JAMS User Guide

Order Number: JAMS-UG-42

This manual provides a complete description of the *Job Access & Management System*.

Revision/Update Information:	This manual supersedes the *Guide to the Job Access & Management System, Version 4.0*.
Operating System and Version:	OpenVMS/VAX Version 6.2 or higher, OpenVMS/AXP V6.2 or higher
Software Version:	JAMS Version 4.2

The information in this document is subject to change without notice and should not be construed as a commitment by MVP Systems Incorporated. MVP Systems, Inc. assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of this license.

Restricted Rights Notice: Use, duplication, or disclosure by the U.S. Government is subject to restrictions set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013.

If you have questions about *JAMS* please feel free to call *JAMS* technical support at (866) 259-5267. Technical support is available around the clock, 24 hours a day, 7 days a week. The mailing address is:

TECHNICAL SUPPORT DEPT.
MVP SYSTEMS INC.
2700 E. MAIN ST.
SUITE 108
COLUMBUS, OH 43209

E-Mail: JAMS@mvpsi.com
WWW: http://JAMS.mvpsi.com
WWW: http://www.mvpsi.com

Contents

INDEX

FIGURES

Preface

This manual provides a detailed description of the capabilities of the *Job Access & Management System (JAMS)*. The information contained within this manual is of interest to those who are responsible for installing, implementing and using this software package.

Additional Documentation

JAMS is designed to run under the OpenVMS and Windows NT/2000 operating systems and this manual assumes that the reader has a basic understanding of these operating system environments. The following OpenVMS documentation may also be helpful when using *JAMS*.

- *Guide to using Command Procedures* provides information on command procedures and batch jobs.
- *DCL Dictionary* provides information on the SUBMIT and PRINT commands and their qualifiers.
- *Guide to Programming Resources* provides information on developing programs in the OpenVMS environment.
- *Guide to OpenVMS System Security* provides information on Access Control List (ACL) based security.

Conventions

The following conventions are used in this manual:

Convention	Description
UPPERCASE	Uppercase words and letters used in examples indicate text that you should type exactly as shown.
lowercase	Lowercase words and letters used in examples indicate text that you should substitute a word or value of your choice.
[]	Brackets ([]) indicate optional elements.
{}	Braces ({}) indicate required elements.
...	An ellipse (...) indicates that the preceding item can be repeated.
CTRL/x	The text CTRL/x indicates that you should press and hold the key labeled Ctrl while you press the key indicated by the x (for example CTRL/C, CTRL/Z).
Key Name	Text enclosed in a box indicates that you should press the key whose name is enclosed by the box.
Gold/x	Key names which begin with Gold/ indicate that you should first press and release the Gold key (PF1 on most keyboards) and then press the key indicated by the x.

1 Overview of JAMS

This chapter provides an overview of the *Job Access and Management System*, also known as *JAMS*.

1.1 Introduction

The *Job Access and Management System* (*JAMS*) is designed to automate and enhance the batch processing capabilities provided by the OpenVMS, Windows NT/2000, and Unix/Linux operating systems. *JAMS* provides those in charge of operations as well as the general end-user, with the ability to request, monitor and control the processing of batch jobs.

JAMS provides the control mechanisms which allow you to give end-users the ability to request batch processing and yet, you can still retain control of how, and when, the requested jobs are executed. In addition to allowing end-users to submit their own jobs, *JAMS* allows you to schedule jobs for unattended execution.

JAMS is scalable, tightly integrated with the operating system, customizable, and yet is ready to provide benefits right-out-of-the-box. You can use *JAMS* as is, or customize it to your needs without worry that future *JAMS* upgrades will displace the work you have done. Properly implemented, *JAMS* will both enhance and simplify your batch scheduling which increases your system's reliability and lowers your total cost of operations.

Visit our web site at http://JAMS.mvpsi.com/ for the latest information regarding JAMS.

1.2 Capabilities of the Job Access and Management System

The *Job Access and Management System* was designed to enhance and control the entire life cycle of a batch job, from the initial end-user request for processing, to the scheduling of the job (or jobs) which need to be run, to monitoring the jobs for successful completion, to the distribution of the information produced by the jobs.

JAMS provides the following key benefits:

- Jobs can run on OpenVMS, Windows NT/2000, or Unix/Linux.
- Without regard to platform, *JAMS* will honor and enforce resource requirements, triggers, and job dependencies.
- Global variables are available to any batch job running on any system.
- Batch jobs can execute in queues, run as detached processes, or specific one-line commands can be issued to run on any given node.
- With resource based scheduling, you can ensure that the workload on your systems is managed.

- You can give end-users simple, secure, access to batch processing.
- Recurring Jobs can be automatically submitted using time based or event based schedules.
- Batch job execution history is immediately available on-line.
- You can use the *JAMS* Job Monitor to manage and track all batch processing.
- You do *not* need to make any changes to your existing batch jobs.
- Recurring jobs may have date parameters and the correct date will be supplied when *JAMS* automatically submits the job.
- *JAMS* can notify people via OpenVMS Mail, broadcasts or OPCOM messages when a batch job fails, runs too long, runs too quickly or is stalled.
- A job may have up to 255 parameters.
- You can use *JAMS* to provide simple, standard, and secure batch job templates.
- Parameter substitution can take place in data areas of DCL, script, and batch command procedures.
- The *JAMS* monitor allows you to monitor and manage batch jobs from from all three interface options (screen, DECwindows/MOTIF, Windows).

1.2.1 User Access to Batch Processing

JAMS is designed to enable end-users to take some responsibility for their batch processing. *JAMS* provides a simple interface to batch job submission as well as functions which allow a user to display and monitor their batch jobs. The end-user is best able to determine when, or if, a job should be executed and what the parameter values for the job should be.

While end-users can take responsibility for directly submitting most of their jobs, the Data Center management still controls the execution and definition of the jobs. Data Center personnel define the jobs and attributes such as execution method, scheduling windows, dependencies, required resources, default parameter values, job execution priority etc. The job can be required to be submitted on hold, meaning that a Data Center Professional must release the job before it will actually run.

In addition to time or trigger based automatic batch job submission, *JAMS* provides five additional means of requesting or submitting a batch job:

- Menu driven, video forms based system.
- DECwindows/Motif based interface.
- Command line interface similar to the OpenVMS SUBMIT command.
- Windows 9x/NT/2000.
- Callable interface which you can access from your applications.

These interfaces are used to submit ad hoc jobs, jobs which are not regularly scheduled via scheduled times or triggers.

1.2.1.1 Menu based job submission

The menu based system provides a simple means to locate and submit a batch job. The end-user is provided with a menu of jobs which they may submit. The menu hierarchy and content can be customized to your specific needs. Once the end-user selects a job, they may be presented with a "fill in the blanks" type of video form which is used to obtain values for the parameters which the job needs. These parameters can be edited and verified *before* the job is submitted. With the built-in security model, users can only submit those jobs which they have clearance to submit. Users will also have the ability to modify job output characteristics, such as the number of copies of a report, or the print queue it should print on.

1.2.1.2 DECwindows/Motif based job submission

The DECwindows/Motif based system is similar to the menu based system except that it is designed to run under the DECwindows/Motif graphical user interface.

1.2.1.3 Command line interface

The command line interface is similar to the OpenVMS SUBMIT command. By using the *JAMS* SUBMIT command, users have access to the enhancements provided by *JAMS* including:

- Forms based parameter entry.
- Modification of report destination queues, forms etc.
- Enhanced parameter editing and substitution.
- Command file template expansion.
- Initiating Jobs on OpenVMS which may actually execute on Windows NT/2000 or UNIX/Linux.

1.2.1.4 Windows 9x/NT/2000 based job submission

Windows 9x/NT/2000 is similar to both the DECwindows/Motif based system and the menu based system. This interface is designed to run under the Windows graphical user interface standard.

1.2.1.5 Callable interface

The callable interface allows you to integrate the *Job Access and Management System* into your custom OpenVMS software. All of the capabilities of the *JAMS* Submit sub-system are available with the callable interface. By calling the appropriate *JAMS* routine, you can present the end-user with a menu of batch jobs to submit or submit a specific job. The callable interface is explained in more detail in *the JAMS Reference Manual*.

1.2.2 Managing Batch Jobs

JAMS provides a high performance dynamic job monitoring and management system. On OpenVMS systems, *JAMS* even monitors those jobs which were not submitted by *JAMS*. The information is constantly updated and always up to date. The Monitor *never* scans the OpenVMS batch queues so performance is not negatively affected, no matter how many people are running the Monitor.

A properly authorized user can use the *JAMS* Monitor to manage jobs. A job may be rescheduled, aborted, held, released or restarted all from within the *JAMS* Monitor.

The *JAMS* Monitor has three interfaces:

- Screen.
- DECwindows/Motif.
- Windows.

1.2.3 Tracking Batch Job History

One of the most basic functions of *JAMS* is to monitor and track the status of batch jobs. *JAMS* maintains a history of batch jobs, tracks the history for those jobs which were submitted by *JAMS* as well as those jobs submitted by other means (OpenVMS SUBMIT command etc.) This history information is available on-line and is updated immediately after the status of a job has changed.

JAMS also monitors jobs in order to resolve *job dependencies*. Job dependencies insure that all prerequisite processing has been completed before a job is released for execution.

1.2.4 Remote Access

JAMS provides the ability to access *JAMS* Servers on remote nodes. Once a person has connected to a remote node, they can submit jobs, monitor batch processing and search the *JAMS* history information.

You can connect to an unlimited number of nodes and it is very easy to toggle between nodes. This capability makes it very easy to manage the batch processing of an entire distributed organization from a single point.

1.2.5 Recurring Jobs

Virtually every site has batch jobs which must be submitted on a regular basis. These recurring jobs can be automatically submitted by *JAMS*. There is virtually no limit to the number of ways to specify the date and time at which a recurring job should be scheduled to execute. You can also define *event based* schedules.

The *Resource* functionality within *JAMS* is designed to limit the number of jobs running simultaneously which require the same resources. Once resource requirements are defined for your jobs you can rest assured that the workload on your servers will be controlled.

1.2.5.1 Time Based Schedules

The specification of a scheduled time includes an English language date selection, a time of day and whether or not to run the job on non-work days.

JAMS capability for understanding English language representations of dates is quite extensive. *JAMS* can understand simple dates such as "MONDAY" or "DAILY" and complex constructs such as "FIRST WORKDAY OF FISCAL QUARTER".

These English date specifications are used to define a job's scheduled day and for establishing the default value for date parameters to jobs. For more information on this capability, refer to Chapter 10, Entering Generic Date Specifications.

When you Setup a recurring Job you must specify the value of any parameters which the Job requires. If a parameter is a date, you can specify an absolute date or a date which is relative to the date on which the job is submitted.

You have the option of enabling any user to define recurring jobs. An end-user who wants a specific report every Monday morning can Setup their request as a recurring job and the report will be ready for their review every Monday morning.

1.2.5.2 Event Based Schedules

JAMS allows you to define *Triggers* which consist of a list of events and a list of actions. When all of the specified events occur, the list of actions is automatically performed. An event can be the successful or unsuccessful completion of a specific Job. An event can also be a boolean expression based upon the value of a *JAMS* Variable.

A Trigger's list of actions is a list of Jobs to be submitted when the Trigger is fired. For each action Job you can specify a schedule date and time for the Job to start. For example, a Trigger could fire at 3:00 pm Tuesday which schedules a Job to run at 2:00 am Sunday.

1.2.6 Maintaining Schedules

One of the most important aspects of managing a data center is scheduling the workload of your computer systems. While the recurring job capabilities of the *Job Access and Management System* can help maintain your schedule, a recurring job is not always practical.

Batch processing which is run only on request can still be given a scheduled date and time for execution. When a user requests a job, *JAMS* will specify the scheduled time when it submits the job. A user can override this scheduled time when they request the job.

Keep in mind that if you elect to use *JAMS* Resources, jobs may not immediately run due to the defined Resource constraints.

Scheduled times are also used to produce reports which show the expected workload for any given day.

1.2.7 Control of Printed Reports

When a batch job is defined in *JAMS* you can specify the reports which the job produces along with the printer queue they should be printed on and the number of copies and form to be printed on. This lets the Operations group control the printing of reports without changing any DCL command files. When a job is requested, a user is able to override the default print specifications for each report.

Note: This capability requires that you use the command file template expansion option when setting up jobs. Command file template expansion is explained in *the JAMS Reference Manual.*

2 Getting Started with JAMS

This chapter provides a step by step guide to getting started with the *Job Access and Management System*, also known as *JAMS*.

2.1 After the Installation

After *JAMS* has been installed, with *no* changes to your existing jobs and *no* information in the *JAMS* database, *JAMS* provides many useful benefits.

2.1.1 Job Execution History

JAMS monitors all batch jobs on the system, even jobs which were not submitted by *JAMS*. You can use the History Inquiry function to review what jobs have run, their execution statistics and completion status. If you retain your log files, they will be available for review as well.

2.1.2 Job Failure Alerting

JAMS can alert you when any batch job fails. Simply select the Configuration option from the Management Options menu and supply the OpenVMS Usernames and/or operator classes for the people who should be notified when a job fails. *JAMS* can notify you of a failed job via VMSmail, broadcast messages and OPCOM messages.

2.1.3 Job Monitoring and Management

The Monitor Jobs menu option can be used to monitor and manage all batch jobs on your system. This feature provides a powerful, easy to learn interface to OpenVMS batch processing.

2.2 Defining and Using JAMS Jobs

JAMS has been designed to be very easy to implement because the implementation can be done in phases, a Job at a time. *JAMS* will start providing useful information within minutes of installation. The benefits of *JAMS* will continue to accrue as you implement more jobs.

In order to expand *JAMS* capabilities, you need to enter information into the *JAMS* database. To begin, you need to understand three terms which are used extensively in *JAMS*. These terms are *System*, *Job* and *Setup*.

A *System* is a logical group of jobs. A *JAMS* System Definition defines things which are common to all jobs within the System.

A *Job* is a command or command procedure. Most sites are already using command procedures for their batch processing. You can continue to use your existing command procedures after installing *JAMS*. In order to take full advantage of *JAMS*, you will need to enter information about your batch jobs into the *JAMS* database, this is a *Job Definition*.

A *Setup* is the definition of a particular occurrence or view of one or more jobs. Setups are commonly used to schedule a job, or stream of jobs, to automatically execute at a regular interval.

2.3 Systems Definitions

In *JAMS*, Job and Setup Definitions must belong to a particular System. This means that you must create at least one System Definition before you can create any Job or Setup Definitions.

Let's create the simplest System possible. We'll call it the DEMO System. For these examples we will use the command line interface. Please keep in mind that you can use this interface or the screen based interface to define Systems.

The *JAMS* command would be:

```
JAMS> DEFINE SYSTEM DEMO
SYSTEM_DEF> END_SYSTEM
```

That's simple! This illustrates that, although a *JAMS* System definition has many potential attributes, you do not have to define anything which isn't useful to your environment.

Note: The previous example showed the results of entering the commands at the *JAMS>* prompt. It will be easier to follow along if you use a text editor to create a *JAMS* command file. This way, you won't have to retype the commands each time we add to them. You simply edit your command procedure and then execute it from the *JAMS>* prompt by typing *@filename.ext*. From now on, the examples will show the contents of the command procedure, without the prompts.

While the DEMO System is simple, it isn't very useful. Let's expand the definition to make it more useful.

```
DEFINE SYSTEM DEMO
    DESCRIPTION "Demo System"
    DEFAULT SOURCE LOCATION DEMO$DISK:[DEMO.DCL]
    BATCH QUEUE PROD_QUE1
    MAIL NOTIFICATION "JOHN"
END_SYSTEM
```

There, now we have a description of this System, and some defaults which will make it easier to create job definitions. There are a lot more attributes which we could specify but, we'll keep it simple for now.

One thing to note, a System Definition has an Access Control List (ACL) which controls who may manipulate the jobs in the System. Since we didn't specify an ACL in the definition, *JAMS* provided a default ACL which grants us complete access. No one else has any access at all.

2.4 Job Definitions

The most basic Job definition consists of the Job's name and System I.D. Entering this information into the *JAMS* database will provide more meaningful reporting, because jobs will be grouped by System. The System definition will also enable a finer degree of control over who should receive notification of abnormal Job terminations.

Let's create the simplest Job possible. We'll call it DEMOJOB1 and make it a member of the DEMO System. The *JAMS* command would be:

```
DEFINE JOB DEMOJOB1
    SYSTEM DEMO
END_JOB
```

While is is extremely simple, it could be a complete job definition because the System definition provides a lot of default values. If the command procedure for this job was named DEMOJOB1.COM and was located in DEMO$DISK:[DEMO.DCL] and it didn't require any parameters, this would be a complete definition. We could submit the job with the command:

```
JAMS SUBMIT DEMOJOB1
```

JAMS would prompt for the scheduled date and time and submit DEMO$DISK:[DEMO.DCL]DEMOJOB1.COM to the PROD_QUE1 batch queue (which it picked up from the System Definition).

2.4.1 Automatic Job Submission

So far, DEMOJOB1 is simple but, not very useful. The first thing that most people want to do with *JAMS* is automate the submission of jobs. We can manually submit DEMOJOB1, let's see what we have to do to automatically submit it.

```
DEFINE JOB DEMOJOB1
    SYSTEM DEMO
    AUTO SUBMIT
    SCHEDULED DATE "MONDAY, WEDNESDAY, FRIDAY"
    SCHEDULED TIME 14:00
END_JOB
```

Now *JAMS* will automatically submit DEMOJOB1 every Monday, Wednesday and Friday at 2:00 PM. One word of caution, *JAMS* generally schedules about 24 hours in advance so a new job definition won't be automatically scheduled until the day after it's created.

Notice how the scheduled date is a natural language specification. *JAMS* understands almost any date specification including complicated ones like "LAST WORKDAY OF MONTH", "2ND TUESDAY OF MONTH" or "FIRST DAY OF NEXT MONTH".

2.4.2 Parameters

Command procedures can be much more powerful if you can pass parameters to them. Likewise, batch jobs can be more powerful if they can handle parameters. *JAMS* has very powerful parameter handling capabilities. Let's add some parameters to our demo job.

```
DEFINE JOB DEMOJOB1
    SYSTEM DEMO
    AUTO SUBMIT
    SCHEDULED DATE "MONDAY, WEDNESDAY, FRIDAY"
    SCHEDULED TIME 14:00
    PARAMETER P1
        PROMPT "Start Date"
        DATE
        DEFAULT VALUE "FIRST DAY OF MONTH"
    END_PARAMETER
    PARAMETER P2
        PROMPT "Sales Category"
        TEXT LENGTH 4
        DEFAULT VALUE "ALL"
    END_PARAMETER
END_JOB
```

We've added two parameters to DEMOJOB1, P1 is a date parameter and P2 is a text parameter. Perhaps the DEMOJOB1 job produces a sales report of sales since the specified date for the specified sales category. Notice that the default value for the date parameter is a natural language date specification.

If you used the JAMS SUBMIT command now, *JAMS* would prompt you for the values for these parameters using a "fill in the blanks" form.

In this example we used parameter names of P1 and P2 which will be familiar to DCL programmers. You want to use "Pn" parameter named for your existing command procedures but, *JAMS* supports up to 255 parameters per job with names up to 31 characters in length. See *the JAMS Reference Manual* for more information on this.

2.4.3 Source Code

A *JAMS* Job definition can also include the command procedure for the job. For clarity, the previous examples didn't include the command procedure. Here's an example which includes the source code.

```
DEFINE JOB DEMOJOB1
    SYSTEM DEMO
    AUTO SUBMIT
    SCHEDULED DATE "MONDAY, WEDNESDAY, FRIDAY"
    SCHEDULED TIME 14:00
    PARAMETER P1
        PROMPT "Start Date"
        DATE
        DEFAULT VALUE "FIRST DAY OF MONTH"
    END_PARAMETER
    PARAMETER P2
        PROMPT "Sales Category"
        TEXT LENGTH 4
        DEFAULT VALUE "ALL"
    END_PARAMETER

    SOURCE IS
$!
$!  The command procedure for the job can be contained
$!  in the job definition too!
$!
$ RUN DEMOPROGRAM
$!
    END_SOURCE

END_JOB
```

2.5 Setup Definitions

A *JAMS* Setup Definition sets up up one or more jobs to run. A Setup can specify values for parameters, schedules and many other attributes of a job. In our Job Definition example, the DEMOJOB1 job is going to automatically run every Monday, Wednesday and Friday to produce a report for all sales categories of sales since the beginning of the month. Suppose the manager of the XYZ sales category wants this report weekly for just the XYZ category. We could create another job which is nearly identical to DEMOJOB1 but a better approach may be to create a Setup Definition which runs the DEMOJOB1 job with difference parameters. Here is that Setup definition:

```
DEFINE SETUP DEMOJOB1_WEEKLY
    SYSTEM DEMO
    AUTO SUBMIT
    SCHEDULED DATE "FRIDAY"
    SCHEDULED TIME 18:00
    JOB DEMOJOB1
        STEP 1
        PARAMETER P1
            DEFAULT VALUE "MONDAY"
        END_PARAMETER
        PARAMETER P2
            DEFAULT VALUE "XYZ"
        END_PARAMETER
    END_JOB
END_SETUP
```

This setup definition runs the DEMOJOB1 job with a different schedule and different parameters.

