only the first six characters. Finally, the tilde (~) and a number are added to complete the 8 characters. The number will be 1 (one) unless a folder with that name already exists. If the name exists the number will be incremented until a unique name is created. For example, the Program Files folder will be called Progra~1 when used with the AT command. For a full explanation of long filename conversion see Microsoft Knowledge Base article Q101601.

A scheduled job is created by entering AT followed by the time, occurrences, date and the command to be executed. Time should be entered in 24 hour military time format (i.e.: 22:00 for 10pm). The number of occurrences is specified by the keyword /next: or /every:. Use /next: to schedule the job to run only once. Use /every: for repetitive jobs. The date must immediately follow the colon. It may be a day of the week or a day of the month. Multiple days are separated by a comma. To conserve space, use only the first letter or two of the day's name. Sa and Su are used to distinguish between Saturday and Sunday. For the day of the month, simply enter the number. This is followed by the full path of the command to be executed. As with the Windows 9x family, the -sysin switch is used to specify the specific SAS program to be executed. Since there is a 255 character limit, you may have to store your SAS programs in a folder that is near the root (C:\) in order to save space. The following command would be entered to schedule our program to run every Tuesday and Thursday at 9:00pm:

```
AT 21:00 /every:Tu,Th c:\progra~1\sasins~1\sas\l8\sas.exe -
sysin C:\MyDocu~1\SASpro~1\Produc~1.sas
```

Windows will automatically assign a number to the job. You will see this number when you use AT to display the active jobs. You will need to use this number in the command line if you want to delete the job from the active list.

WINDOWS 2000

For backwards compatibility, Windows 2000 has inherited all of the functionality of the AT command from NT 4.0. However, a nice graphical interface similar to Windows 9X has also been included with Windows 2000. This "Task Scheduler" utility can be accessed most quickly by double-clicking on the Scheduled Tasks icon in the Windows control panel. The Task Scheduler is also available through the click path Start – Programs – Accessories – System Tools. One improvement of the Task Scheduler over the AT command is the ability to schedule a job to run when the system is started up or when you log in. This is convenient if you need to start a program such as the Job Spawner that isn't set up to run as a Windows Service. Use of the Task Scheduler in Windows 2000 is identical to the procedure described above for Windows 98 with the exception of an added security feature. Windows 2000 provides the "Run As" feature that allows you to supply a user name and password for the scheduled task. For instance, you may want to schedule a job that accesses data that you cannot access from the account you

normally use to log in. You could supply an authorized account in the "Run As" field and schedule the job without having to log out and log back in with the authorized account. Another nice feature in Windows 2000 is the ability of the Task Scheduler to monitor and manage jobs scheduled through the AT command. A sample Task Scheduler window is shown in Exhibit 1 at the end of this paper.

DATA WAREHOUSE ADMINISTRATOR

The Data Warehouse Administrator software does not have an integral scheduler. However, it can serve as a front end or graphical interface for the AT command on Windows NT/2000 systems and for the cron command on Unix systems. As a word of caution, Data Warehouse Administrator explicitly specifies the location of the log file and saved output. If the path is any significant length the 255 character limit will be exceeded. This makes it imperative to set up the working folder close to the root and give it a short path name. An example of a suitable folder name would be C:\whjobs.

Job scheduling in this environment is intended to automate the loading of data into the warehouse rather than facilitate stand-alone jobs as described in the preceding sections. The jobs scheduled by the warehouse administrator will contain code that is generated as the load process is configured for your data warehouse tables.

The instructions and examples that follow are based on Version 1.3 of the SAS/Warehouse Administrator® software. This release runs under version 6 of base SAS. It is assumed that the reader has a basic familiarity with the structure of a data warehouse and navigation within the SAS/Warehouse administrator software.

When the user right clicks on a warehouse table, a menu should appear with "Run" as one of the selections. Clicking on the "Run" option should bring up a window similar to the one shown in Exhibit 2. When the Batch Code radio button is clicked the schedule button will no longer be grayed out. However, in our experience there have been difficulties using this option to successfully schedule a job. Therefore, an alternate method will be provided. Click on the Save button and save the code as a Source entry. This will store the code in a SAS catalog where it can be retrieved later. When the code has been saved, close this window and the Warehouse Environment window should be visible once again.

Click on Tools from the SAS menu bar. A drop-down menu should appear with Scheduler as one of the available selections. Selecting this option will bring up the Job Window shown in Exhibit 3. Enter a descriptive name for the job and select the Source Code location that was used in the previous step.

Click the Date/Time tab to see the window shown in Exhibit 4. Make the appropriate selections according when you want the job to run.

