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SOS/Solaris Performance Advisor

User Guide

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240 2nd Avenue SW

Albany, OR 97321

USA

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SOS/Solaris Performance Advisor version B.01

Whitney Olsen, Laura Bryngelson, Rodica Popa 03152002

TABLE OF CONTENTS

LIST OF FIGURES

1

WELCOME TO SOS PERFORMANCE ADVISOR

Welcome to the SOS/SOLARIS Performance Advisor software package by Lund Performance Solutions. SOS/SOLARIS is the industry-standard performance monitoring and management application for Sun Enterprise servers.

This software collects and measures Sun Solaris 2.6, 2,7, an d 2.8 (both 32-bit and 64-bit) performance data and provides system managers comprehensive, real-time and historical information in easy-to-read displays.

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Lund Performance Solutions

240 2nd Avenue SW

Albany OR 97321 USA

Internet URL

Visit the Lund Performance Solutions web site at **http://www.lund.com/**.

Telephone Number

For customer and technical support, call **(541) 812-7600**, Monday through Friday during the hours of 8:00 A.M., to 5:00 P.M., Pacific time, excluding holidays.

Fax Number

Transmit fax messages to **(541) 812-7611**.

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- Type of computer hardware you are using.
- Software version number of your operating system(s).
- Exact wording of any messages that appear on your screen.
- What you were doing when the problem occurred.
- How you tried to solve the problem.

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Product Documentation

User's Guide

This user's guide accompanies the SOS/SOLARIS Performance Advisor software as a guide for the new user and as a quick reference for experienced users. This guide assumes that you have a working knowledge of the Solaris operating environment.

Online Help System

In the online Help system, you will find explanations of the many features of SOS Performance Advisor, as well as tips to guide you through the program's basic functionality.

2

SOS/SOLARIS OVERVIEW

SOS Performance Advisor Architecture

SOS/SOLARIS Performance Advisor is comprised of several programs and files. The relationships between the most significant programs and files is illustrated in Figure 2.1.