Setups can contain more than one job. Once the managers of the other sales categories see how useful this weekly report is, they will want the same report for their sales category. The setup could wind up looking like this:

```
DEFINE SETUP DEMOJOB1_WEEKLY
    SYSTEM DEMO
    AUTO SUBMIT
    SCHEDULED DATE "FRIDAY"
    SCHEDULED TIME 18:00
    JOB DEMOJOB1
        STEP 1
        PARAMETER P1
            DEFAULT VALUE "MONDAY"
        END_PARAMETER
        PARAMETER P2
            DEFAULT VALUE "XYZ"
        END_PARAMETER
    END_JOB
    JOB DEMOJOB1
        STEP 2
        PARAMETER P1
            DEFAULT VALUE "MONDAY"
        END_PARAMETER
        PARAMETER P2
            DEFAULT VALUE "ABC"
        END_PARAMETER
    END_JOB
    JOB DEMOJOB1
        STEP 3
        PARAMETER P1
            DEFAULT VALUE "MONDAY"
        END_PARAMETER
        PARAMETER P2
            DEFAULT VALUE "DEF"
        END_PARAMETER
    END_JOB
END_SETUP
```

Now, the DEMOJOB1_WEEKLY Setup runs the DEMOJOB1 Job three times with different parameters. Since we specified sequential steps, the jobs will run one at a time. We could also put more than one job in a step to run jobs in parallel.

2.6 Sequencing

One of the most important responsibilities of a job scheduling system is to properly sequence and regulate job execution. It must make sure that a job's prerequisites are met before a job is released and it must make sure that it doesn't overload the systems with batch processing. *JAMS* provides a number of feature in this area.

2.6.1 Setups

A Setup sets up one or more Jobs to run. A Setup is the simplest way to sequence a stream of Jobs. The Jobs in a Setup run in order based upon the step which the job is assigned. If more than one Job is assigned the same step, those Jobs can run in parallel.

In addition to a step, each Job in the Setup also contains attributes that define what should happen if the Job fails. These attributes include:

- Minimum acceptable completion severity.
- Should the Setup wait for the completion of this job?
- Should the Setup halt if the job fails?

2.6.2 Dependencies

A Job or Setup can have an unlimited number of dependencies. There are job completion dependencies and variable dependencies.

2.6.2.1 Job Dependencies

A job completion dependency insures that a prerequisite job has completed before a job is released. One key question is, completed since when? The default is since the last time that the depending job completed. You can change this *since job* or eliminate the since job and use an absolute time range.

Let's add a Job dependency to our demo job (note that this is a partial Job definition).

```
DEFINE JOB DEMOJOB1
 ...
    DEPENDS ON
        JOB RUN_FIRST
    END_DEPEND
 ...
END_JOB
```

This dependency will make the DEMOJOB1 job wait if the RUN_FIRST job hasn't completed successfully since the last time that DEMOJOB1 completed successfully.

Let's change this dependency a little.

```
DEFINE JOB DEMOJOB1
 ...
    DEPENDS ON
        JOB RUN_FIRST
        SINCE JOB RUN_LAST
    END_DEPEND
 ...
END_JOB
```

Now this dependency will make the DEMOJOB1 job wait if the RUN_ FIRST job hasn't completed successfully since the last time that a third job (RUN_LAST) completed successfully.

We can also eliminate the since job.

```
DEFINE JOB DEMOJOB1
 ...
    DEPENDS ON
        JOB RUN_FIRST
        NO SINCE JOB
 WITHIN 12 HOURS
    END_DEPEND
 ...
END_JOB
```

Now this dependency will make the DEMOJOB1 job wait if the RUN_FIRST job hasn't completed successfully within the past 12 hours.

2.6.2.2 Variable Dependencies

A *JAMS* Variable is persistent named piece of data. It has a name, datatype and current value. *JAMS* Variable have a number of uses one of which is being used in a dependency. A Variable dependency is simply a test of the value of a variable. If the test is true, the dependency is satisfied.

Let's add a Variable dependency to our demo job (note that this is a partial Job definition).

```
DEFINE JOB DEMOJOB1
 ...
    DEPENDS ON
        VARIABLE FREESPACE > 25000
    END_DEPEND
 ...
END_JOB
```

This dependency looks at the *JAMS* Variable named FREESPACE. If it's value is greater than 25,000 the dependency is satisfied.

2.6.3 Precheck Jobs

A *Precheck Job* is a user written dependency. When a Job's dependencies are satisfied *JAMS* will submit the Job's Precheck Job (if it has one), if the Precheck Job completes successfully *JAMS* will release the main Job. If the Precheck fails, the main Job will continue to hold and *JAMS* will resubmit the Precheck job after the defined delay.

The Precheck job can also exit with the JAMS_CANCELJOB status which tells *JAMS* that the main job doesn't need to run. *JAMS* will then process the main job as if it has just completed and it will be removed from the schedule. Let's see what we would add to a Job (or Setup) definition to add a Precheck Job (note that this is a partial Job definition).

```
DEFINE JOB DEMOJOB1
 ...
    PRECHECK JOB CHECK_EDI_TRANSMISSION
    PRECHECK INTERVAL 00:15
 ...
END_JOB
```

You can see that we only needed to add two lines to the job definition in order to specify a Precheck Job. The second line is optional, if we had left it out the interval would default to 5 minutes.

2.6.4 Resources

Resources are a very powerful scheduling tool because they let you define the requirements for your jobs and then *JAMS* will figure out which jobs can run together, how many jobs can run simultaneously etc. In *JAMS*, a Resource is created with a command like this:

```
CREATE RESOURCE SALES_DATABASE/AVAILABLE=100
```

In this example we've created a Resource called SALES_DATABASE and we specified that we have 100 available. Now we can add Resource Requirements to System, Job or Setup definitions by simply adding a like like this:

```
DEFINE JOB DEMOJOB1
 ...
    REQUIRES SALES_DATABASE QUANTITY 25
 ...
END_JOB
```

Now, there must be 25 units of the SALES_DATABASE available or the DEMOJOB1 will remain pending. You will never have more than 4 occurrences of DEMOJOB1 running concurrently.

Just think of the possibilities, is the SALES_DATABASE resource represents a database named Sales, a job which requires exclusive access to the sales database simply has to specify that it requires 100 units of SALES_DATABASE. If you have a problem with the sales database you can simply change the quantity available to zero and jobs will stop running.

3 Getting Started on Windows NT/2000

This chapter provides a step by step guide to getting started running *JAMS* jobs on Microsoft Windows NT/2000.

3.1 Getting Ready for Windows NT

There are a number of tasks which must be completed before you can run jobs under Windows NT/2000. These tasks include:

- Install and Configure the *JAMS* Agent
- Define NT Usernames in *JAMS*
- Grant "Log on as a batch job" to NT accounts or groups

3.1.1 Install and Configure the *JAMS* Agent

The *JAMS* Agent for Windows NT must be installed on any Windows NT/2000 machine which will run *JAMS* Jobs. The Agent can be installed on any class of NT system, from Workstation to Datacenter Server. Refer to the *JAMS* Installation Guide for a detailed explanation of the Agent installation procedure.

Installing the Agent also installs a *JAMS* Control Panel applet which is used to configure the Agent. This control panel applet lets you configure three settings:

Temporary Directory

The temporary directory is used to store temporary command procedures. These command procedures are deleted when a job completes. For Windows NT V4.0, the default can be used. For Windows 2000, you must specify a directory which can be accessed by the *JAMS* Agent and the accounts which jobs will run under.

Requester Secret

The Requester Secret is used to authenticate *JAMS* Servers before they can even attempt to run a job. The default is blank which disables this check. If you use requester authentication you must set the same secret here and on the server. You set the requester secret on the server with the JAMS SET AGENT/SECRET="secret" command.

TCP/IP Port

The Agent will listen for requests on the TCP/IP port specified. The default is port 77 which is reserved for private RJE systems. The port on the agent must match the port on the server. You set the TCP/IP port on the server with the JAMS SET AGENT/PORT=n command.

Allow Interactive

If checked, the Agent will allow jobs to run with interactive access to the desktop. Interactive access must be requested by setting the INTERACTIVE option in the job's execution method.

3.1.2 Define NT Usernames in *JAMS*

In order to run a job under Windows NT, the *JAMS* server must supply a valid NT username and password. You must use the SET USERNAME command to define the username/password combinations. You can also specify an access control list (ACL) which is used to determine who can use the username.

Here is an example of an NT user definition:

```
JAMS> SET USERNAME ADMINISTRATOR/PASSWORD="SecretPassword" -
_JAMS> /ACL=(IDENTIFIER=[1,*],ACCESS=SUBMIT)
```

This example defines the NT username "Administrator". The password must be the correct password for the Administrator account but, the password isn't checked until a job is run under this username. Note that the password is enclosed in quotes to preserve the case. The ACL will allow OpenVMS users that are in the [1,*] UIC group to specify "Administrator" as the username in a job or system definition.

3.1.3 Grant "Log on as a batch job" to NT accounts or groups

JAMS jobs run as batch processes under Windows NT. The NT account that the batch job will run as must have the "Log on as a batch job" user right. You can grant this right to specific accounts or, grant the right to a group and make the accounts members of the group.

3.1.3.1 Granting rights under Windows NT V4.0

Under Windows NT V4.0, you must grant the "Log on as a batch job" right on each machine which will be running the *JAMS* Agent. You only have to grant the right on one domain controller and it will propagate to the other domain controllers in the domain. It will *not* propagate to member servers or workstations, you must grant the right on each of those machines.

You can use User Manager for Domains to grant the right for both the domain and individual machines. Select the **User Rights** option from the *Policy* menu. You must check the "Show Advanced User Rights" check box to display the "Log on as a batch job" user right.

To manage user rights on member servers and workstations, select the **Select Domain...** option from the **User** menu. Enter "\ \ machinename" in the Domain field and click Ok. You will then be connected to the specified machine and you will be able to manage the user rights on that machine.

3.1.3.2 Granting rights under Windows 2000

Under Windows 2000, you can grant the "Log on as a batch job" right at the domain level or local level.

To manage rights under Windows 2000 you use the "Local Security Policy" or "Domain Security Policy" Administrator Utilities.

3.1.3.3 Granting rights with the NTRights.exe Utility

The *NTRights.exe* utility is included in the Windows NT Server 4.0 Resource Kit supplement 3 and in the Windows 2000 Resource Kit. If you have this utility you can grant the "Log on as a batch job" right with a command like this:

```
ntrights +r SeBatchLogonRight -u user_or_group -m \\computername
```

Note that the rights name *is* case sensitive.

3.2 Creating NT Jobs

Once you've completed the initial setup required to run jobs on Windows NT/2000, defining jobs is simple. There is essentially no difference between an NT and an OpenVMS job definition. The key differences are:

- An NT job must use NT commands rather than DCL.
- An NT job must specify an execution method which is designed for NT.
- An NT job should specify an agent node name.

3.2.1 Windows NT Execution Methods

JAMS ships with three Windows NT specific execution methods. You can create additional execution methods with the CREATE METHOD command. The three Windows NT execution methods are:

Method	Description
NT	Runs an NT command file.
NTCMD	Runs a single NT command.
NTPARSE	Runs an NT command file which has been parsed for JAMS parameter references.

3.2.2 Windows NT Example Job

Let's take the DEMOJOB1 from the Chapter 2 and make it into a Windows NT job.

```
DEFINE JOB DEMOJOB1
    SYSTEM DEMO
    METHOD NTPARSE
    AGENT NODE NTNODE.YOURNAME.COM
    AUTO SUBMIT
    SCHEDULED DATE "MONDAY, WEDNESDAY, FRIDAY"
    SCHEDULED TIME 14:00
    PARAMETER P1
        PROMPT "Start Date"
        DATE
        DEFAULT VALUE "FIRST DAY OF MONTH"
    END_PARAMETER
    PARAMETER P2
        PROMPT "Sales Category"
        TEXT LENGTH 4
        DEFAULT VALUE "ALL"
    END_PARAMETER
END_JOB
```

Notice that the only difference between the NT and OpenVMS version of this job is METHOD and AGENT NODE lines. One other key difference is the default filename. The execution method defines the default file extension so the OpenVMS version would use a default filename of DEMOJOB1.COM and the NT version would use a default filename of DEMOJOB1.CMD. Both versions would look in the directory specified in the DEMO system definition.

4 Getting Started on Unix

This chapter provides a step by step guide to getting started running *JAMS* jobs on Unix, Linux or any other operating system which supports rexec.

4.1 Getting Ready for Unix

There are a number of tasks which must be completed before you can run jobs under Unix. These tasks include:

- Define Unix Usernames in *JAMS*
- Verify that the rexec daemon is enabled on your target machines.

4.1.1 Define Unix Usernames in *JAMS*

In order to run a job via Rexec, the *JAMS* server must supply a valid username and password. You must use the SET USERNAME command to define the username/password combinations. You can also specify an access control list (ACL) which is used to determine who can use the username.

Here is an example of a user definition:

```
JAMS> SET USERNAME "Ritchie"/PASSWORD="SecretPassword" -
_JAMS> /ACL=(IDENTIFIER=[1,*],ACCESS=SUBMIT)
```

This example defines the username "RITCHIE". The password must be the correct password for the RITCHIE account but, the password isn't checked until a job is run under this username. Note that both the username and password are enclosed in quotes to preserve the case. The ACL will allow OpenVMS users that are in the [1,*] UIC group to specify "Ritchie" as the username in a job or system definition.

4.1.2 Verify that the rexec daemon is enabled on your target

To verify that the rexec daemon is enabled and working on your target machine, enter and rexec command from the OpenVMS machine which is running *JAMS*. The exact format of the rexec command may differ depending upon which TCP/IP package you have installed. For Compaq TCP/IP Services a test command would be similar to this:

```
$ rsh/user=unixuser/password=password unixhost ls
```

4.2 Creating Unix Jobs

Once you've completed the initial setup required to run jobs via rexec, defining jobs is simple. There is essentially no difference between an rexec and an OpenVMS job definition. The key differences are:

- An rexec job must use the target environment commands rather than DCL.
- An rexec job must specify an execution method which is designed for rexec jobs.
- An rexec job should specify an agent node name.

4.2.1 Rexec Execution Methods

JAMS ships with an execution method named rexec which is designed for single command jobs and an execution method named rexec_script which sends a parsed command procedure to an rexec server. You can create additional execution methods with the CREATE METHOD command.

4.2.2 Rexec Example Job

Let's take the DEMOJOB1 from the Chapter 2 and make it into an rexec job.

```
DEFINE JOB DEMOREXEC
    SYSTEM DEMO
    METHOD REXEC
    AGENT NODE UNIXNODE.YOURNAME.COM
    AUTO SUBMIT
    SCHEDULED DATE "MONDAY, WEDNESDAY, FRIDAY"
    SCHEDULED TIME 14:00
    COMMAND "perl knit2.pl"
END_JOB
```

5 Using JAMS_MASTER

This chapter describes the *JAMS_MASTER* program. *JAMS_MASTER* is the OpenVMS command line and screen based user interface to *JAMS*. This program is used to define jobs and their environment, submit jobs, and to monitor and control the *JAMS* system processes.

Many of the functions of *JAMS_MASTER* are also available with both the DECwindows/Motif and Windows 9x/NT/2000 interfaces. Refer to Chapter 8 for more information on the DECwindows/Motif interface. Refer to Chapter 7 for more information on the Windows interface.

5.1 JAMS_MASTER

To enter the *JAMS* Master environment, run the *JAMS_MASTER.EXE* executable image which is located in the directory pointed to by the *JAMS_EXE* logical name. The system responds with a brief introductory message and the JAMS> prompt as shown in the following example:

```
$ RUN JAMS_EXE:JAMS_MASTER Return
JAMS V4.0N
Copyright (c) 1991 - 2002 MVP Systems, Inc., All rights reserved.
For technical support call (866) 259-JAMS 24 hours a day, 7 days a week.
JAMS>
```

5.1.1 Foreign Command Lines

The *JAMS_MASTER.EXE* executable also supports foreign command lines. You can create a DCL symbol which invokes *JAMS_MASTER.EXE* and then specify a command on the same line as the symbol, as shown in the following example:

```
$ JAMS:==$JAMS_EXE:JAMS_MASTER Return
$ JAMS MENU Return
```

You can also define DCL symbols which will both invoke *JAMS_MASTER* and pass a command line to be processed. The following example defines a symbol which can be used to immediately display a specific job submission menu.

```
$ PAYJOBS:==$JAMS_EXE:JAMS_MASTER MENU/OPTION=SUBMIT/MENU=PAYROLL Return
```

5.2 Customizing JAMS_MASTER

Some areas and features of the *JAMS_MASTER* can be customized. This customization is controlled with logical names. These logicals may be defined system-wide or, on a per process basis.

5.2.1 Remote Connections

You can define the logical name JAMS_REMOTE_CONNECTIONS to be a list of remote node specifications *JAMS* will connect to when you use the MENU command to enter the screen based environment. The remote node specifications should be in the standard DECnet format as in the following example:

```
$ DEFINE JAMS_REMOTE_CONNECTIONS GRAPE, TRAFIC"MYPROXY"
```

In this example, when the MENU command is issued connections will be established to the remote node GRAPE using the current users default DECnet proxy and to the remote node TRAFIC using the MYPROXY username/proxy.

5.2.2 Title

The screen based environment displays a title at the top of every screen. You can customize this title by defining the logical name *JAMS_HEADING*, as in the following example:

```
$ DEFINE JAMS_HEADING "Joe's Ambulance and Medical Supplies"
```

5.2.3 Default Job Submission Menu

You can use the logical name *JAMS_DEFAULT_MENU* to define the *JAMS* Menu Name which should be used when a user selects the Job Submission menu option. If this logical name is undefined, or incorrectly defined, a System based menu will be displayed.

5.2.4 Messages

JAMS uses standard OpenVMS messages. A OpenVMS message consists of a facility, a severity, an identifier and the text of the message. When *JAMS* sends a message to the screen, it may include any of these components. You can define which of the message components should be displayed by defining the logical name *JAMS_MESSAGE_FLAGS*. This logical name must equate to an integer which is the sum of one or more of the following numbers. Including a number in the sum means that the indicated portion of the message should be sent to the user.

Number	Description
1	Include the text of the message.
2	Include the identifier of the message.
4	Include the severity of the message.
8	Include the facility of the message.

If this logical name is not defined, or defined incorrectly, the default is determined by the processes message flags which are set with the OpenVMS SET MESSAGE command.

5.2.5 Date and Time Format

The input and output format of dates and times can be customized on a per user basis. This customization does not affect how *JAMS* stores dates and times. It also does not affect how dates and times are passed to batch jobs. It only affects what you see and enter on the screen.

To customize dates and times, define one or more of the following logical names:

Logical Name	Default	Description
JAMS_DATE_ORDER	MDY	Defines the order of a dates fields, possible values are MDY, DMY or YMD.
JAMS_DATE_DELIMITER	/	Defines the character used to delimit a dates fields.
JAMS_TIME_FORMAT	12	Specifies whether you want 12 or 24 hour format, possible values are 12 and 24.
JAMS_HOURS_DELIMITER	:	The character used to delimit the hours field.
JAMS_MINUTES_DELIMITER	:	The character used to delimit the minutes field.
JAMS_SECONDS_DELIMITER	space	The character used to delimit the seconds field.
JAMS_CENTURY_YEAR	20	If the year entered is less than or equal to this number, the century is 2000, otherwise the century is 1900. Possible values are zero through 99.
JAMS_YEAR_DIGITS	2	Specifies whether you want 2 or 4 digit years, possible values are 2 and 4. This only affects the display and entry of dates. Internally, 4 digit years are always used.