Click the Server tab to see the window shown in Exhibit 5. The first time you schedule a job, you will need to add a Scheduling Server. The server can be Windows NT/2000 or Unix. The server configuration will be saved in your SAS profile for future use. Once a server is configured, select the server for the job you are scheduling. Click the Schedule button on the right side of the window when you are ready to submit the job to the server. You can use the View button to check the status of your scheduled warehouse jobs. When you are finished, click on the close button to exit this window.

You should be aware that each time you schedule a job a SAS program file is created in the working folder you set up for the server. The program will have a name like A0000018.sas. There will be a corresponding log file with the same prefix. These files

are not deleted when the job is deleted from the schedule. Periodic cleanup may be required to avoid confusion when searching the working folder for log files. Exercise caution not to delete a program for a job that still has an active schedule.

The job scheduling functions in the SAS/Warehouse Administrator® software that runs under SAS version 8 are very similar to those described above. The main difference is the location of some of the tools within the user interface. Scheduling in the latest release is more closely integrated into the creation of the load process. Before SAS/Warehouse Administrator can generate code to schedule a job, the following tasks must be completed.

1. Define the scheduling server where the job will run.
2. Define an appropriate Jobs Information library.

Rather than reproducing SAS documentation in this paper, let me refer you to Chapter 15 of the SAS/Warehouse Administrator® User's Guide, Release 2.0.

LSF SCHEDULER

On August 14, 2001, SAS announced that it had begun shipping Platform Computing's LSF Job Scheduler with SAS/Warehouse Administrator® software Release 2.2. Since it is a relatively new addition to the SAS environment, LSF Job Scheduler is beyond the scope of this paper.

CONCLUSION

The convenience of using the job schedulers varies greatly

depending upon the operating system you are using. However, the functionality does exist without spending a lot of extra money. A little time spent familiarizing yourself with the available utilities will pay great benefits the next time your SAS jobs run while you are sleeping.

REFERENCES

Microsoft Knowledge Base Article, "Converting Filenames from NTFS to FAT (8.3) Convention (Q101601)"
<http://support.microsoft.com/default.aspx?scid=kb;en-us:Q101601>, August 8, 2001.

SAS Institute Inc. (1999), SAS/Warehouse Administrator® User's Guide, Release 2.0, Cary, NC, USA

CONTACT INFORMATION

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Exhibit 1 – Windows 2000 Task Scheduler Window