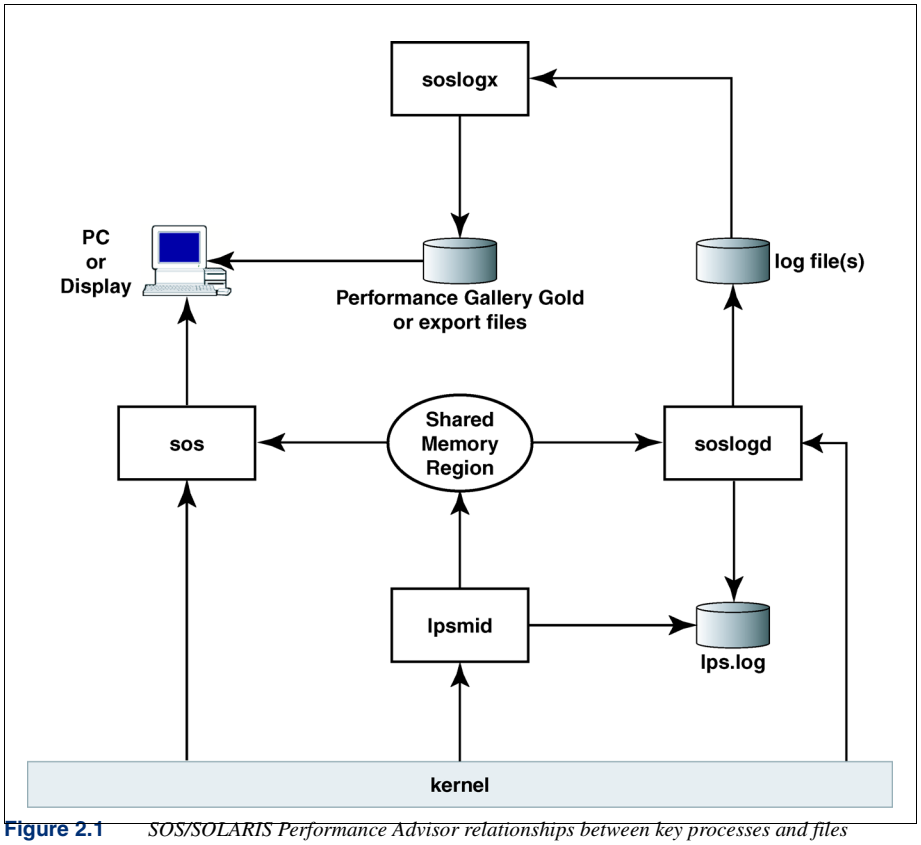


Figure 2.1 *SOS/SOLARIS Performance Advisor relationships between key processes and files*

The LPSMID process is responsible for retrieving much of the performance data from the kernel and providing it to other processes. The user does not have to execute LPSMID, it will be executed automatically by any process that requires it. LPSMID is a daemon process, so it executes in the background and does not interact with the user. Any informational, warning, and error messages from LPSMID will be stored in the lps.log file.

The LPSMID process uses a shared memory segment to deliver the performance data to other processes, which include SOS and SOSLOGD. In addition to the data provided by LPSMID, both SOS and SOSLOGD retrieve some data from the kernel directly.

The SOS process displays real-time performance data to the user in text mode.

SOSLOGD is a daemon process. Its function is to periodically write performance data to log files for later historical analysis. Since it's a daemon process, it also stores informational, warning, and error messages in the lps.log file.

The SOSLOGX process reads the log files created by SOSLOGD. SOSLOGX displays this information to the user, and also allows the user to convert that information to other file formats:

- ASCII text, to export data to spreadsheet applications, such as MS Excel.
- Performance Gallery Gold (*.pfg), to export data to Performance Gallery Gold, a trend analysis and graphical reporting application by Lund Performance Solutions.

  For information about Performance Gallery Gold, please refer to the Performance Gallery Gold User's Guide or contact your Lund account manager (see "Lund Performance Solutions Sales Team" on page 2).

OSF/1 Directory Hierarchy

SOS Performance Advisor versions 2.x, A.0x and later use the OSF/1 directory hierarchy.

IMPORTANT A directory other than the default directory can be assigned during the installation process. Please be aware that every user of this software package will need the same directory in their path.

Directories

IMPORTANT The LPS directory statements that include the default directory and the corresponding environment variable must be set if the default location is not used.

For example:

LPS_OPT_PATH=/opt/lps

Where:

- LPS_OPT_PATH is the environment variable
- /opt/lps is the default directory location

In the past, all Lund Performance Solutions files (lps files) associated with the SOS Performance Advisor application could be found in one directory (LPSPATH=/opt/lps). In accordance with the OSF/1 standard, Lund Performance Solutions files are now located in three different directories, which are described in the next table.

Table 2.1 *SOS Performance Advisor directory locations*

Directory	Description
LPS_ETC_PATH=/etc/opt/lps	Contains host-specific configuration files that can be modified by the user.
LPS_OPT_PATH=/opt/lps	Contains host-specific, third-party files that do not generally change.
LPS_VAR_PATH=/var/opt/lps	Contains host-specific files that are dynamic in nature, including temporary files and files that grow in size.

Subdirectories

The subdirectories of each directory are listed and described in the next table (it is assumed the default directory is used).

Table 2.2 *SOS Performance Advisor subdirectory listings*

Directory	Subdirectory	Description
/etc/opt/lps/	cfg	Contains configuration files used by the Lund Performance Solutions products. Initially, these will be the same files found under /opt/lps/newcfg, except they are actually used by the product and can be modified by the user.
	rpt	Contains SOSLOGX report files.
/opt/lps/	bin	Contains the lps binary files.
	lib	Contains the lps library files.
	newcfg	Contains the configuration files as distributed by Lund Performance Solutions (before user customization). These files are meant to be used as a reference point. They are not actually used by the product. See /etc/opt/lps for more information.
/var/opt/lps/	log	Contains log files.
	tmp	Contains temporary files.