5.2.6 Monitor Options

The *JAMS Monitor Current Jobs* menu option is used to monitor the batch jobs which are running under *JAMS*. This application has an Options form which allows you to set job selection criteria and display characteristics. When you exit from *JAMS* these options are saved as DCL symbols and will be re-used if you invoke *JAMS_MASTER* again. You could also set these symbols in your LOGIN.COM command file so that they are set every time you log on. These symbols are:

JAMS_MONITOR_JOB_SELECTION
JAMS_MONITOR_RUN_USER_SELECTION
JAMS_MONITOR_SCROLL
JAMS_MONITOR_SHOW_DEPEND
JAMS_MONITOR_SHOW_HELD
JAMS_MONITOR_SHOW_PENDING

JAMS_MONITOR_SHOW_RETAINED
JAMS_MONITOR_SHOW_TIMED
JAMS_MONITOR_SORT_STATUS
JAMS_MONITOR_SUBMIT_USER
JAMS_MONITOR_SYSTEM_SELECTION

These symbols correspond to the fields on the Monitor Options screen.

When an executing job is displayed in the Monitor, the jobs execution statistics are periodically updated. You can define the update interval by defining the logical name *JAMS_STATS_INTERVAL* to be the number of seconds between updates. If this logical name is not defined, it defaults to 10 seconds.

6 The Screen Based Environment

This chapter provides a description on using the *JAMS* screen based environment.

The screen based environment is a menu driven, forms based environment. From the JAMS> prompt, issue the MENU command to enter the screen based environment. The screen based environment requires an SMG compatible terminal. Compaq provides SMG support for the VTxxx series terminals.

The screen based environment provides a robust, easy to learn user interface. This section explains how to use the screen based environment and explains the features which are common to all of the applications available within *JAMS* Maintenance.

6.1 The Main Menu

The screen displayed upon entry to the screen based environment is the Main Menu. You can return to this menu from any data entry screen by pressing Gold/M. This will abort any changes which are in progress and return to the Main Menu.

The Main Menu is show in Figure 6–1. The selections available from the main menu are explained in the following sections.

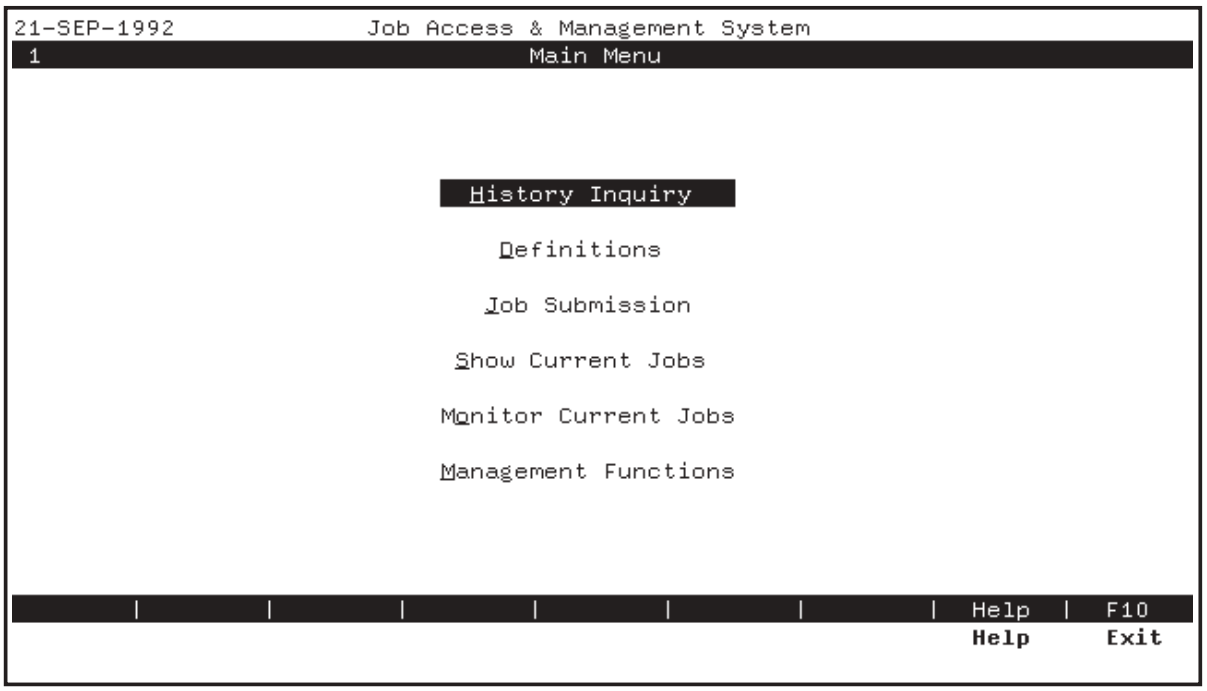
6.1.1 History Inquiry

The History Inquiry menu option is used to view information on batch jobs which are pending, executing or have completed.

When you initially enter the History Inquiry application, you are presented with a data entry screen which is used to enter you search criteria. You can also use the Gold/C function key to establish a connection with a remote node, disconnect an already established connection or switch to an existing connection.

Once you have entered your selection criteria and pressed Return, *JAMS* will search for job execution history which matches your selection criteria and, if any records are found, display a summary list of the history. You can move through the list to view this summary information. Figure 6–2 is an example of the History List Screen.

Figure 6–1 Main Menu



If you want to see detailed information for a specific history line, move the cursor to the desired line and press the Select key. A detail history form will be displayed which shows all of the information which *JAMS* maintains for a Job.

While viewing history detail, you can press Prev Screen to see the previous history record in the list or press Next Screen to see the next record in the list. From the History Detail Screen, press any key to return to the history list.

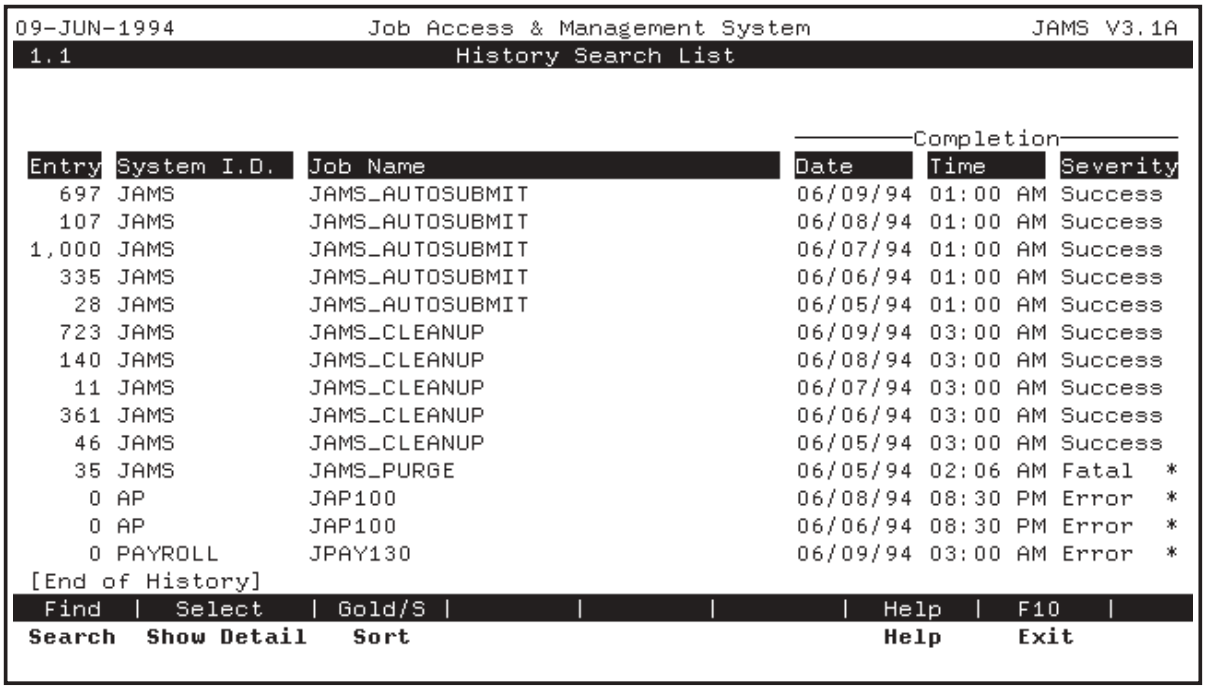
If a Job's .LOG file is available, the Gold/L will be activated and shown in the function key legend. You can press Gold/L to view the Job's .LOG file.

Figure 6–3 is an example of the History Detail Screen.

The *JAMS* history is purged by the *JAMS_PURGE* Job. The length of time that history is retained is one of the parameters to this job and is user defined.

The selection criteria consists of the following fields:

Figure 6–2 History List Screen



System I.D.

If you enter a value in the System I.D. field, only history from Jobs in the indicated System is displayed. Leave this field blank to display history from Jobs in all Systems and from unregistered Jobs.

Job Name

The Job Name search key uses standard OpenVMS wildcards. Leaving the field blank is the same as specifying *.

Setup Name

The Setup Name search key uses standard OpenVMS wildcards. Leaving the field blank is the same as specifying *.

Starting and Ending Dates

Only jobs *submitted* between these two dates will be displayed.

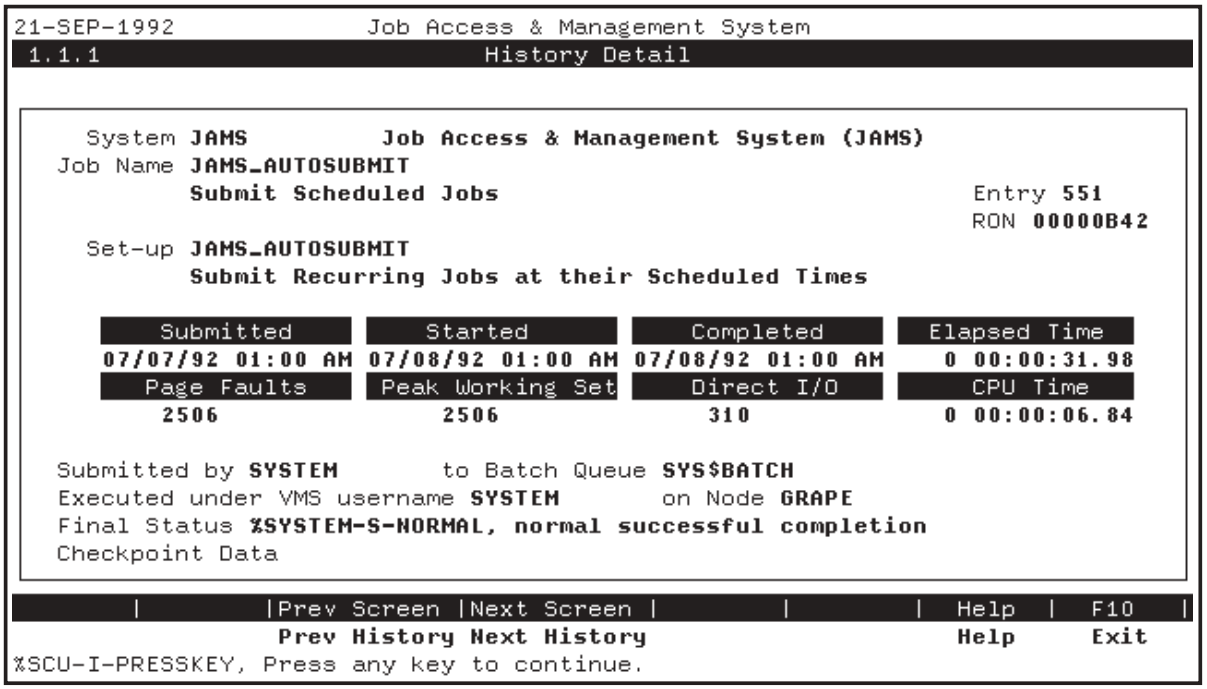
Clear List First

If your enter a "Y" in this field, the current History list will be cleared before the new search begins. If you enter "N", data from the new search will be merged with the current list.

Include Jobs with a final severity of

These fields allow you to select History based upon the severity of the Jobs final status.

Figure 6–3 History Detail Screen



6.1.2 Definitions

The Definitions option pops up a sub-menu with the following options available:

6.1.2.1 Setup Definitions

The Setup Definitions option is used to maintain Setup definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Setup definition, refer to *the JAMS Reference Manual*.

6.1.2.2 Job Definitions

The Job Definitions option is used to maintain Job definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Job definition, refer to *the JAMS Reference Manual*.

6.1.2.3 System Definitions

The System Definitions option is used to maintain System definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a System definition, refer to *the JAMS Reference Manual*.

6.1.2.4 Trigger Definitions

The Trigger Definitions option is used to maintain Trigger definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Trigger definition, refer to *the JAMS Reference Manual*.

6.1.2.5 Variable Definitions

The Variable Definitions option is used to maintain Variable definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Variable definition, refer to *the JAMS Reference Manual*.

6.1.2.6 Menu Definitions

The Menu Definitions option is used to maintain Menu definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Menu definition, refer to *the JAMS Reference Manual*.

6.1.3 Job Submission

The Job Submission option is used to submit a Job or Setup. A Job Submission menu is displayed which could contain Jobs, Setups, Systems or additional Menus. The initial menu is determined by the */MENU* qualifier or the *JAMS_DEFAULT_MENU* logical name. For additional information, refer to *the JAMS Reference Manual*

For a complete description of submitting a *JAMS* Job, refer to Chapter 9.

6.1.4 Show Current Jobs

This option displays a list of the currently scheduled Jobs which are known to *JAMS*. The functionality of this option has been superseded by the Monitor Current Jobs option.

6.1.5 Monitor Current Jobs

Displays a list of current Jobs known to the *JAMS* Scheduling sub-system. This list is continuously updated. This display also provides comprehensive job management capabilities.

Note: This monitor is a *high performance* batch job monitor. It does *not* scan the OpenVMS batch queues to obtain its information. The JAMS_SCHEDULE process broadcasts messages to the monitors when events occur. Running the JAMS monitor will *not* affect the performance of the OpenVMS batch and print queue sub-system.

Figure 6–4 Monitor Jobs Display

```
04-OCT-1992              Job Access & Management System
 1.10                          Monitor Current Jobs

                                                    Completion Elapsed  CPU    DIO
Entry Job Name               Node   CPU %  DIO/s  %    Time    Time Time   Count
----- -------------------- ------ -----  ----- ---- ----- ------- ----- -------
  487 JAP100               GRAPE    75%      8  46%  0:02    0:01  0:01     800
  521 JPAY110              GRAPE    43%      4  64%  0:03    0:03  0:01     991
  523 VERIFY_LIBRARY       Pending
  463 JAP110               Waiting for dependent Jobs to complete
  522 JPAY120              Waiting for dependent Jobs to complete
  524 FULL_BACKUP          Holding until released
  511 JAMS_AUTOSUBMIT      Holding until  5-OCT-1992 01:00
  512 JAMS_CLEANUP         Holding until  5-OCT-1992 03:00

 Gold/O | Select |        |        |        |        |        | Help  | F10
Options  Job Menu                                              Help    Exit
```

Figure 6–4 is an example of the Monitor screen display. This example shows a number of batch jobs which are in various states. The first job is a registered job which is executing. If a job is executing, performance information is included in the display. If the job is not executing, the performance information is replaced by a text message which indicates the current status of the job. When a job completes, the text message indicates the final status of the job.

The display includes the following information about this job:

Entry

This is the *JAMS* entry number for the job.

Job Name

This is the name of the job as specified in the *JAMS* Job definition.

Node

This is the name of the node on which this job is running.

CPU %

This column shows the CPU utilization percentage for this job during the most recent update interval.

DIO/s

This column shows the average number of direct I/Os per second which this job performed during the most recent update interval.

Completion %

If this job is registered in the *JAMS* database, we can compute the completion percent based on the Job's past performance. This percentage is an estimate of how close to completion the Job is. This can be a useful monitoring tool. If an operator sees a Job which shows a completion percentage of 200%, they know that the Job has used twice the resources which it normally takes and they may want to take corrective action.

This percentage is calculated using the Jobs current and average CPU usage and Direct I/O count so running the a Job on a heavily loaded system will not affect this calculation.

Completion Time

If this Job is registered in the *JAMS* database, we can calculate how much longer the Job is going to run based on the Job's past performance. This calculation is based on the Job's current CPU utilization and direct I/O per second count. We extrapolate this data to determine how much longer the job will run before reaching its average CPU usage and direct I/O count.

Elapsed Time

This shows how long the Job has been executing, in hours and minutes.

CPU Time

This shows how much CPU time the Job has accumulated, in hours and minutes.

DIO Count

This shows the number of direct I/O operations performed by the Job.

Job Status Line

The display may also include a line which shows a Job's status information. A batch job may use the *JAMS SET STATUS/MONITOR* command to set it's status text. If the */MONITOR* qualifier is used then the status text will be displayed in the Monitor window.

Function Keys

Gold/C - Connections

The Gold/C key is used to establish a connection with a remote node, disconnect an already established connection or switch to an existing connection.

Gold/O - Options

The Gold/O key is used to display and modify the Monitor Options. When you press the Gold/O key, updating stops and the Monitor Options screen is displayed as shown in Figure 6–5.

Gold/N

The Gold/N key is used to switch to the next connection.

Select - Job Management Menu

The Select key is used to select a job and pop-up the Job Management Menu. Use the Next Screen, Prev Screen, and arrow keys to move the cursor to the desired job then press the Select key. The selected job will be highlighted and the Job Management Menu will pop up as shown in Figure 6–6.

6.1.5.1 Monitor Options

The Monitor options screen is used to set the characteristics of your monitoring session. You can set job selection criteria, sorting and scrolling options. You can also limit the display to only jobs submitted by your username. The Monitor Options screen is shown in Figure 6–5.

Option Fields

Job Name

You can enter a standard OpenVMS wildcard expression here and only Jobs which match the wildcard expression will be shown.

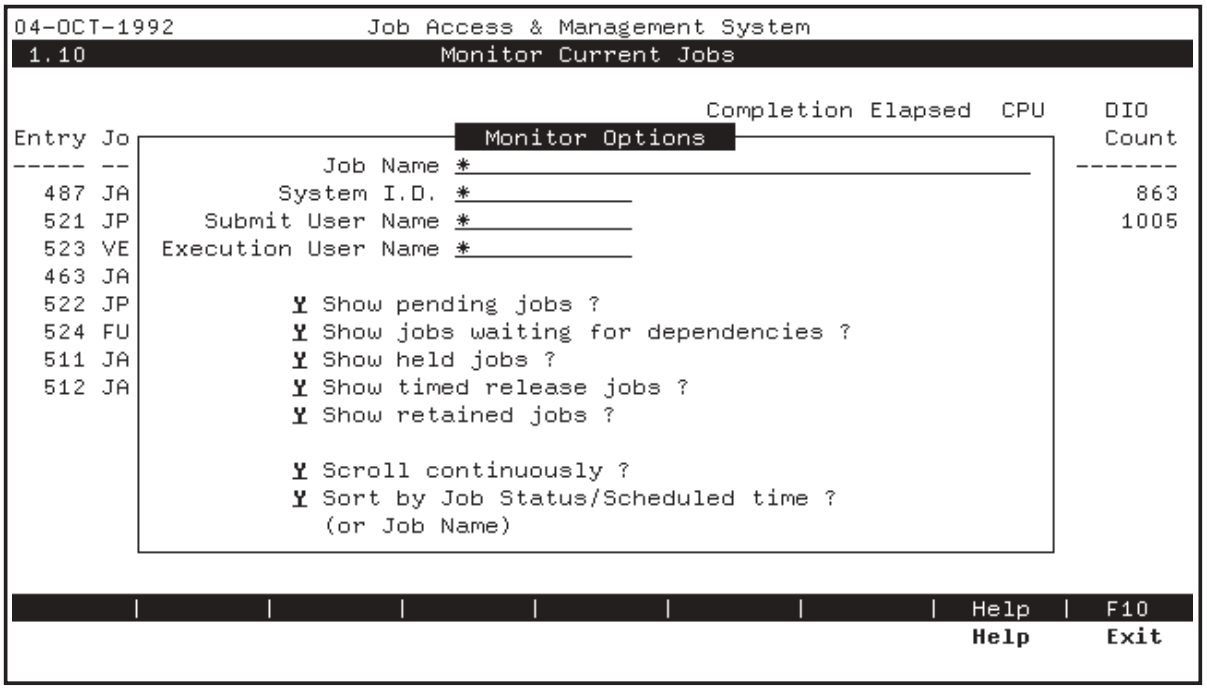
System I.D.

You can enter a standard OpenVMS wildcard expression here and only Jobs whose System I.D. match the wildcard expression will be shown.

Submit User Name

You can enter a standard OpenVMS wildcard expression here and only Jobs which were submitted by a user with an OpenVMS username which matches the wildcard expression will be shown.

Figure 6–5 Monitor Options



Execution User Name

You can enter a standard OpenVMS wildcard expression here and only Jobs which will execute with an OpenVMS username which matches the wildcard expression will be shown.

Show pending jobs ?

If you enter a Y, jobs which are pending will be included in the monitor display.