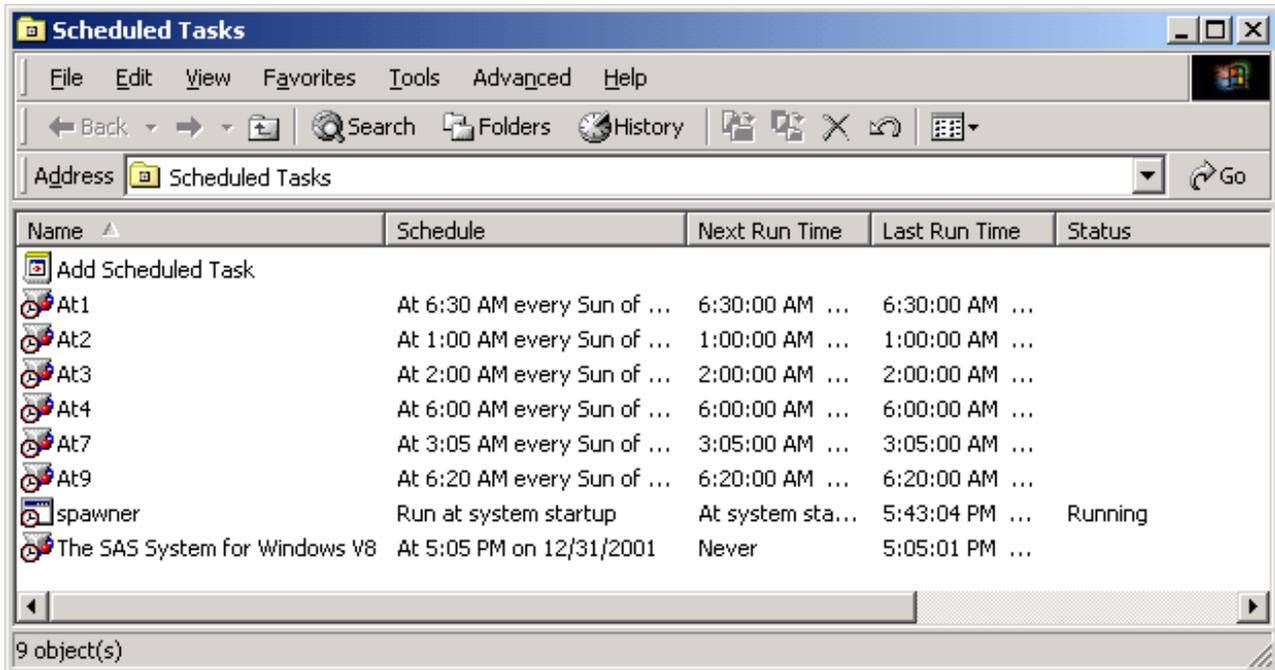


Exhibit 2 – SAS/Warehouse Administrator Load Generation Window

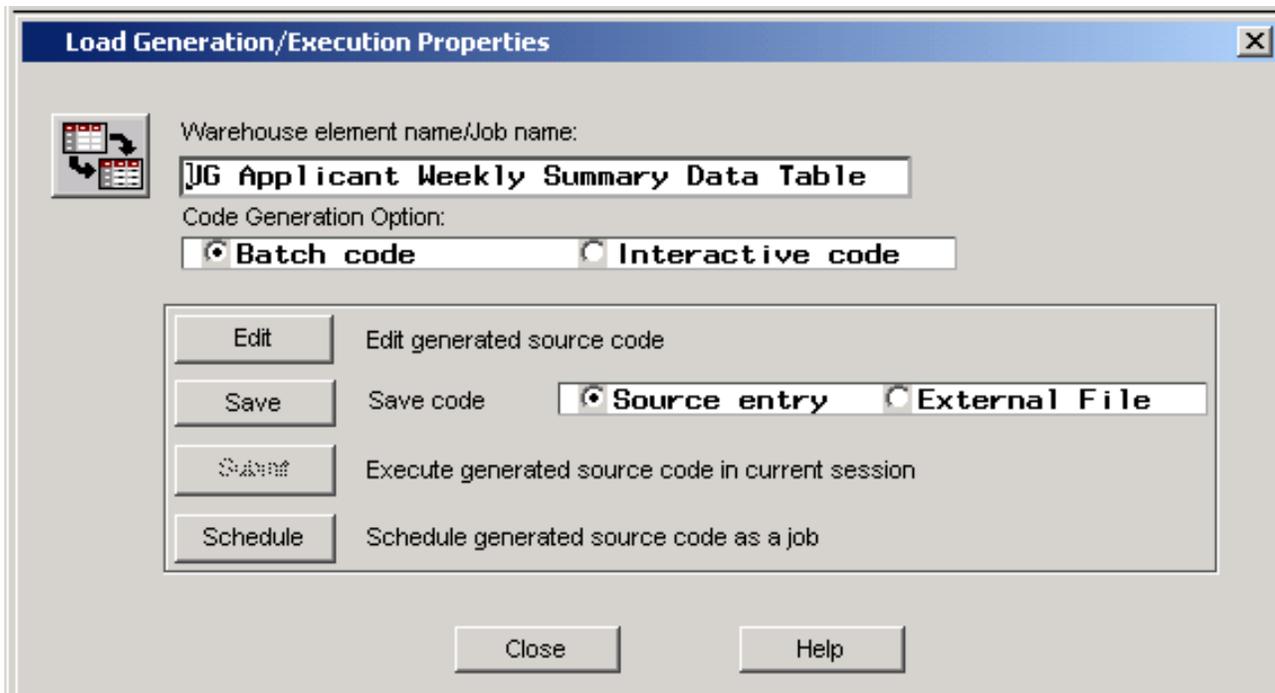


Exhibit 3 – SAS/Warehouse Administrator Job Scheduler - Job Window

Job Scheduler

Job | Date/Time | Server | Prolog/Epilog | Tracking

Job name:

Job description:

Source code type: Catalog entry External file

Source code location:

Close

Schedule

View

Hosts

Libraries

Help

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Exhibit 4 – SAS/Warehouse Administrator Job Scheduler – Date/Time Window

Job Scheduler

Job | Date/Time | Server | Prolog/Epilog | Tracking

Select a run frequency:

Run once
 Run daily
 Run weekly
 Run monthly

Run Date: January 14, 2002

Run Time: 7 : 42 pm

Months: January, February, March, April, May

Days: 1, 2, 3, 4, 5

Weekdays: Sunday, Monday, Tuesday, Wednesday, Thursday

Close

Schedule

View

Hosts

Libraries

Help

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Exhibit 5 – SAS/Warehouse Administrator Job Scheduler - Server Window