Files

The following file listings are grouped by directory location.

Table 2.3 *SOS Performance Advisor file listings*

Location	File	Description
/etc/opt/lps/cfg/	advice	Contains configurations for the SYSTEM PERFORMANCE ADVICE messages in the Global Summary screen.
	holidays	Contains the configurations for holidays (predetermined days to be excluded from data collections).
	ppoints	Contains configurations for pulse points.
	soskip	Contains configurations for the KIP (key indicators of performance) line.
	workdefs	Contains workload definitions.
/etc/opt/lps/rpt/	reprtdef	Contains compiled SOSLOGX reports.
	*.rpt	Contains SOSLOGX reports.
/opt/lps/bin/	kiclean	An executable program that turns off kernel measurements and cleans up the interprocess communication (IPC) structures created by LPSMID (for example, micro-state accounting for Solaris).
	lpscheck	A program that checks the license status.
	lpsextnd	An executable program used to extend the demonstration license expiration date.
	lpskill	An executable program that kills any lps daemon.
	lpsmid	A daemon that periodically reads process information from the /rocfs structure and saves it.

Location	File	Description
/opt/lps/bin/	lpstrap	A script to send SNMP traps from the advice module to an event browser.
	sos	The character-based real-time performance tool.
	soslogd	A daemon that creates historical performance files.
	soslogx	A character-based tool to view the historical files and extract them for other formats (such as Performance Gallery gold data files (*.pfg)).
	sosrcrom	The SOSLOGX report compiler.
/opt/lps/lib/	itemlist	A list of all data items logged in historical files and usable by soskip, advice, and ppoints.
	license	A new version of license file.
	logxhelp	The SOSLOGX online help file.
	lpscfg	The obsoleted license file.
	pfgitems2	A list of Performance Gallery Gold extraction items.
	soshelp	The SOS online help file.
/opt/lps/newcfg/	cfg	The advice, ppoints, soskip, and holidays configuration files as distributed by Lund Performance Solutions (before user customization). See /etc/opt/lps/cfg for descriptions.
	rpt cfg	The reprtdef and *.rpt files as distributed by Lund Performance Solutions (before user customization). See /etc/opt/lps/rpt for descriptions.
/var/opt/lps/log/	SLLOGCAT	The log file catalog.
	SL*	Contains historical log files.

Location	File	Description
/var/opt/lps/tmp/	*unix.ino	Contains kernel inode to help determine if rebuild of ksymbols.db is necessary.
	lps.log	Contains messages from lps daemons.
	lpsmid.pid	Contains the LPSMID process ID.
	soslogd.pid	Contains SOSLOGX process ID.

Environment Variables

Each of the environment variables are outlined in Table 2.4. For instructions to set the environment variables, see “Setting the Environment Variables” on page 13.

Table 2.4 *SOS Performance Advisor environment variables*

Variable Name	Default Value	Accepted Value
PATH	$PATH:/opt/lps/bin	$PATH:/<custom directory name>/bin
TERM	N/A	N/A
LPS_OPT_PATH	/opt/lps	An existing, fully-qualified directory
LPS_ETC_PATH	/etc/opt/lps	
LPS_VAR_PATH	/var/opt/lps	
LPS_TIME_SEP	: (colon)	Any single alpha-numeric character
LPS_DATE_SEP	/ (forward slash)	
LPS_DECIMAL_INDICATOR	. (period)	
LPS_DATE_FMT	MDY (month day year)	MDY, DMY, or YMD

Security

UNIX software products from Lund Performance Solutions utilize a system group for security purposes. The "lps" group is created during the software installation process.