Show jobs waiting for dependencies ?

If you enter a Y, jobs which are pending because they are waiting for dependent jobs to complete will be included in the monitor display.

Show held jobs ?

If you enter a Y, jobs which are holding until explicitly released will be included in the monitor display.

Show timed release jobs ?

If you enter a Y, jobs which are waiting until a specific date and time will be included in the monitor display.

Show completed/retained jobs ?

If you enter a Y, jobs which have been retained in the batch queue after completion will be included in the monitor display.

Scroll continuously ?

If you enter a Y, when the monitor has more jobs to display than can fit on the screen, the job list will continuously scroll so that all jobs can be displayed.

Sort by Job Status/Schedule time (or Job Name)

If you enter a N here, the Jobs are sorted by Job Name.

If you enter a Y here, the Jobs will be sorted by status and scheduled date/time. The order is as follows:

1 Executing and completed jobs, by Job Name.

2 Pending jobs, by priority.

3 Jobs waiting for Pre-check jobs.

4 Jobs waiting for dependencies.

5 Jobs which are held.

6 Jobs waiting for a specific date/time (in order by date/time).

7 Jobs which are retained in a queue.

6.1.5.2 Job Management Menu

The Job Management Menu is used to manage jobs which are executing or pending. A pending job must be known to *JAMS* before it will display in the Monitor window. Please refer to the *the JAMS Reference Manual* section in Chapter 5 for information on when and how a job becomes known to *JAMS*.

To use the pop up Job Management menu, use the Next Screen, Prev Screen, and arrow keys to move the cursor to the desired job then press the Select key. The selected job will be highlighted and the Job Management Menu will pop up as shown in Figure 6–6.

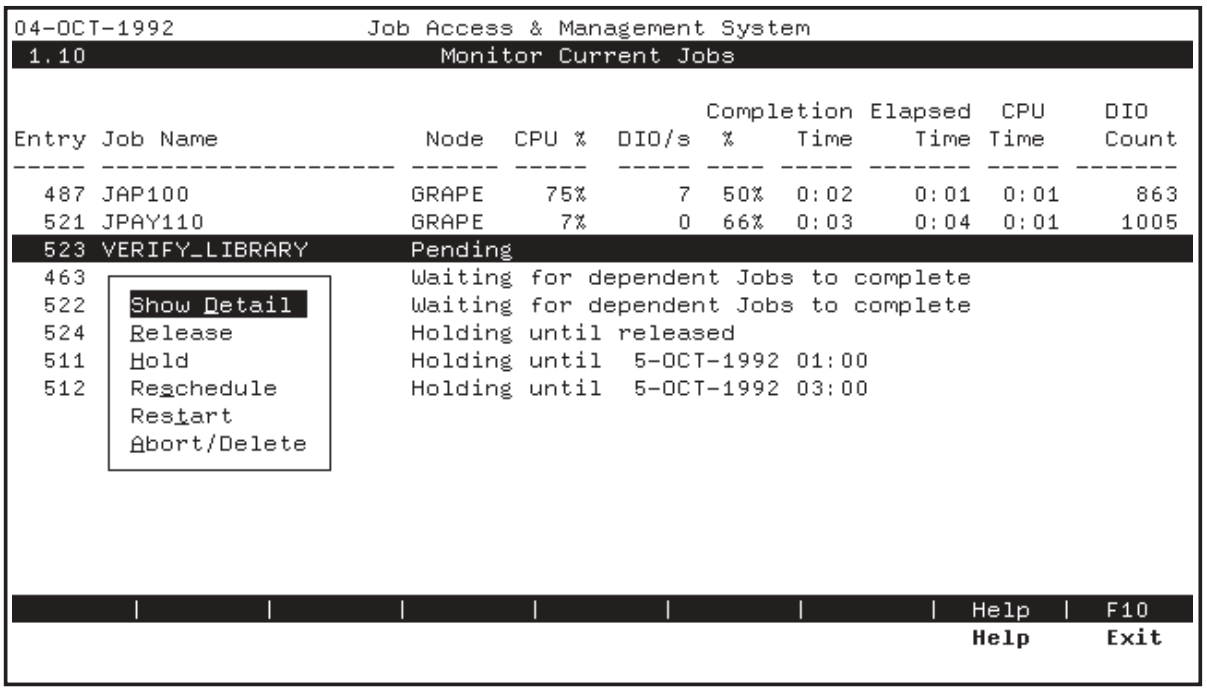
You must be properly authorized to use many of the functions available on the Job Management menu. Authorization is defined by the MONITOR ACL, the Job's ACL and the System's ACL.

Job Management Menu Options

Show Detail

This option will display detailed information about the selected job. Figure 6–7 is an example of this display. If the job is executing, the performance information is updated every five seconds. If the job is not executing, the performance information is replaced by a list of dependent jobs which this job is waiting on, if any.

Figure 6–6 Job Management Pop-up Menu



Release

Jobs can be in a pending or holding state for many different reasons. When you elect to release a job, a form will appear showing all the reasons this particular job is not running. You can then decide to remove some or all of the constraints which are keeping the job from executing.

Hold

The selected job is held until released.

Reschedule

This option is used to change the scheduling attributes of a job which is not executing. A screen is displayed which allows you to change the job attributes.

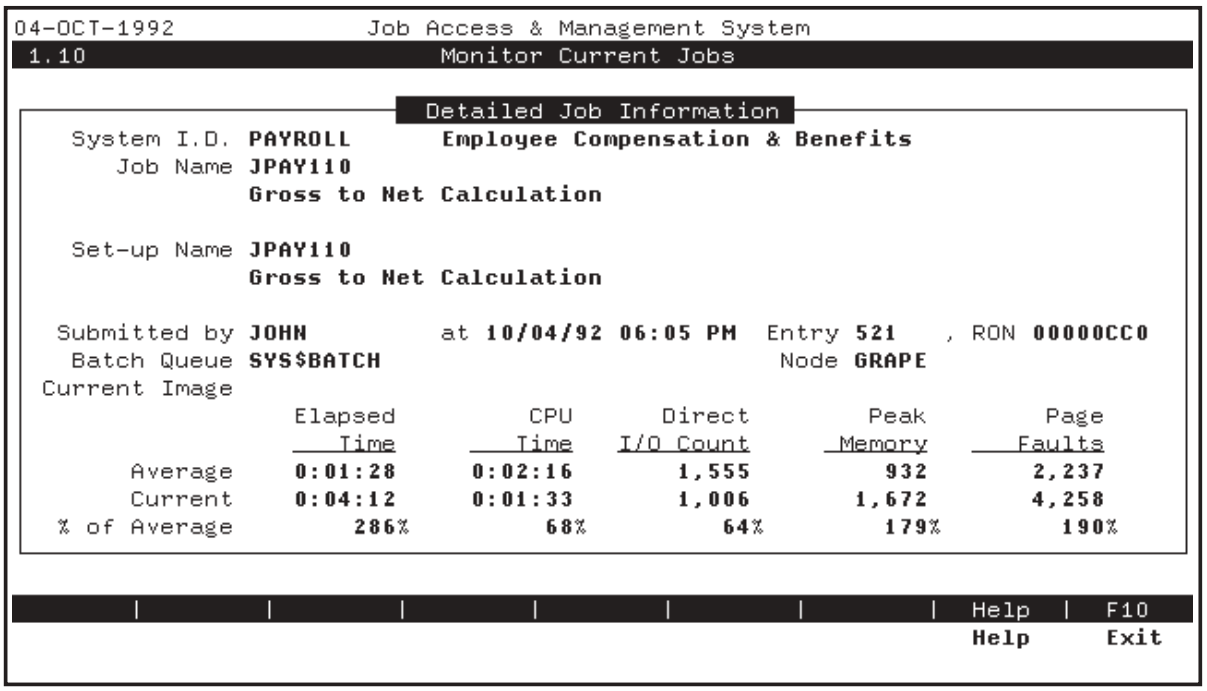
Restart

This option is used to abort and restart an executing job. A screen is displayed which allows you to enter where the job should execute as well as the hold status. If you exit from this screen, no action is taken. If you complete the form and press Return, the job is aborted and either restarted or placed on hold.

Abort/Delete

If the selected job is currently executing it is aborted. Otherwise the job is deleted from the schedule.

Figure 6–7 Job Detail



6.1.6 Management Functions

The Management Functions option pops up a sub-menu with the following options available:

6.1.6.1 Named Times

The Named Times option is used to maintain Named Times. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Named Time definition, refer to *the JAMS Reference Manual*.

6.1.6.2 Dates

The Dates option is used to maintain special Date definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of special Dates definition, refer to *the JAMS Reference Manual*.

6.1.6.3 Access Control

The Access Control option is used to maintain Access Control Lists for many of the *JAMS* functions. A menu is displayed which lists the available Access Control Lists. Once you select an ACL to modify, the ACL is displayed in a list and you can select a specific Access Control Entry (ACE) to modify or insert or delete ACE's.

For a complete description of each of the ACL's and the rights available, refer to *the JAMS Reference Manual*.

6.1.6.4 Node Definitions

The Node Definitions option is used to maintain Node definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Node definition, refer to *the JAMS Reference Manual*.

6.1.6.5 Node Groups

The Node Groups option is used to maintain Node Group definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Node Group definition, refer to *the JAMS Reference Manual*.

6.1.6.6 Configuration

The Configuration option will display a data entry screen which contains all of the *JAMS* configuration attributes. For a complete description of all of the configuration attributes, refer to *the JAMS Reference Manual*.

6.1.6.7 Date Types

The Date Types option is used to maintain Date Type definitions. This is a standard maintenance function. Working with standard maintenance functions is explained in Section 6.2.9.

For a complete description of the attributes of a Date Type definition, refer to *the JAMS Reference Manual*.

6.2 Common Functions and Features

The *JAMS* screen based user interface provides a common interface to each function. Once you learn to use one function learning to use the next one is simpler because the interface is the same. The following sections describe the common features and functions of the screen based interface.

6.2.1 On-line Help

The *JAMS* screen based environment provides extensive on-line help. You access the on-line help by pressing the Help or PF2 key.

The *JAMS* full screen help utility is similar to the standard OpenVMS Help utility. When you press the Help key, help text will be displayed for the current menu or field. You can use the Next Screen and Prev Screen keys to scroll the help text.

If there are additional topics available, there will be a box menu below the help text which is used to select one of the additional topics. Use the arrow keys to change the highlighted topic and press Return to display the selected topics help text.

Press the Exit key to exit help and return to the application.

6.2.2 Menus

Menus are used in many places in the *JAMS* Maintenance sub-system. Menus are presented in the center of the screen as a vertical list of options surrounded by a bounding box. The currently selected option is highlighted with reverse video.

Use the arrow keys, space bar, Tab and Ctrl/H keys to move the highlighted option. Press Return to Select the highlighted option. You can exit a menu by pressing the Exit key (F10).

You can also select a menu option directly by pressing the highlighted letter of the menu option. The highlighted letter is underlined.

6.2.3 Insert/Overstrike

When the cursor is in a field, you can press Ctrl/A to toggle between insert mode and overstrike mode. Insert mode does not work in date and time fields.

6.2.4 Moving Between Fields

When the cursor is in a data entry screen, you can move to the next field by pressing the Tab or down arrow key. You can move to the previous field by pressing the up arrow key, or Ctrl/H (backspace).

6.2.5 Exit Key

The Exit (F10) key is used to go back one logical level. The PF4 can also be used in place of the Exit key. You can also use the Ctrl/Z key to exit back to the DCL level.

The Exit and Ctrl/Z keys will abort any changes which are in progress.

6.2.6 Find Key

Many fields (including most key fields) have search capabilities. When the cursor is in a field with search capabilities, "Find" will be displayed in the Function Key Label. You can press the Find key and a search list will be displayed. If the field has a limited number of values, the possible values are displayed in a list, and you can select the desired value.

If the field could have many different values, such as a Job Name, the list will have one or more search keys at the top of the list. You can enter information into these fields to narrow the search then press Return to start searching. The list of data records found is displayed in the bottom portion of the list, and you can select one of the values.

6.2.7 List Screens

List screens are similar to menus. A vertical list of available options is displayed and you can use the arrow keys to move the cursor through the list. A list may also be larger than the available screen size. In this case, the data will scroll within the list window. You can use the Next Screen and Prev Screen keys to scroll by pages. You can also press Gold/Up Arrow to move to the first item in the list or Gold/Down Arrow to move to the last item in the list. To select an item in the list, move the cursor to the line which contains the item you want to select and then press Return.

6.2.8 Screen Layout

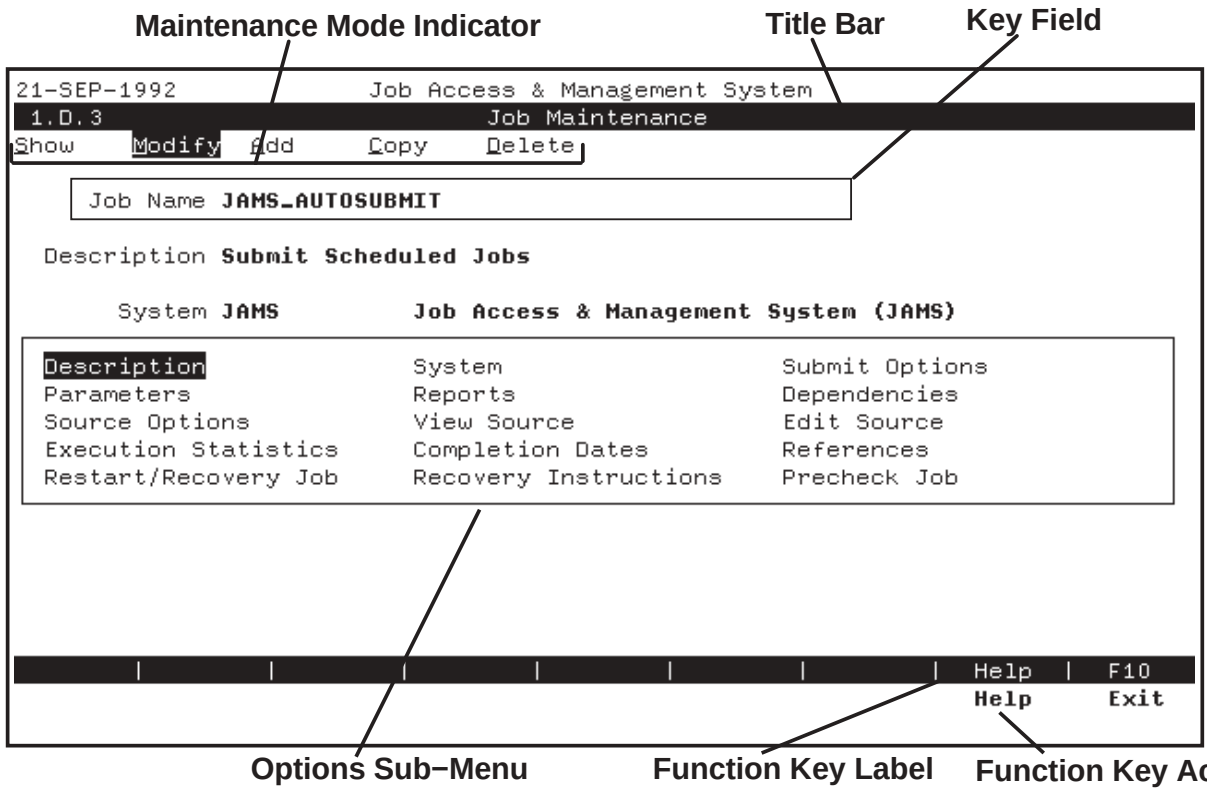
A Sample *JAMS* Screen is shown in Figure 6–8. The top three lines of the screen display status information. The first line contains the current date, the sub-system title and version information. The second line contains a title bar which consists of a numeric screen identifier and a description or heading. If this is a maintenance function, the third line is used for a horizontal strip menu used to select and display the maintenance mode.

The bottom three lines are used to display active function key information and to display messages. Messages are displayed on the last line. The reverse video line is broken into a number of sections. Each section can contain the name of an active function key, the Function Key Label. Directly below the name of the key is an indicator of what should happen when you press the function key, the Function Key Action.

6.2.9 Maintenance Functions

Many of the options available from the *JAMS* Main Menu are maintenance functions. Maintenance functions are used to add, change, delete and inquire into definitions of *JAMS* objects such as Jobs or Setups. The following sections explain how to use a *JAMS* maintenance function.

Figure 6–8 Sample JAMS Screen



6.2.9.1 Maintenance Mode Menu/Indicator

Most of the maintenance screens available to you have multiple modes. For example, if you select Job Definitions after selecting Definitions from the Main Menu, the Job Definitions maintenance screen is displayed and the Maintenance Mode Menu is displayed on the third line of the terminal. The current mode is highlighted with reverse video. Use the arrow keys (or Tab and Ctrl/H) to change the highlighted mode and press Return when the mode you desire is highlighted.

You can also enter the first letter of the desired mode to select a maintenance mode.

The possible options available on the Maintenance Mode Menu are:

Show - Display data with no update capabilities.
Modify - Modify existing data records.
Add - Add new data records.
Copy - Copy an existing record to a new record.
Delete - Delete existing data records.

If the *JAMS* Access Control has been used to limit access, only the options which are currently available to you are displayed. If there is only one option available, it is automatically selected and you skip over the Maintenance Mode Menu.

6.2.9.2 Key Fields

Once you have selected an option from the Main Menu and selected a Maintenance Mode (if needed), the cursor moves into the data entry portion of the screen. The first step is to select a data record to process. You select a record by entering a value into one or more *key fields*. These fields are highlighted with reverse video and are the only fields the cursor will move to.

After you have entered the key fields, press Return, and the specified data will be retrieved, displayed, and the cursor will move into the first data field.

If the data could not be located or you selected Add mode and the data could be located, an appropriate message is displayed and the cursor remains in the key field(s).

Remember that you can use the Find key if you do not remember (or want to type) the key field information.

6.2.9.3 Data Entry Screens

One you have selected an object you are presented with either a data entry screen or a menu of options. Simple objects, like a Variable Definition, present a data entry screen which contains all of the attributes of the object. Complex objects, like a Job Definition, present a menu of options. When you select one of the options you are presented with a data entry screen which contains the attributes which pertain to the selected option. Some of the options may present a list screen when the option may have multiple occurrences. An example of this would be the parameters for a Job Definition. Since a Job may have many parameters, when you select the Parameters option you are presented with a list of the Jobs Parameters. When you select a parameter (or insert a new one) you are presented with a data entry screen which has the attributes for the selected parameter.

6.2.9.4 Special Function Keys

Some of the maintenance functions also have special function keys. If a special function key is used, it will be shown in the function key legend at the bottom of the screen. An example of this would be Trigger Definitions. When you select a Trigger, the Triggers information is displayed in a data entry screen but you also have two special function keys. One to display the Triggers Events and one to display the Triggers Actions.

7 JAMS Windows Interface

This chapter describes the *JAMS* Windows 9x/NT/2000 Interface. You can submit, monitor, and view the history of job execution using this interface.

7.1 Starting the JAMS Windows 9x/NT/2000 Interface

When *JAMS* is installed, *JAMS* is added to the **Programs** section of the **Start Menu**. To start the interface, select *JAMS* from the Programs section of the Start Menu.

If the *JAMS* menu item does not appear in your Start Menu, you can search for the file "JAMSWin.exe" on your local disk drives. If you find the file, double-click it to start the interface. You may also want to create a short-cut to this program to make it easily available for the future.

When *JAMS* starts, you will be presented with a *JAMS* Server Login dialog box. Here you must specify the remote server you would like to connect to along with your username and password for authentication. At the time of login, you can also specify if you would like for *JAMS* to remember this information the next time you run the *JAMS* Windows interface.

7.2 Submit Window

The Submit Window is used to select and submit *JAMS* Jobs which are run on demand. The window consists of a default or user defined menu hierarchy. The default hierarchy shows all of the *JAMS* Systems, expanding a System displays all of the Jobs and Setups for the selected System.

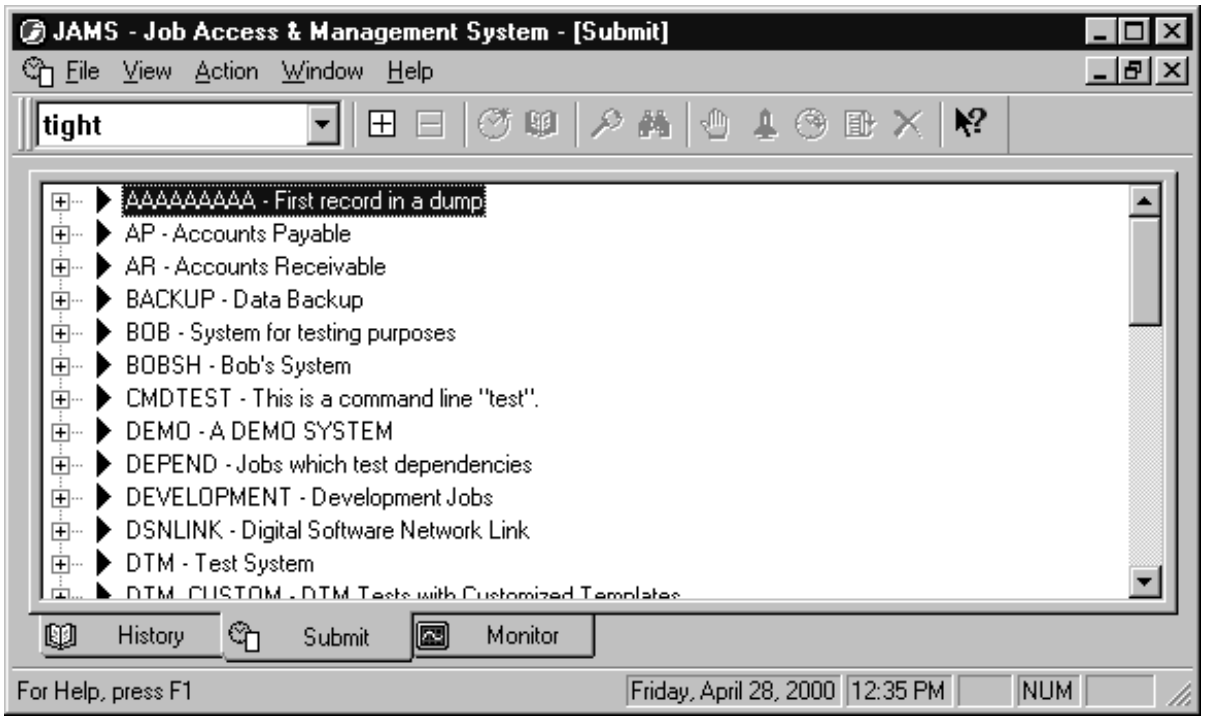
If you want to specify a user defined menu, define the logical name *JAMS_DEFAULT_MENU* to be the name of the menu which you want to use as the top level menu.

Figure 7–1 is an example of the Submit Window.

7.2.1 Navigating the Window

The Submit Window displays a menu hierarchy. A sub-menu is denoted with a triangle to the left of the menu name. If the triangle points to the right, the menu is not expanded. If the triangle points down, the menu is expanded. To expand a menu, you can double click on the menu or, click on the menu (to select it) and then pull down the **Action** menu and select

Figure 7–1 Windows Submit Window



Expand. You can also right-click while the cursor is on the menu you want to expand and then select **Expand** from the pop-up menu.

You can submit a Job or Setup by double clicking on the Job or Setup. You can also select **Submit** from the pull-down or pop-up menu.

You can activate the *JAMS* History window and display a Jobs history by selecting **Show History** from a pull-down or pop-up menu.

7.2.2 File menu

The **File** pull-down menu is used to control the Submit window.

Connect...

This menu option activates a dialog box which allows you to connect to a remote *JAMS* Server. Once connected, you can submit Jobs on that server.

Disconnect

This menu option lets you disconnect from one of the remote *JAMS* Servers which you are connected to.

Close

This menu option will close the Submit window.

Exit

This menu option will close all of the *JAMS* windows and exit.

7.2.3 Action menu

The **Action** menu is used to perform an action on the Submit window or the selected line in the Submit window. The items in the Action menu are also available from a pop-up menu. Right-click any menu, Job or Setup to display the pop-up menu. The options on the **Action** menu include:

Expand

This option will expand the selected line. This option is only active when the selected line is a menu line.

You can also expand or collapse a menu by double clicking on the menu line.

Collapse

This option will collapse the selected menu line. This option is only active when the selected line is a menu line.

You can also expand or collapse a menu by double clicking on the menu line.

Collapse All

This option will collapse all expanded menus.

Show History

This option activates the *JAMS* History Window, clears the current history list and performs a search for history of the selected Job.

Submit

This option will submit the selected Job or Setup. A dialog box which contains the jobs parameters will be displayed. If the Job has defined reports, you can click on the Reports tab to display and possibly override the report printing information.

7.2.4 Window menu

The **Window** menu is used to activate other portions of the *JAMS* Windows interface. From the Submit window, you can activate the History window or the Monitor window.

7.3 Submitting a Job

When you submit a job, a dialog box which contains the jobs parameters will be displayed. If the Job has defined reports, you can click on the Reports tab to display and possibly override the report printing information.

7.4 Monitor Window

The Monitor Window is used to monitor and manage the batch jobs running on your system. The *JAMS* Job Monitor is a high performance, continuously updated display of the batch jobs known to *JAMS*. This display also provides comprehensive job management capabilities.

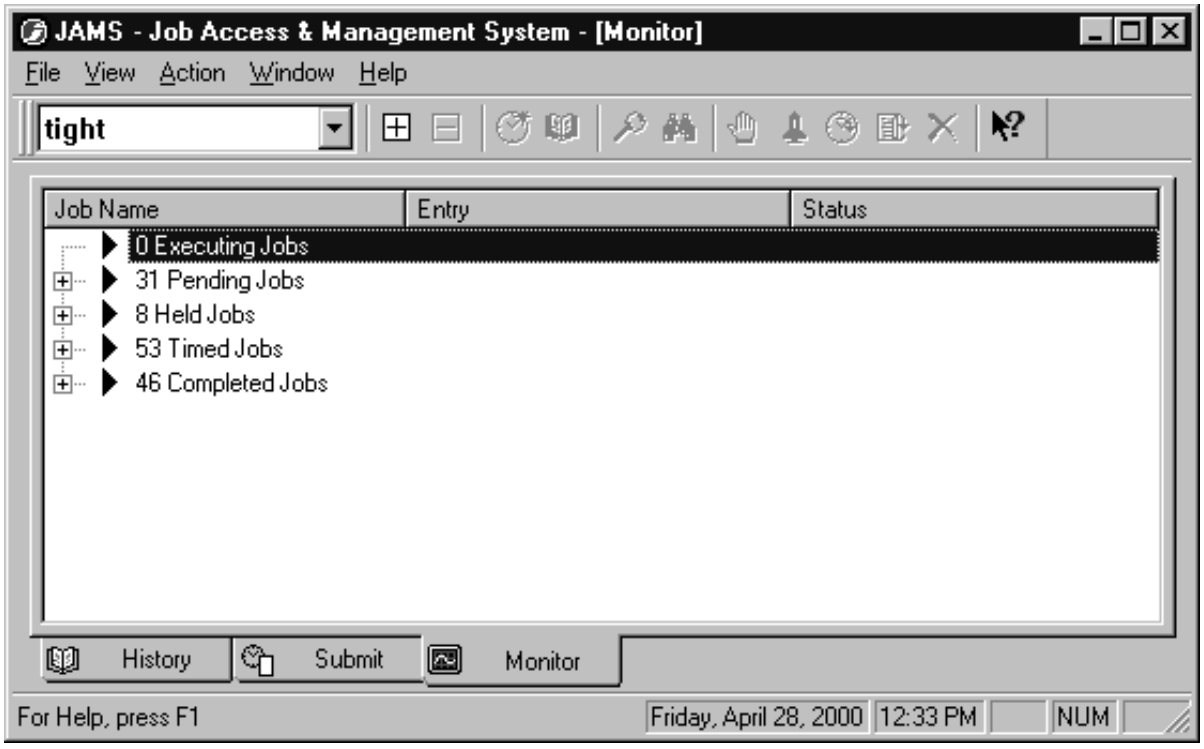
Note: This monitor is a *high performance* batch job monitor. It does *not* scan the operating system's batch sub-system to obtain its information. The JAMS_SCHEDULE process broadcasts messages to the monitors when events occur. Running the *JAMS* monitor will *not* affect the performance of the batch sub-system.

7.4.1 The Monitor Display

The Monitor Window includes two types of display lines, top level categories and Jobs. A top level category line includes an icon which shows whether or not the line is expanded, the number of jobs in the category, the name of the category and detail headings. You can expand or collapse a category line by double clicking on the line.

Figure 7–2 is an example of the Monitor Window.

Figure 7–2 Windows Monitor Window



7.4.2 Monitor Detail Lines

When a Job is executing, the Monitor includes the following information:

Job Name

This is the name of the job as specified in the *JAMS* Job definition.

Entry

This is the *JAMS* entry number for the job.

Node

This is the name of the node on which this job is running.

CPU %

This column shows the CPU utilization percentage for this job during the most recent update interval.

DIO/s

This column shows the average number of direct I/O's per second which this job performed during the most recent update interval.

Completion %

If this job is registered in the *JAMS* database, we can compute the completion percent based on the Job's past performance. This percentage is an estimate of how close to completion the Job is. This can be a useful monitoring tool. If an operator sees a Job which shows a completion percentage of 200%, they know that the Job has used twice the resources which it normally takes and they may want to take corrective action.

This percentage is calculated using the Jobs current and average CPU usage and Direct I/O count so running the a Job on a heavily loaded system will not affect this calculation.

Completion Time

If this Job is registered in the *JAMS* database, we can calculate how much longer the Job is going to run based on the Job's past performance. This calculation is based on the Job's current CPU utilization and direct I/O per second count. We extrapolate this data to determine how much longer the job will run before reaching its average CPU usage and direct I/O count.

Elapsed Time

This shows how long the Job has been executing, in hours and minutes.

CPU Time

This shows how much CPU time the Job has accumulated, in hours and minutes.

DIO Count

This shows the number of direct I/O operations performed by the Job.

7.4.3 File menu

The **File** pull-down menu is used to control the Monitor window.

Connect...

This menu option activates a dialog box which allows you to connect to a remote *JAMS* Server. Once connected, you can monitor Jobs on that server.

Disconnect

This menu option lets you disconnect from one of the remote *JAMS* Servers which you are connected to.

Close

This menu option will close the Monitor window.

Exit

This menu option will close all of the *JAMS* windows and exit.

7.4.4 Action menu

The **Action** menu is used to perform an action on the Monitor window or the selected line in the Monitor window. The items in the Action menu are also available from a pop-up menu. Right-click a Job in the Monitor to display the pop-up menu. The options on the **Action** menu include:

Expand

This option will expand the selected line. All current and future jobs in this category will be displayed. This option is only active when the selected line is a top level line.

You can also expand or collapse a category by double clicking on the category line.

Collapse

This option will collapse the selected line. The jobs in this category will no longer be displayed. This option is only active when the selected line is a top level line.

You can also expand or collapse a category by double clicking on the category line.

Collapse All

This option will collapse all of the top level categories.

You can also expand or collapse a category by double clicking on the category line.

Show Detail

This option will display a window which shows detailed information about the selected Job. This information will be updated as the Job executes.

You can also display a Job's detail window by double clicking on the Job.

Show History

This option activates the *JAMS* History Window, clears the current history list and performs a search for history of the selected Job.

Release

Jobs can be in a pending or holding state for many different reasons. When you elect to release a job, a window will appear showing all the reasons this particular job is not running. You can then decide to remove some, or all of the constraints which are keeping the job from executing.

Hold

The selected job is held until released.

Reschedule

This option is used to change the scheduling attributes of a job which is still pending. A screen is displayed which allows you to enter a new queue name, scheduled date/time and hold status.

Restart

This option is used to abort and restart an executing job. A window is displayed which allows you to enter a new queue name and hold status. If you complete the form and click on the **Ok** button, the job is aborted and requeued.

Abort/Delete

If the selected job is currently executing, it is aborted and deleted from the batch sub-system. Otherwise the job is simply deleted from the batch sub-system. You are asked to confirm this action.

7.4.5 Window menu

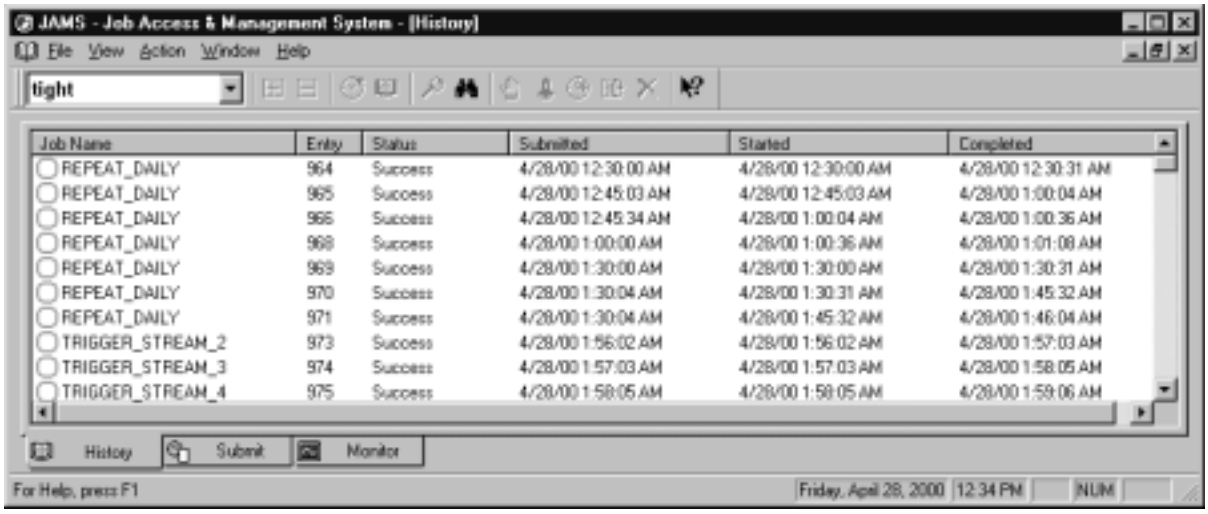
The **Window** menu is used to activate other portions of the *JAMS* Windows interface. From the Monitor window, you can activate the Submit window, or the History window.

7.5 History Window

The History Window is used to search and examine batch job execution history.

Figure 7–3 is an example of the History Window.

Figure 7–3 Windows History Window



7.5.1 The History Display

The History display window contains one line for each history record which matched your selection criteria. Each line shows the Job Name, final status and, submit, start and completion time. You can double click on a line to display a detail window.

You can sort the list by any column. To sort the list, single click on any column, *JAMS* will then sort the list in ascending order.

Each time you use the **Search...** option, the records which match your selection criteria are added to the existing records. You can clear the list by selecting **Clear List** from the **Action** menu.

7.5.2 File menu

The **File** pull-down menu is used to control the History window.

Connect...

This menu option activates a dialog box which allows you to connect to a remote *JAMS* Server. Once connected, you can search History on that server.

Disconnect

This menu option lets you disconnect from one of the remote *JAMS* Servers which you are connected to.

Close

This menu option will close the History window.

Exit

This menu option will close all of the *JAMS* windows and exit.

7.5.3 Action menu

The **Action** menu is used to perform an action on the History window or the selected line in the History window. The options on the **Action** menu include:

Show Detail

This option will display a window which shows detailed information about the selected Job. From this detail window, you can also view the Jobs log file.

You can also display a Jobs detail window by double clicking on the Job.

Search...

This option displays a dialog box in which you enter your selection criteria. When you click on the Ok button, the search starts and a work in progress box is displayed. The work in progress box has a Cancel button which can be used to cancel a long search. If you cancel a search, all of the records located thus far will be included in the list.

The number of records which a single search will add to the list can be limited. Define the logical name *JAMS_HISTORY_LIMIT* to be the desired limit. If this logical name is not defined, the limit defaults to 500 records.

Each time you use the **Search...** option, the records which match your selection criteria are added to the existing records. You can clear the list by selecting **Clear List** from the **Action** menu.

Clear List

This option clears all of the history lines from the list. Each time you perform a search, the lines which match the search are added to the current list.

7.5.4 Window menu

The **Window** menu is used to activate other portions of the *JAMS* Windows interface. From the History window, you can activate the Submit window, or the Monitor window.

7.5.5 History Search Window

The Search window is displayed to obtain search selection criteria. You can enter:

Search

Here you can select the Remote Node which is where the search will actually occur on.

System ID

Enter a System ID to limit the history records to Jobs from the specified System. Leave this field blank to display Jobs from any System.

Job Name

Enter Job Name with wildcards. The wildcard characters are * which matches any set of characters and % which matches any single character.

Setup Name

Enter Setup Name with wildcards. The wildcard characters are * which matches any set of characters and % which matches any single character.

Start/End Times

Enter the beginning and ending date and time range. Only Jobs *submitted* within this range will be included in the list.

Final Status

You can limit your search to only Jobs with a specific final status severity. Select the severities which you want to include in your list.

7.6 Using Help

There are three ways to obtain help from within the *JAMS* Windows interface:

1 The **Help** pull-down menu.

2 The Help button on the Toolbar.

3 The Help (F1) key.

Help Menu

The **Help** menu has two options. If you select **Help Topics** option, a JAMS Client help application appears.

The **About JamsWin** option displays the standard windows about box, showing copyright and version information.

Toolbar Help

By selecting the **Toolbar Help** option you will find that the cursor changes to a question mark and you can click on the component of the window on which you would like help.

Help Key - F1

If you press the Help F1 key, *JAMS* will provide help on the item in which the cursor is located. If this item does not have any specific help, help will be displayed on the next higher item (such as the window which contains the item).

Help Button

Some dialog boxes have a Help button which will provide help which is specific to the dialog box. In some cases, a dialog box will have a Help button but it will not be active. This means that the dialog box is capable of providing help but there is no help available for the specific message being displayed by the dialog box.

8 JAMS DECwindows/Motif Interface

This chapter describes the *JAMS* DECwindows/Motif Interface.

8.1 Starting the JAMS DECwindows/Motif Interface

When *JAMS* is installed, *JAMS* is added as a Session Manager/FileView menu item. If you have not customized your *Applications* pull-down menu, the *JAMS* menu item will be automatically added to your *Applications* Menu.

If the *JAMS* menu item does not appear in your *Applications* Menu, pull-down the *Options* Session Manager menu and select *Menus...*. This will display a dialog box which lets you customize your menus. Add the *JAMS* menu item to one of your menus and click on the *Ok* button.

Once the *JAMS* menu option is available on one of your menus, you can select it to activate the *JAMS* DECwindows/Motif interface.

You can also activate the *JAMS* DECwindows/Motif interface by running the *JAMS_MASTER_MOTIF.EXE* executable which is in *JAMS_EXE:*.

8.1.1 Remote Connections

You can define the logical name JAMS_REMOTE_CONNECTIONS to be a list of remote node specifications *JAMS* will connect to when the DECwindows/Motif interface starts. The remote node specifications should be in the standard DECnet format as in the following example:

```
$ DEFINE JAMS_REMOTE_CONNECTIONS GRAPE, TRAFIC"MYPROXY"
```

In this example, when JAMS_MASTER_MOTIF starts up, connections will be established to the remote node GRAPE using the current users default DECnet proxy and to the remote node TRAFIC using the MYPROXY username/proxy.

8.2 Submit Window

The Submit Window is used to select and submit *JAMS* Jobs which are run on demand. The window consists of a default or user defined menu hierarchy. The default hierarchy shows all of the *JAMS* Systems, expanding a System displays all of the Jobs and Setups for the selected System.

If you want to specify a user defined menu, define the logical name *JAMS_DEFAULT_MENU* to be the name of the menu which you want to use as the top level menu.

Figure 8–1 DECwindows Submit Window

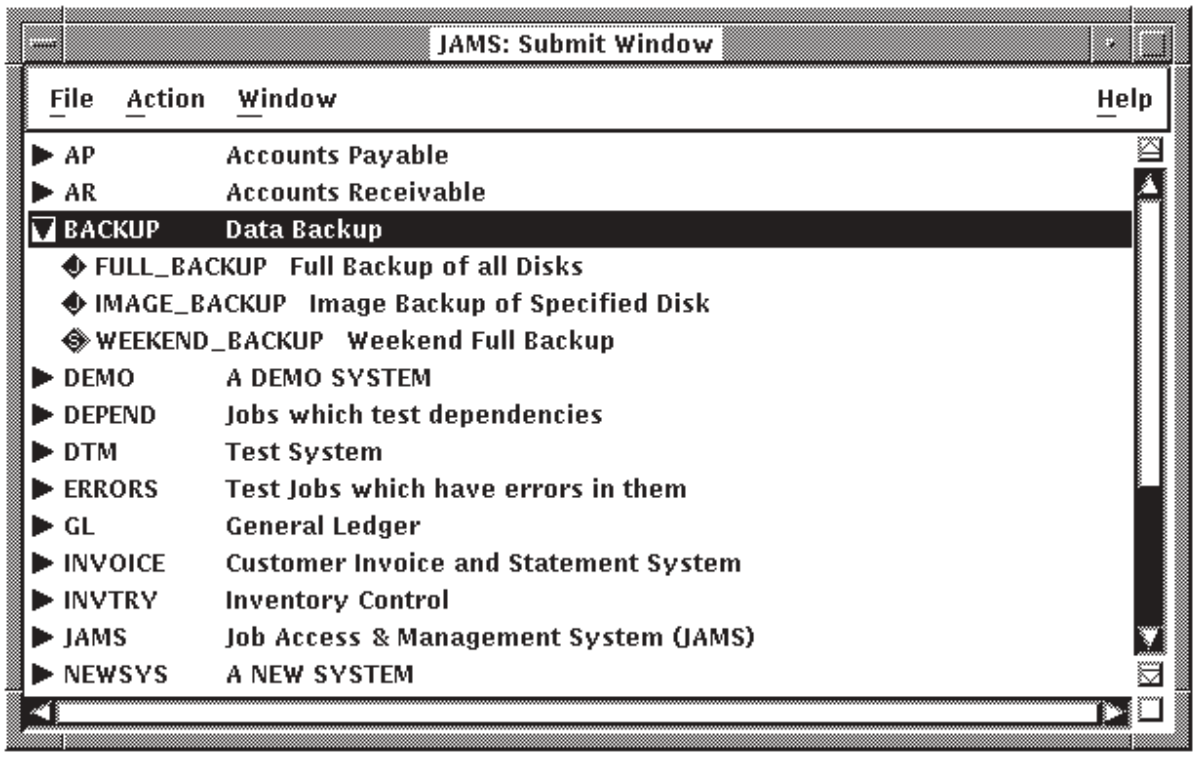


Figure 8–1 is an example of the Submit Window.

8.2.1 Navigating the Window

The Submit Window displays a menu hierarchy. A sub-menu is denoted with a triangle to the left of the menu name. If the triangle points to the right, the menu is not expanded. If the triangle points down, the menu is expanded. To expand a menu, you can double click on the menu or, click on the menu (to select it) and then pull down the **Action** menu and select **Expand**. You can also press MB3 while the cursor is on the menu you want to expand and then select **Expand** from the pop-up menu.

You can submit a Job or Setup by double clicking on the Job or Setup. You can also select **Submit** from the pull-down or pop-up menu.

You can activate the *JAMS* History window and display a Jobs history by selecting **Show History** from a pull-down or pop-up menu.

8.2.2 File menu

The **File** pull-down menu is used to control the Submit window.

Connect to Server...

This menu option activates a dialog box which allows you to connect to a remote *JAMS* Server. Once connected, you can submit Jobs on that server.

Disconnect

This menu option lets you disconnect from one of the remote *JAMS* Servers which you are connected to.

Settings...

This menu option activates a dialog box which allows you to select which windows will be opened when the *JAMS* DECwindows/Motif interface is started.

Save Settings

This menu option will save the current size and position of the *JAMS* windows. These sizes and positions will be used the next time you start the *JAMS* DECwindows interface.

Close Window

This menu option will close the Submit window. If there are no other *JAMS* windows open, the image will exit.

Exit

This menu option will close all of the *JAMS* windows and exit.

8.2.3 Action menu

The **Action** menu is used to perform an action on the Submit window or the selected line in the Submit window. The items in the Action menu are also available from a pop-up menu. Press MB3 to display the pop-up menu. The options on the **Action** menu include:

Expand

This option will expand the selected line. This option is only active when the selected line is a menu line.

You can also expand or collapse a menu by double clicking on the menu line.

Collapse

This option will collapse the selected menu line. This option is only active when the selected line is a menu line.

You can also expand or collapse a menu by double clicking on the menu line.

Collapse All

This option will collapse all expanded menus.

Show History

This option activates the *JAMS* History Window, clears the current history list and performs a search for history of the selected Job.

Submit

This option will submit the selected Job or Setup. A dialog box which contains the jobs parameters will be displayed. If the Job has defined reports, you can click on the Reports... button to display and possibly override the report printing information.

8.2.4 Window menu

The **Window** menu is used to activate other portions of the *JAMS* DECwindows/Motif interface. From the Submit window, you can activate the History window, the Monitor window or the Definitions window.

8.3 Submitting a Job

When you submit a job, a dialog box which contains the jobs parameters will be displayed. If the Job has defined reports, you can click on the Reports... button to display and possibly override the report printing information.

8.4 Monitor Window

The Monitor Window is used to monitor and manage the batch jobs which are known by the *JAMS*. The *JAMS* Job Monitor is a high performance, continuously updated display of all batch jobs scheduled or submitted by end-users. This display also provides comprehensive job management capabilities.

8.4.1 The Monitor Display

The Monitor Window includes two types of display lines, top level categories and Jobs. A top level category line includes an icon which shows whether or not the line is expanded, the number of jobs in the category, the name of the category and detail headings. You can expand or collapse a category line by double clicking on the line.

Figure 8–2 is an example of the Monitor Window.

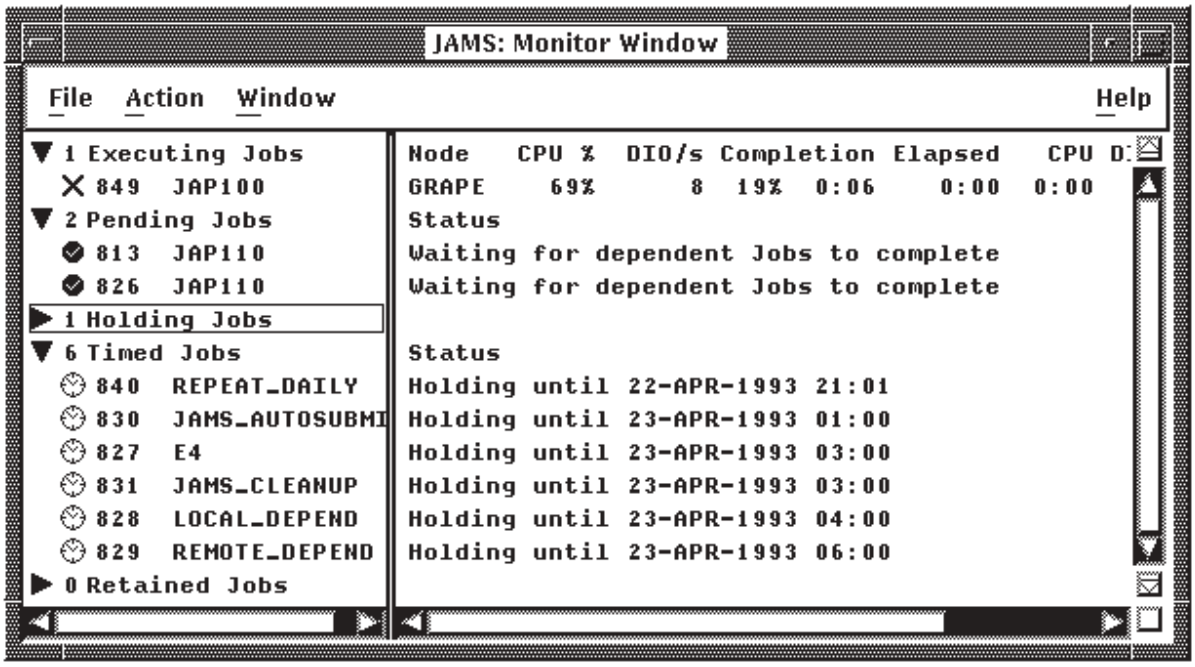
8.4.2 Monitor Detail Lines

When a Job is executing, the Monitor includes the following information:

Entry

This is the *JAMS* entry number for the job.

Figure 8–2 DECwindows Monitor Window



Job Name

This is the name of the job as specified in the *JAMS* Job definition.

Node

This is the name of the node on which this job is running.

CPU %

This column shows the CPU utilization percentage for this job during the most recent update interval.

DIO/s

This column shows the average number of direct I/O's per second which this job performed during the most recent update interval.

Completion %

If this job is registered in the *JAMS* database, we can compute the completion percent based on the Job's past performance. This percentage is an estimate of how close to completion the Job is. This can be a useful monitoring tool. If an operator sees a Job which shows a completion percentage of 200%, they know that the Job has used twice the resources which it normally takes and they may want to take corrective action.

This percentage is calculated using the Jobs current and average CPU usage and Direct I/O count so running the a Job on a heavily loaded system will not affect this calculation.

Completion Time

If this Job is registered in the *JAMS* database, we can calculate how much longer the Job is going to run based on the Job's past performance. This calculation is based on the Job's current CPU utilization and direct I/O per second count. We extrapolate this data to determine how much longer the job will run before reaching its average CPU usage and direct I/O count.

Elapsed Time

This shows how long the Job has been executing, in hours and minutes.

CPU Time

This shows how much CPU time the Job has accumulated, in hours and minutes.

DIO Count

This shows the number of direct I/O operations performed by the Job.

8.4.3 File menu

The **File** pull-down menu is used to control the Monitor window.

Connect to Server...

This menu option activates a dialog box which allows you to connect to a remote *JAMS* Server. Once connected, you can monitor Jobs on that server.

Disconnect

This menu option lets you disconnect from one of the remote *JAMS* Servers which you are connected to.

Settings...

This menu option activates a dialog box which allows you to select which windows will be opened when the *JAMS* DECwindows/Motif interface is started.

Save Settings

This menu option will save the current size and position of the *JAMS* windows. These sizes and positions will be used the next time you start the *JAMS* DECwindows interface.

Close Window

This menu option will close the Monitor window. If there are no other *JAMS* windows open, the image will exit.

Exit

This menu option will close all of the *JAMS* windows and exit.

8.4.4 Action menu

The **Action** menu is used to perform an action on the Monitor window or the selected line in the Monitor window. The items in the Action menu are also available from a pop-up menu. Press MB3 to display the pop-up menu. The options on the **Action** menu include:

Expand

This option will expand the selected line. All current and future jobs in this category will be displayed. This option is only active when the selected line is a top level line.

You can also expand or collapse a category by double clicking on the category line.

Collapse

This option will collapse the selected line. The jobs in this category will no longer be displayed. This option is only active when the selected line is a top level line.

You can also expand or collapse a category by double clicking on the category line.

Collapse All

This option will collapse all of the top level categories.

You can also expand or collapse a category by double clicking on the category line.

Show Detail

This option will display a window which shows detailed information about the selected Job. This information will be updated as the Job executes.

You can also display a Jobs detail window by double clicking on the Job.

Show History

This option activates the *JAMS* History Window, clears the current history list and performs a search for history of the selected Job.

Release

Jobs can be in a pending or holding state for many different reasons. When you elect to release a job, a window will appear showing all the reasons this particular job is not running. You can then decide to remove some, or all of the constraints which are keeping the job from executing.

Hold

The selected job is held until released.

Reschedule

This option is used to change the scheduling attributes of a job which is not executing. A dialog box is displayed which allows you to change the attributes of the job.

Restart

This option is used to abort and restart an executing job. A window is displayed which allows you to specify where the job should execute as well as the hold status. If you complete the form and click on the **Ok** button, the job is aborted and either restarted or placed on hold.

Abort/Delete

If the selected job is currently executing it is aborted. Otherwise the job is deleted from the schedule.

8.4.5 Window menu

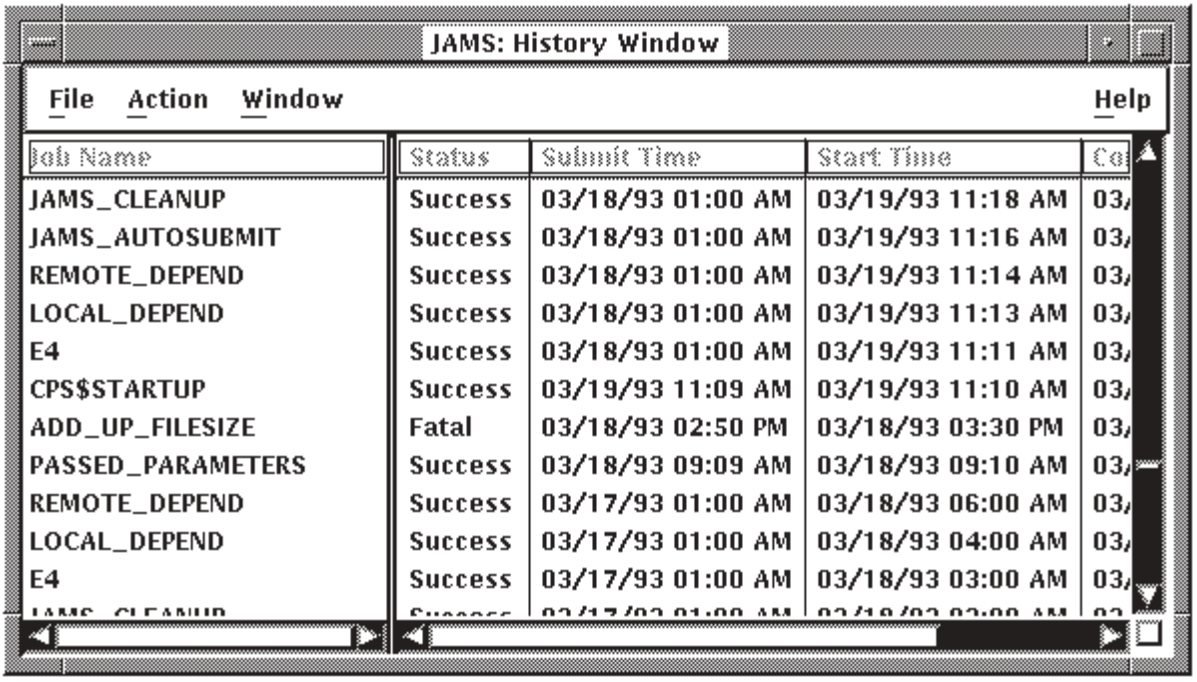
The **Window** menu is used to activate other portions of the *JAMS* DECwindows interface. From the Monitor window, you can activate the Submit window, the History window or the Definitions window.

8.5 History Window

The History Window is used to search and examine batch job execution history.

Figure 8–3 is an example of the History Window.

Figure 8–3 DECwindows History Window



8.5.1 The History Display

The History display window contains one line for each history record which matched your selection criteria. Each line shows the Job Name, final status and, submit, start and completion time. You can double click on a line to display a detail window.

You can sort the list by Job Name, Start Time or End Time. To sort the list, pull down the **Action** menu, move to **Sort** and then select one of the sort options from the cascade menu.

Each time you use the **Search...** option, the records which match your selection criteria are added to the existing records. You can clear the list by selecting **Clear List** from the **Action** menu.

8.5.2 File menu

The **File** pull-down menu is used to control the History window.

Connect to Server...

This menu option activates a dialog box which allows you to connect to a remote *JAMS* Server. Once connected, you can search History on that server.

Disconnect

This menu option lets you disconnect from one of the remote *JAMS* Servers which you are connected to.

Settings...

This menu option activates a dialog box which allows you to select which windows will be opened when the *JAMS* DECwindows/Motif interface is started.

Save Settings

This menu option will save the current size and position of the *JAMS* windows. These sizes and positions will be used the next time you start the *JAMS* DECwindows interface.

Close Window

This menu option will close the History window. If there are no other *JAMS* windows open, the image will exit.

Exit

This menu option will close all of the *JAMS* windows and exit.

8.5.3 Action menu

The **Action** menu is used to perform an action on the History window or the selected line in the History window. The options on the **Action** menu include:

Show Detail

This option will display a window which shows detailed information about the selected Job. From this detail window, you can also view the Jobs log file.

You can also display a Jobs detail window by double clicking on the Job.

Search...

This option displays a dialog box in which you enter your selection criteria. When you click on the Ok button, the search starts and a work in progress box is displayed. The work in progress box has a Cancel button which can be used to cancel a long search. If you cancel a search, all of the records located thus far will be included in the list.

The number of records which a single search will add to the list can be limited. Define the logical name *JAMS_HISTORY_LIMIT* to be the desired limit. If this logical name is not defined, the limit defaults to 500 records.

Each time you use the **Search...** option, the records which match your selection criteria are added to the existing records. You can clear the list by selecting **Clear List** from the **Action** menu.

Sort

The option allows you to sort the current list by Job Name, Start time or End time.

Clear List

This option clears all of the history lines from the list. Each time you perform a search, the lines which match the search are added to the current list.

8.5.4 Window menu

The **Window** menu is used to activate other portions of the *JAMS* DECwindows interface. From the History window, you can activate the Submit window, the Monitor window or the Definitions window.

8.5.5 History Search Window

The Search window is displayed to obtain search selection criteria. You can enter:

System ID

Enter a System ID to limit the history records to Jobs from the specified System. Leave this field blank to display Jobs from any System.

Job Name

Enter Job Name with wildcards. The wildcard characters are * which matches any set of characters and % which matches any single character.

Start/End Times

Enter the beginning and ending date and time range. Only Jobs *submitted* within this range will be included in the list. If you leave the times blank, they default to midnight for the start time and 23:59:59.99 for the end time.

Final Status

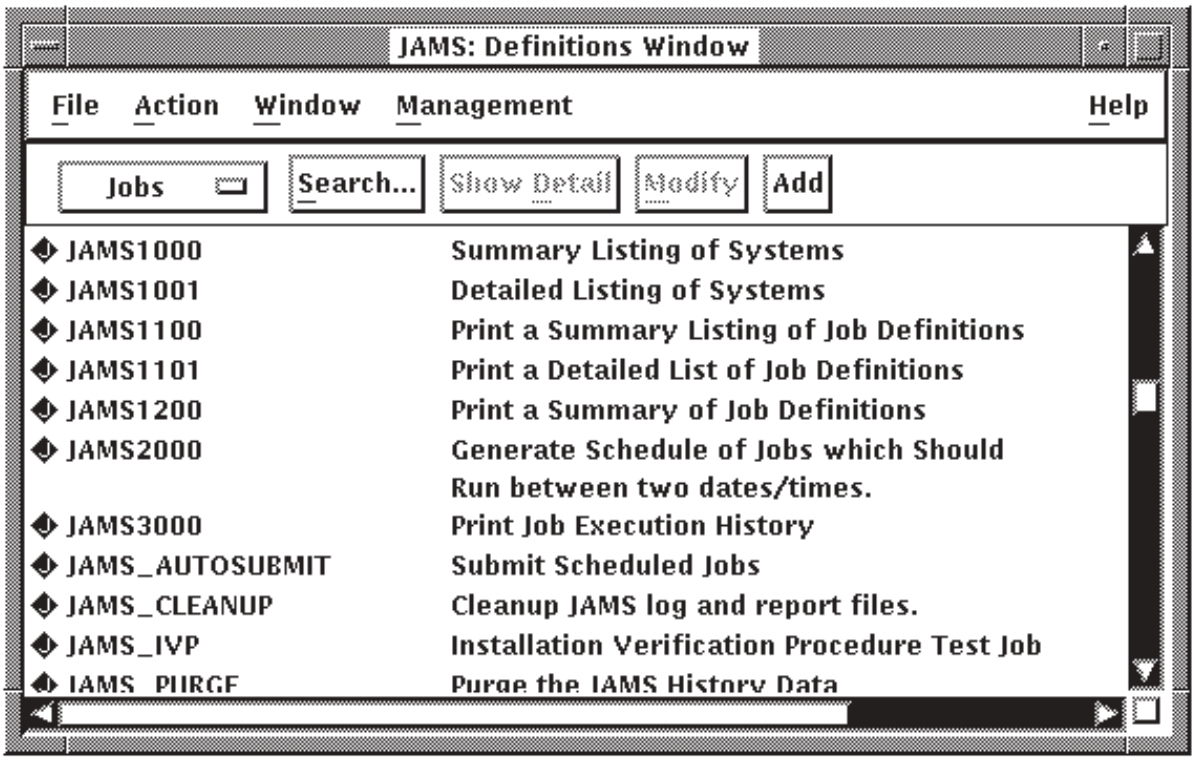
You can limit your search to only Jobs with a specific final status severity. Select the severities which you want to include in your list.

8.6 Definitions Window

The Definitions Window is used to maintain the *JAMS* database.

Figure 8–4 is an example of the Definitions Window.

Figure 8–4 DECwindows Definitions Window



8.6.1 Button Bar

The Definitions window includes a button bar which includes:

- An option button used to select the current view.
- A Search button used to initiate a search which will augment or replace the entries in the current view.
- A Show Detail button which is used to display the detail of the selected entry.
- A Modify button which is used to modify the detail of the selected entry.
- An Add button which is used to add a new definition.

8.6.2 The Definitions Display

The Definitions display window contains one line for each record which matched your selection criteria. You can double click on a line to display a detail window.

8.6.3 File menu

The **File** pull-down menu is used to control the Definitions window.

Connect to Server...

This menu option is disabled in the Definitions window.

Disconnect

This menu option is disabled in the Definitions window.

Settings...

This menu option activates a dialog box which allows you to select which windows will be opened when the *JAMS* DECwindows/Motif interface is started.

Save Settings

This menu option will save the current size and position of the *JAMS* windows. These sizes and positions will be used the next time you start the *JAMS* DECwindows interface.

Close Window

This menu option will close the Definitions window. If there are no other *JAMS* windows open, the image will exit.

Exit

This menu option will close all of the *JAMS* windows and exit.

8.6.4 Action menu

The **Action** menu is used to perform an action on the Definitions window or the selected line in the Definitions window. The options on the **Action** menu include:

Search...

Pops up the search dialog box for the current view. When you click on the Ok button, the search starts and a work in progress box is displayed. The work in progress box has a Cancel button which can be used to cancel a long search. If you cancel a search, all of the records located thus far will be included in the list.

Clear List

Clears the list for the current view.

Show Detail

Displays the detail of the currently selected line.

Show History

Pops up the *JAMS* History window and performs a search based upon the currently selected line in the Definitions window.

Modify

Displays the detail of the currently selected line and allows modification.

Submit

Submits the currently selected line in the Definitions window.

Copy

Copies the currently selected item to a new name.

Add

Adds a new item. This is a cascading menu which allows you to add a System, Trigger, Variable or Menu.

Delete

Deletes the currently selected item. A confirmation dialog box is displayed to confirm the delete.

8.6.5 Window menu

The **Window** menu is used to activate other portions of the *JAMS* DECwindows interface. From the Definitions window, you can activate the Submit window, the Monitor window or the History Window.

8.6.6 Management menu

The **Management** menu is used to view or modify various *JAMS* management objects. The options on this menu include:

Dates

Used to specify special dates used for scheduling or date parameters.

Access Control

Used to define Access Control Lists which control access to various *JAMS* options.

Remote Nodes

Used to define *remote* nodes which are also running *JAMS*. These nodes may be used for remote job dependencies.

Node Groups

Used to define groups of remote nodes which may be used to define job dependencies. Defining a dependency on a job at a remote node group is the same as defining a dependency for the job on each node in the node group.

Configuration

Used to define *JAMS* configuration options.

Date Types

Used to define special date types.

8.6.7 Search Criteria

When you initially select a category of definitions, or when you press the Search button, you are presented with a search criteria dialog box.

Only records which match the criteria entered will be displayed in the Definitions window. You can also choose to clear the list before performing the new search.

8.7 Connect Dialog

When you select **Connect to Server** from the **File** menu, a dialog box is displayed which has three fields, Server Name, Username and Password. The Server Name is the DECnet node name of the server you want to connect to. You can leave the Username and Password fields blank to access the server via a DECnet proxy. You can also enter a Username and leave the Password blank to use a specific DECnet proxy.

8.8 Using Help

There are three ways to obtain help from within the *JAMS* DECwindows interface:

1 The **Help** pull-down menu.

2 Press the Help key.

3 Some windows have a Help button.

Help Menu

The **Help** menu has a number of options. If you select **On Context**, the cursor changes to a question mark and you can click on the component of the window on which you would like help.

The **On Window** option will provide help on the entire window.

The **Tutorial** option provides a tutorial on *JAMS*. This is a good place to start if you are new to *JAMS*.

The **Using Help** option displays the text you are now reading.

The **On Version** option displays a dialog box which contains version and support information.

Help Key

If you press the Help key, *JAMS* will provide help on the item in which the cursor is located. If this item does not have any specific help, help will be displayed on the next higher item (such as the window which contains the item).

Help Button

Some dialog boxes have a Help button which will provide help which is specific to the dialog box. In some cases, a dialog box will have a Help button but it will not be active. This means that the dialog box is capable of providing help but there is no help available for the specific message being displayed by the dialog box.

9 Submitting Ad Hoc Jobs

This chapter explains how *JAMS* can make it easier to submit batch jobs. Traditional job scheduling systems help manage regularly scheduled batch jobs. One of the strengths of *JAMS* is that it also helps you manage ad hoc jobs, job which are run only when needed. *JAMS* provides a simple, menu driven means to select a job and then uses "fill-in-the-blanks" video forms to prompt the user for the job's parameters and printing options.

While the end-user is responsible for requesting the job and providing values for the parameters, *JAMS* still schedules the job based upon the Job and System definitions which can be maintained by the MIS Department.

9.1 Submitting a JAMS Job

The *JAMS_MASTER* program is used to submit batch jobs. *JAMS_MASTER* provides menu based access to job submission as well as a *SUBMIT* command which is very similar to the standard OpenVMS *SUBMIT* command.

Using *JAMS* does *not* preclude or diminish the value of using the OpenVMS SUBMIT command. In fact, *JAMS* can track and maintain history for jobs submitted via the standard SUBMIT command.

9.1.1 Replacing the OpenVMS SUBMIT Command

You can define a symbol which will simulate the standard OpenVMS *SUBMIT* command. *JAMS* accepts the *SUBMIT* command and many of the same qualifiers as the standard OpenVMS SUBMIT command. The following example shows how you can define a symbol to replace the OpenVMS *SUBMIT* command.

```
$ SU*BMIT :== $JAMS_EXE:JAMS_MASTER.EXE SUBMIT Return
$ SUBMIT MYJOB
```

This example defines the DCL symbol SUBMIT (which can be abbreviated to the first two or more characters), then uses this symbol to submit the Job MYJOB. The standard OpenVMS SUBMIT command would look for a file named MYJOB.COM in the current default directory and submit the command file to the SYS$BATCH queue.

JAMS would look for a Setup or Job named MYJOB in its database. If found, it would determine the name and location of the command file, prompt for any parameters, and submit the Job to the schedule. The Job may run in a queue or as a detached process, depending upon the Execution Method defined for the Job. The Job may be defined to run on OpenVMS, Windows NT, or a UNIX/Linux system.

Note: Even though the Job is being initiated on OpenVMS, the Job itself may very well run on Windows NT or UNIX/Linux. The Execution Method along with the Agent Node determines how the Job is submitted, the Operating System it will run on, and the node where the Job runs.

Command line access to *JAMS* batch jobs is generally used by more technically oriented people. *JAMS* batch jobs can be very useful for software development activities, such as program compiles, because *JAMS* can save the value of a job's parameters in DCL symbols so that the next time the job is submitted, the parameter defaults are recalled.

9.2 Selecting a Job to Submit

If your site is a typical OpenVMS environment, you eventually accumulate hundreds or even thousands of batch jobs. *JAMS* can help you manage all these jobs and provide a menu based environment which will help you find the exact job which you want to submit.

If you know the name of the Job which you want to submit, you can use the *JAMS SUBMIT* command to submit the Job. In many cases, the exact name of a job is not remembered. This is when *JAMS* menu based access to batch jobs becomes indispensable.

The *Job Submission* menu option on the JAMS_MASTER main menu is the entry point to *JAMS* menu based job selection. A typical, user defined menu is shown in Figure 9–1.

This menu has three columns, they are:

1 The name of the line item.

2 The type of the line item, M for Menus, J for Jobs and S for Setups.

3 The Description of the line item (which may span two lines).

The list of line items may be longer than can be shown on the screen. You can use the arrow keys or the Next Screen and Prev Screen keys to scroll through the list of options.

Position the cursor on the desired line item and press Return. If you selected another menu, the current line items will be replaced by the line items from the selected menu. If you selected a Job or Setup, a sequence of screens will be presented which allow you to provide values for the Job's parameters and Report overrides.

9.2.1 Parameters

When you use *JAMS* to submit a job which has parameters, a parameter form will be dynamically created and displayed. Each field on the form consists of the parameter's prompt text and a variable field where you can enter the value of the parameter. If a Job has many parameters, there may be more than one parameter form.

Figure 9–1 Job Submission Menu

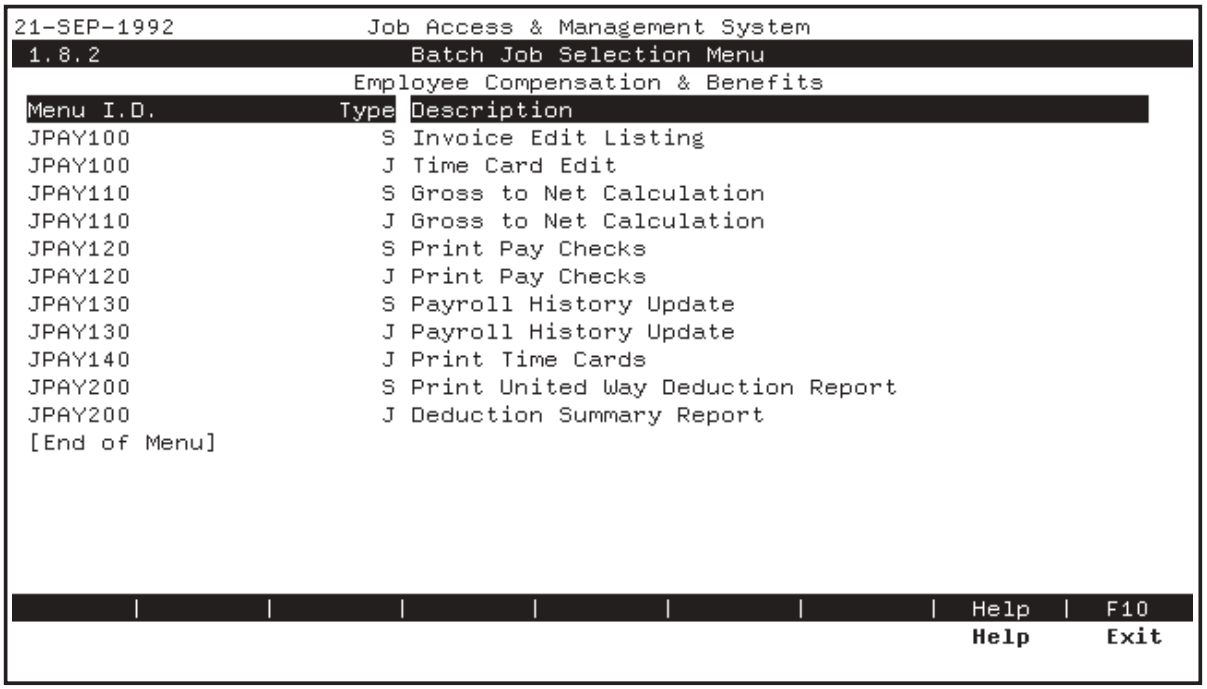


Figure 9–2 shows an example of a parameter entry form.

All of the fields on a parameter screen are user defined. Each field has one of four possible formats:

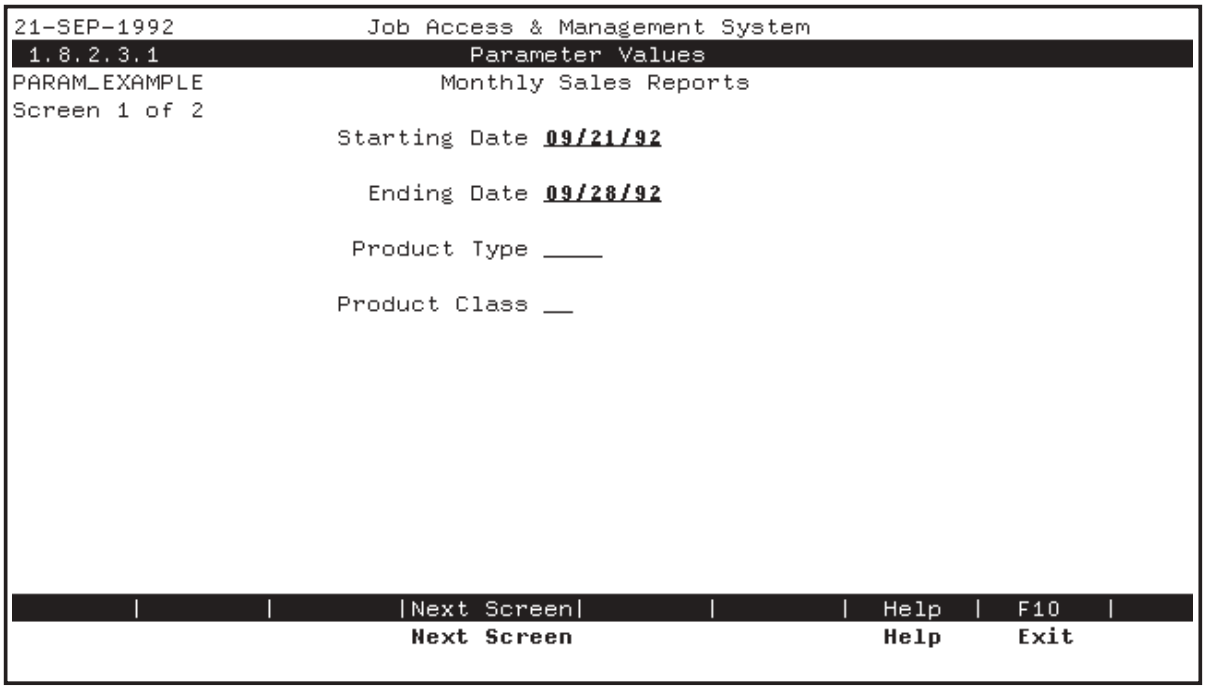
1 Text - Any character may be entered. Input may be forced to uppercase. The length of the entry is limited.

2 Integer - Only the numeric digits may be entered. The length of the entry may be limited.

3 Date - The field has a default format of MM/DD/YY where MM represents a two digit month, DD represents a two digit day of the month and YY represents the two digit year of the century. This format can be customized on a per user basis. See Section 5.2.5 for more information.

4 Time - The field has a default format of HH:MM II where HH represents a hour (in 12 hour format), MM represents the minutes and II represents the meridian indicator (AM or PM). This format can be customized on a per user basis. See Section 5.2.5 for more information.

Figure 9–2 Sample Parameter Form



You can enter values for the parameters or accept the defaults. When *JAMS* determines the default value for a parameter, it takes the following steps:

1 Use the default value entered in the parameter definition.

2 If a Setup is being submitted, use the default value from the Setup's parameter screen.

3 If /USE_SYMBOLS is specified (which is the default), see if there is a DCL symbol with the same name as the parameter and use the symbol's value, if defined.

4 If a value was specified with the /PARAMETER qualifier, use the specified value.

9.2.2 Report Overrides

After you have responded to any parameter forms, the Job/Report override form will be displayed. This form will vary depending on how many Reports are defined for the Job. If the the Job does not have any Reports defined, the form will contain only the Job overrides. If the Job has only one Report, the Job and Report override fields will be displayed on the same form.

Figure 9–3 Sample Job/Report Override Form, one Report

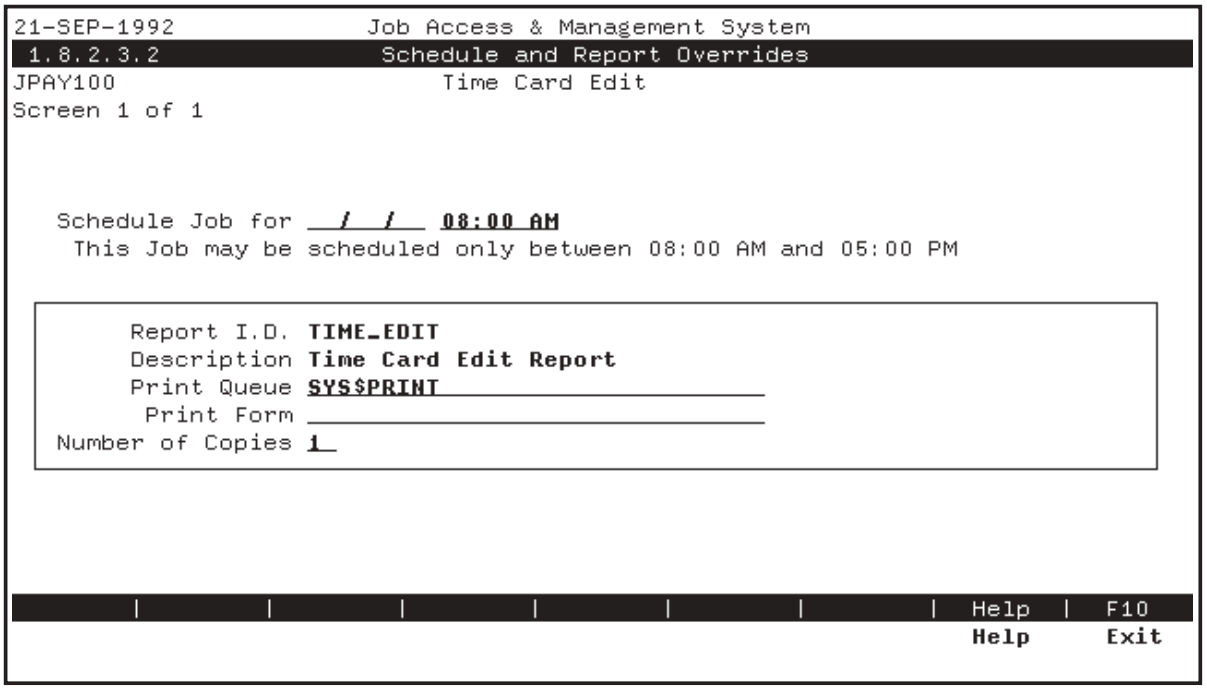


Figure 9–3 shows an example of the Job/Report override form for a Job which has only one Report.

The fields on this form are:

Schedule Job for

This is the date and time when the Job will be released to run. The Job is submitted immediately but, if a date and time is specified here, the job will remain in a pending state until the indicated date and time. This field is equivalent to the OpenVMS /AFTER= qualifier of the SUBMIT command.

Print Queue

This is the OpenVMS print queue where the indicated Report will be printed. The default is defined in the Report Definition. You can override this queue but any value you enter must be a valid OpenVMS print queue.

Print Form

This is the OpenVMS print form which should be used when the indicated Report is printed. The default is defined in the Report Definition. If left blank, the default form of the specified Print queue will be used.

Number of Copies

This is the number of copies of the indicated Report which should be printed. The default is defined in the Report Definition. To suppress printing of the Report, enter zero.

If the Job has more than one Report, the Reports are contained in a list along with the Job override fields. After filling in the Scheduled date and time, you can position the cursor to a specific Report and press the Select key to modify the Report's information. When you press the Select key, a pop-up form will appear which contains the same fields as a single Report screen.

Figure 9–4 shows an example of the Job/Report override form for a Job which has more than one Report.

Figure 9–4 Sample Job/Report Override Form, many Reports

```
21-SEP-1992              Job Access & Management System
 1.8.2.3.2                Schedule and Report Overrides
JPAY110                       Gross to Net Calculation
Screen 1 of 1


   Schedule Job for __/__/__ __:_____

 Report Name                Description
 GROSS_NET                  Gross to Net
 HOURS_RECAP                Hours Worked by Department
 TAX_SUMMARY                Tax Deduction Summary
 VOL_SUMMARY                Voluntary Deduction Summary
 [End of Reports]

        |        |        |        |        |        |  Help  |  F10
                                                       Help     Exit
```

10 Entering Generic Date Specifications

This chapter explains generic, English language based date specifications.

10.1 Date Specifications

There are many places in the *JAMS* system where you need to specify a date. Sometimes an exact date specification is adequate, but usually not. Most of the time, you want to specify a generic date.

In cases where a generic date is desirable, *JAMS* accepts an English language based date specification. *JAMS* capability for understanding date specifications is quite extensive.

There are three key times when *JAMS* will accept a generic date specification, in a scheduled date, as default parameter values and as Setup parameter values.

10.1.1 Scheduled Date

When you specify the scheduled date for a Job or Setup, you use generic date specifications.

10.1.2 Default Parameter Values

When you define a parameter for a Job, if the parameter's data type is DATE, you can specify a default value for the parameter using generic date specifications.

When a user selects the Job, they are presented with a screen based form used to obtain the values for the Jobs parameters. Parameters with a data type of DATE are presented as a standard MM/DD/YY date field but *JAMS* uses the generic date specification to determine what the default date should be.

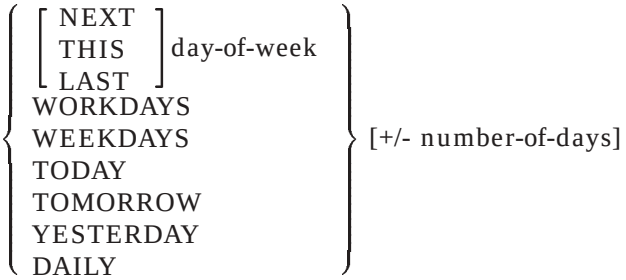
10.1.3 Setup Parameter Values

When you define a Setup, you are prompted for the values for the Job's parameters. If the Job has any parameters which have a data type of DATE, the parameter form will have a sixty character text field for the date parameter, rather than the standard MM/DD/YY type of field. You can then enter a generic date specification.

This is extremely important for Setups which are automatically submitted. When *JAMS* automatically submits Jobs, prompting for the value of parameters is not possible. The generic date specification is evaluated to obtain the value for the parameter.

10.2 Simple Specifications

Simple date specifications specify a date relative to the current date. The format for a simple date specification is:



10.2.1 Description of components

day-of-week

The *day-of-week* can be the full name of a weekday or the first three characters of a weekday name.

When you specify a day of the week, such as MONDAY, *JAMS* interprets this as "Monday of this week". In this context, a week begins on Monday and ends on Sunday.

The days of the week can be preceeded by a modifier such as LAST, THIS or NEXT. The THIS modifier has no effect and is supported for readability.

When you use a modifier, such as LAST, *JAMS* interprets this to mean "weekday of last week". Thus, the text "LAST THURSDAY" will return the same date no matter what day of the week it is interpreted.

WORKDAYS

This specifies the first workday which is on or after the current date. Workdays are defined in the *JAMS* configuration and in Date Definitions.

WEEKDAYS

This specifies the first weekday which is on or after the current date.

TODAY

Specifies the current date.

TOMORROW

Specifies the current date plus one day.

YESTERDAY

Specifies the current date minus one day.

DAILY

This is synonymous with TODAY and is provided for readability. Specifies the current date.

+/- number-of-days

A simple date specification can optionally have a positive or negative integer appended to it which adds or subtracts the indicated number of days.

10.2.2 Valid Simple Date Specifications

Some examples of valid, simple date specifications are:

- TODAY + 5
- NEXT MON
- LAST TUESDAY
- WORKDAYS

10.3 Complex Specifications

Complex date specifications are used to specify a date relative to an arbitrary period of time. By period of time, we mean something like a month, or fiscal period.

A complex date specification may be thought of as two components, the day specification and the period specification. For example, in the text "1st WORKDAY of NEXT MONTH", the day specification is "1st WORKDAY" and the period specification is "NEXT MONTH".

The general format of a Complex Date specification is as follows:

[**day-of-period** OF] **period** [+/- number-of-days]

The syntax for the **day-of-period** specification can take one of two forms. Both forms are equivalent, the choice of which form to use is left to the user. The two forms of the **day-of-period** specification are:

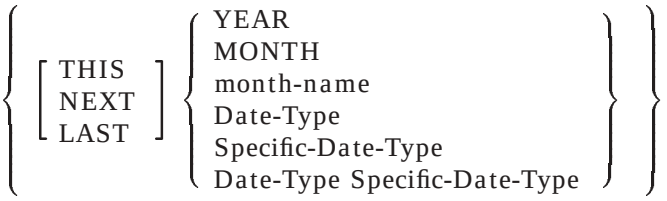
[FIRST | LAST | 1[st] | 2[nd] | 3[rd] | integer [th]] { day-of-week | WORKDAY | WEEKDAY | DAY | MONTH }

or

{ day-of-week | WORKDAY | WEEKDAY | DAY | MONTH } [OF { FIRST | LAST | 1[st] | 2[nd] | 3[rd] | integer [th] } WEEK]

If you do not specify the day of period, the default is the current day.

The syntax for the **period** specification is:



While this syntax specification seems ominous, it is actually a representation of how people commonly specify dates.

10.3.1 User Defined Periods

If you specify a period by using user defined Date Types, you may have to specify both the Specific and generic Date Types. For example, if you have defined the Date Type FISCAL with Specific Date Types of PERIOD_01 through PERIOD_12, you can specify the second period as:

"FISCAL PERIOD_02" or "PERIOD_02".

If you defined two Date Types which both use the Specific Type of PERIOD_02, then you *must* specify "FISCAL PERIOD_02".

10.3.2 Weeks

When used in the context of a period, a week is defined as starting on the first day of the period and continuing for seven days.

10.3.3 Valid Complex Date Specifications

The following examples of valid complex date specifications are based on the current date being March 1st, 1991.

Specification	Date
FIRST MONDAY OF NEXT MONTH	01-APR-1991
2ND MONDAY OF THIS MONTH	12-MAR-1991
FIRST MONDAY OF LAST MARCH	05-MAR-1990
6TH WEEKDAY OF NEXT MONTH	08-APR-1991
6TH WEEKDAY OF MONTH	08-MAR-1991

11 Managing JAMS

This chapter explains management of *JAMS*.

11.1 JAMS Processes

When the *JAMS* start-up procedure is executed on OpenVMS one, two or three detached processes will be started. The *JAMS_MONITOR* process is started on all OpenVMS nodes and the *JAMS_SCHEDULE* and *JAMS_NETWORK* processes are started on one OpenVMS node in the VMScluster.

On Windows NT/2000 systems, the *JAMS* Agent service must be running.

11.1.1 The JAMS_MONITOR process

The JAMS_MONITOR process must be running on all OpenVMS nodes which will process batch jobs. The JAMS_MONITOR process monitors the creation and termination of batch processes. It also will redirect connection requests from remote nodes to the node in the VMScluster which is running the JAMS_NETWORK process. Do not confuse the JAMS_MONITOR process with the *JAMS* Job Monitor function. The JAMS_MONITOR is notified of the creation of a batch process by the JAMS_REGISTRAR program.

The JAMS_REGISTRAR program should be executed by the OpenVMS system wide login command file (it will have no effect on non batch processes). The JAMS_REGISTRAR program sends a message to the JAMS_MONITOR to alert the monitor that a batch job has started. It also sets the batch job's termination mailbox to point to the JAMS_MONITOR's mailbox. The OpenVMS job controller will place a message in the job's termination mailbox when the job terminates, no matter how the Job terminates. The JAMS_MONITOR process will verify the mailbox messages which it receives and forward them to the JAMS_SCHEDULE process.

Note: If you are using other software which uses the termination mailbox, make sure that the termination mailbox is set up for the *other* software before running the JAMS_REGISTRAR program. The JAMS_MONITOR process will receive the termination message and forward it to the second mailbox.

The JAMS_MONITOR process will also keep track of the JAMS_SCHEDULE and JAMS_NETWORK processes to make sure that there is one of each running in the VMScluster.

11.1.2 The JAMS_SCHEDULE process

There should always be one JAMS_SCHEDULE process running in a VMScluster. The JAMS_MONITOR processes in the cluster (one on each node) will keep track of the JAMS_SCHEDULE process and if the process dies or the node which the JAMS_SCHEDULE process is executing on leaves the cluster, one of the remaining JAMS_MONITOR processes will fire up another JAMS_SCHEDULE process on a remaining node.

The JAMS_SCHEDULE process receives messages from the JAMS_MONITOR processes and performs the following basic tasks:

- Updates Job History.
- Examines Jobs submitted by the *JAMS* Submit sub-system to determine if all of the Jobs dependencies have been satisfied.
- Fires Triggers when their events occur.
- Releases Jobs when their dependencies are satisfied.
- Verifies that resources are available for a Job.
- Releases Jobs when their resources become available.
- Sends notification of failed Jobs via OpenVMS Mail, operator requests and broadcasts.
- Sends messages to *JAMS* Job Monitors when the status of a job changes.

11.1.2.1 Controlling the JAMS_SCHEDULE node selection

The JAMS_SCHEDULE process must be running on one node in a VMScluster. If a JAMS_MONITOR process detects that the JAMS_SCHEDULE process is not running, it will start one.

In a large VMScluster, you may have many different types of systems, these may range from fast Alpha class systems to small VAXstation 2000's. Generally, you want the JAMS_SCHEDULE process to run on one of your more powerful nodes, or one with available capacity.

You can control which node the JAMS_SCHEDULE process will start on by defining the logical name JAMS_SCHED_WEIGHT. This logical must be defined in the system logical name table, have the executive attribute and translate into a numeric value. If JAMS_SCHED_WEIGHT is not defined, or is defined incorrectly, then the value 1 will be used.

Nodes which have JAMS_SCHED_WEIGHT defined as 0 (zero) will *never* start a JAMS_SCHEDULE process. In fact, they won't even check to see if a schedule process is running.

When a monitor detects that the schedule process is not running, it will compare the value of it's JAMS_SCHED_WEIGHT logical with the values of the other nodes in the VMScluster. The node with the highest value will then start a schedule process.

If you want to move the JAMS_SCHEDULE process off of the node which it is currently running on, you can use the STOP SCHEDULE and START SCHEDULE commands. You may need to do this if your primary node goes down and the Schedule process starts on one of the secondary nodes. Note however that when the Schedule process is restarted, it will start on the node with the highest JAMS_SCHED_WEIGHT value.

11.1.2.2 Customizing JAMS_SCHEDULE startup

You can customize the start up of the JAMS_SCHEDULE process by creating the JAMS_COM:JAMS_SCHEDULE_STARTUP.COM command procedure. If this command procedure exists, it is executed by the JAMS_SCHEDULE process when it starts. You can use this command procedure to define process level logical names, set RMS buffers or perform almost any other type of initialization.

11.1.3 The JAMS_NETWORK process

The JAMS_NETWORK process provides wide area network communications support. When *JAMS* needs to communicate with a remote node, a message is sent to the local JAMS_NETWORK process which will establish a link with the remote node and send the message. If a link cannot be established, the JAMS_NETWORK process will save the message and periodically retry.

11.1.3.1 Controlling the JAMS_NETWORK node selection

The JAMS_NETWORK process is similar to the JAMS_SCHEDULE process in that there is only one JAMS_NETWORK process per VMScluster. If you will be using the wide area network features of *JAMS*, the JAMS_NETWORK process must be running on one node in the local VMScluster and one node on the remote VMScluster. If a JAMS_MONITOR process detects that the JAMS_NETWORK process is not running, it will start one.

Generally, you want the JAMS_NETWORK process to run on one of your more powerful nodes, or one with good network connections.

You can control which node the JAMS_NETWORK process will start on by defining the logical name JAMS_NETWORK_WEIGHT. This logical must be defined in the system logical name table, have the executive attribute and translate into a numeric value.

Nodes which have JAMS_NETWORK_WEIGHT defined as 0 (zero) will *never* start a JAMS_NETWORK process. In fact, they won't even check to see if a network process is running. Also, if this logical name is zero, a remote node will not be able to establish a connection because the JAMS_MONITOR process will not redirect remote network connection requests to the node which is running the JAMS_NETWORK process.

When a monitor detects that the network process is not running, it will compare the value of it's JAMS_NETWORK_WEIGHT logical with the values of the other nodes in the VMScluster. The node with the highest value will then start a network process.

If the JAMS_NETWORK_WEIGHT is not defined, or is defined incorrectly, then the value 1 will be used.

If you want to move the JAMS_NETWORK process off of the node which it is currently running on, you can use the STOP NETWORK and START NETWORK commands. You may need to do this if your primary node goes down and the network process starts on one of the secondary nodes. Note however that when the network process is restarted, it will start on the node with the highest JAMS_NETWORK_WEIGHT value.

11.1.4 The JAMS Agent Windows NT/2000 Service

The *JAMS* Agent Windows NT/2000 Service receives requests and sends responses to the JAMS_SCHEDULE which is running in the VMScluster. The JAMS Agent's purpose is to initiate the batch job which is received from the JAMS_SCHEDULE and to provide status back to the JAMS_ SCHEDULE when the job completes.

Communication between the JAMS_SCHEDULE process and the JAMS Agent is secured. Only JAMS_SCHEDULE processes can access the *JAMS* Agent service running on Windows NT/2000.

The communication between JAMS_SCHEDULE and the *JAMS* Agent can be further secured through the use of a password. The password is only necessary in those situations where you have multiple systems (VMSclusters and stand-alone systems) running the JAMS_SCHEDULE process, and you wish to specify the JAMS_SCHEDULE processes which should be able to schedule batch jobs on any specific Windows NT/2000 system. The password must be set in the JAMS Database on the OpenVMS system as well as in the control applet on the Windows NT/2000 system.

If you have only one OpenVMS system (VMScluster or stand-alone) or all of your OpenVMS systems are trusted to submit batch jobs to the Windows NT/2000 system, then the password is not needed.

For *JAMS* to successfully submit jobs to Windows NT/2000 systems the following conditions must be established:

- The *JAMS* Agent Service must be installed on the Windows NT/2000 Server or Workstation system. The installation must occur using a Windows NT/2000 Administrator account (local or Domain).
- Verify that the *JAMS* Agent NT Service is running.
- The Agent Node Name, found under the Submit Options of the Job, must specify the Windows NT/2000 computer name where the job will run.
- The Execution Method, found under the Source Options of the Job must specify a Windows NT/2000 Execution Method. *JAMS* ships with three NT Execution Methods already established. They are:
  - NT. Non-parsed batch file.
  - NTCMD. Non-parsed one line NT command.
  - NTPARSE. Parsed batch file.

- A username/password combination must be previously established which is passed to the *JAMS* Agent by the JAMS_SCHEDULE process. See *the JAMS Reference Manual* for detailed instructions on how to establish this information in the *JAMS* database. The *JAMS* Agent first authenticates this username/password combination against the local Windows NT/2000 security system. If this fails, authentication will be attempted against the Windows NT/2000 Domain that this computer is in.
- The username above, must have the "Logon as Batch Job" Windows NT/2000 privilege.

11.1.5 Log Files

The *JAMS* Monitor, Schedule and Network processes share a common log file which they use to log events when they occur. This log file is named JAMS.LOG and is located in JAMS_DATA:. You can type this file at any time.

11.2 Recurring Jobs

JAMS has the capability to automatically submit recurring Jobs. This is done by the *JAMS_AUTOSUBMIT* batch Job. This Job is scheduled to run every day at 1:00 am, including non-workdays.

You must submit this Job after the initial installation of *JAMS*. After the initial submission, you should make sure that the *JAMS_AUTOSUBMIT* Job is scheduled. If your recurring Jobs are not submitted, it may be caused by a failure of the *JAMS_AUTOSUBMIT* Job.

The Jobs supplied with *JAMS* are in the System named JAMS. You should update this System Definition to add the appropriate names to the list of people who should be notified when a Job is this System fails. This is especially important since the failure of the *JAMS_AUTOSUBMIT* Job will prevent other Jobs from running.

11.3 Relative CPU Power Ratings

The *JAMS* job history information includes the amount of CPU processing time consumed by a job. If you have a VMScluster which consists of nodes with varying CPU speeds, you may want to define relative CPU ratings for each CPU in your cluster.

The CPU rating is used when *JAMS* reports CPU utilization history and when making projections. The CPU rating is expressed as a percentage. If the CPU rating is undefined, it is assumed to be 100 percent.

If, for example, you have a VMScluster which consists of 5 VAX 64X0's (7.0 VUP's per CPU) and one VAX 65X0 (13 VUP's per CPU), you could leave the CPU rating undefined on the 64X0's (which would default to 100 percent) and define the CPU rating for the 65X0 as 185 percent (13/7).

You define a nodes CPU rating by defining the logical name JAMS_CPU_RATING. This logical name must be defined in the system logical name table and it must be defined with the executive qualifier. The following command would define a CPU rating of 185 percent:

```
$ DEFINE/SYSTEM/EXECUTIVE JAMS_CPU_RATING 185
```

This CPU rating is an arbitrary rating of the CPU processing speed relative to the other nodes in your VMScluster.

For SMP machines which may have multiple CPU's, the CPU rating should be based on the relative power of a single CPU.

11.4 Security

JAMS includes a feature which allows an unprivileged (but authorized) user to submit a batch job which will run under a different, possibly privileged, username. This feature must be carefully managed in order to prevent abuse.

This concept may be alarming at first but, if properly managed this feature can enhance your overall security. With *JAMS*, instead of granting a person the privileges they need to perform a simple task, privileges which could be misused, you grant them submit access to a specific Job or System which contains Jobs to perform the privileged tasks. Since the user cannot modify the Job definitions, they cannot misuse the privileges. You can essentially grant a person privileges for a limited set of functions.

In order to insure the security of your OpenVMS and *JAMS* environment, you must follow these guidelines:

- Use the SET USERNAME command to define Access Control Lists which grant submit access to OpenVMS usernames. This can eliminate the need to give people the CMKRNL privilege.
- If a *JAMS* System runs under a privileged username, make sure that the directory where the Systems command files are located is secure. Also make sure that access to the System definition is secure.
- If a *JAMS* System runs under a privileged username, make sure that the *JAMS* template library used by the system is secure.

When *JAMS* is first installed, you must have the OpenVMS BYPASS privilege to perform any activity in the *JAMS* database. You can ease this restriction using the Access Control menu option in JAMS_MASTER. As long as you protect any System or Job definitions which execute under a privileged username, *JAMS* will not pose a security risk and in fact, will enhance your overall security.

11.5 Backing Up the JAMS Database

Currently, the *JAMS* database consists of a number of RMS files. These files are created by the installation procedure. The *JAMS* database files are located in the directory which is pointed to by the *JAMS_DATA* logical name. This logical name is defined by the *JAMS_STARTUP.COM* command procedure. These files are protected from normal user access by standard OpenVMS file protections.

Normally, the JAMS_SCHEDULE process has many of these files open for write access. Because of this, you cannot make a valid backup copy of the *JAMS* database without stopping the JAMS_SCHEDULE process.

The JAMS_MASTER program has a STOP SCHEDULE command. This command is intended to be used during the backup of the *JAMS* database. *JAMS* will not lose any information while the Schedule process is down but, jobs which are submitted by the *JAMS* Submit sub-system will remain in a pending state until the Schedule process is restarted. The general procedure is:

1 Issue the JAMS STOP SCHEDULE command.

2 Backup the *JAMS* database.

3 Issue the JAMS START SCHEDULE command.

The JAMS_MONITOR and JAMS_NETWORK processes also have files open for write access. The JAMS_MONITOR opens the JXQ.DAT and JCQ.DAT files for write access and the JAMS_NETWORK has the NWIP.DAT file open for write access. These files are used to pass data between the Monitor, Schedule and Network processes. This data is transient and there is no need to backup these files. If these files ever become corrupt or lost, they can be recreated by performing the following steps:

1 Stop the Monitor, Schedule and Network processes on all nodes in the cluster.

2 Delete the JCQ.DAT, JXQ.DAT or NWIP.DAT files in the JAMS_DATA directory.

3 Start the Monitor processes (which will create new JCQ.DAT and JXQ.DAT files and start the Schedule and Network processes).

11.6 JAMS Queue Characteristics

JAMS uses OpenVMS queue characteristics to prevent batch jobs from executing (assuming the Job in question utilizes queues). The *JAMS_WAITING* and *JAMS_SCHEDULE* queue characteristics should *never* be assigned to a batch queue because this would defeat the purpose of assigning the characteristic to a job (namely preventing the job from starting).

The following table lists the queue characteristics which may be assigned to a Job and the reason they are assigned to a job. These characteristics are defined the first time that the JAMS_SCHEDULE process starts.

Characteristic	Reason
JAMS_SCHEDULE	This Job needs to be examined by the JAMS_SCHEDULE process to determine if it can be released.
JAMS_WAITING	This Job is waiting for a Precheck Job, Dependency or time slot.

If you notice that a Job remains in a pending state longer than you think it should, you can use the SHOW ENTRY/FULL *entry* OpenVMS command to display all information about the Job. If the Job has characteristics associated with it, the characteristic numbers are displayed. You can translate these numbers into the text characteristics with the OpenVMS command SHOW QUE/CHAR.

If you see Jobs with the JAMS_SCHEDULE characteristic for more than a few seconds, it indicates that the JAMS Schedule process is not running. If the JAMS Schedule process is in fact running, it either has a very heavy work load or it is not working correctly. If you feel that the *JAMS* Schedule process is not working correctly, you should try stopping and starting the *JAMS* Schedule by using the STOP SCHEDULE and START SCHEDULE commands.

11.6.1 Production & Debug Characteristics

You can also define queue characteristics to identify production and debug batch queues. When a Job is submitted by *JAMS* the /DEBUG qualifier is used to define whether this is a debug or normal (production) run of the job. For jobs which are *not* submitted by *JAMS*, *JAMS* will look at the queue which the job is in, if the queue has the *JAMS_PRODUCTION* characteristic then the job is considered a production run. If the queue has the *JAMS_DEBUG* characteristic then the job is considered a debug job. If the queue has neither of these characteristics then a *JAMS* configuration field determines whether this is a production or debug run.

If you plan to use the *JAMS_PRODUCTION* and/or *JAMS_DEBUG* characteristics, you must define the characteristics manually.

Index

L

M

N

O

P

Q

R

S

T

U

V

W