Members of the lps group can execute the following tasks:

- Modify existing SOS Performance Advisor reports.
- Execute kiclean to remove unnecessary overhead and used memory by LPSMID when it is not able to perform cleanup prior to the last exit (when LPSMID is killed using the 9 signal (kill -9 PID)).

The LPS group is also used to enforce security for log files, the log catalog and the lps directories.

3

ENVIRONMENT VARIABLES AND WORKLOAD GROUPS

Environment Variables

Each of the SOS/SOLARIS environment variables are outlined in Table 3.1. Instructions to set the environment variables are provided in the next section, "Setting the Environment Variables."

Table 3.1 *SOS Performance Advisor environment variables*

Variable Name	Default Value	Accepted Value
PATH	$PATH:/opt/lps/bin	$PATH:/<custom directory name>/bin
TERM	N/A	N/A
LPS_OPT_PATH	/opt/lps	An existing, fully-qualified directory
LPS_ETC_PATH	/etc/opt/lps	
LPS_VAR_PATH	/var/opt/lps	
LPS_TIME_SEP	: (colon)	Any single alpha-numeric character
LPS_DATE_SEP	/ (forward slash)	
LPS_DECIMAL_INDICATOR	. (period)	
LPS_DATE_FMT	MDY (month day year)	MDY, DMY, or YMD

Setting the Environment Variables

Prior to running the SOS Performance Advisor programs, set the appropriate environment variables:

- PATH
- TERM

- LPS_OPT_PATH

  Set only if the host-independent application files were placed in a custom directory during installation.

- LPS_ETC_PATH

  Set only if the host-specific configuration files were placed in a custom directory.

- LPS_VAR_PATH

  Set only if the host-specific dynamic files were placed in a custom directory.

- Localization environment variables (optional).

Setting the PATH Environment Variable

Prior to running SOS Performance Advisor, it is necessary to set the PATH environment variable:

- If the SOS Performance Advisor application files were placed in the default directory (/opt/lps) during installation, add the following line to your .profile:

  PATH=$PATH:/opt/lps/bin

- If the SOS Performance Advisor application files were placed in a custom directory, add the following line to your .profile:

  PATH=$PATH:/<custom directory name>/bin

If you are not sure how to set the PATH environment variable for the shell used when running SOS Performance Advisor, please ask your system administrator for assistance.

Setting the TERM Environment Variable

Prior to running SOS Performance Advisor, it might be necessary to set the TERM environment variable equal to the appropriate device name of your terminal. For example:

TERM=vt100

For more information about the TERM environment variable, please refer to your system documentation.

Setting LPS_OPT_PATH, LPS_ETC_PATH, and LPS_VAR_PATH

In the past, all Lund Performance Solutions files (lps files) associated with the SOS Performance Advisor application could be found in one directory (/opt/lps). In accordance with the OSF/1 standard, Lund Performance Solutions files are now located in three different directories, which are listed in Table 3.2.

If the SOS Performance Advisor application files were placed in a custom directory during installation, it will be necessary to set the corresponding environment variable equal to the custom directory destination prior to running the application.

Table 3.2 *SOS Performance Advisor custom directory PATH environment variables*

Variable Name	Accepted Value	Default Value
LPS_OPT_PATH	An existing, fully-qualified directory	/opt/lps
LPS_ETC_PATH		/etc/opt/lps
LPS_VAR_PATH		/var/opt/lps

Setting the Localization Environment Variables

Four specific environment variables are available in SOS Performance Advisor to customize certain date, time, and numerical characteristics of the application for use in different countries or languages. These environment variables, including their acceptable ranges and default values, are outlined in the next table.

Table 3.3 *SOS Performance Advisor localization environment variables*

Variable Name	Accepted Value	Default Value
LPS_TIME_SEP	Any single alpha-numeric character	: (colon)
LPS_DATE_SEP		/ (forward slash)
LPS_DECIMAL_INDICATOR		. (period)
LPS_DATE_FMT	MDY, DMY, or YMD	MDY (month day year)

Workload Groups

A workload is a group of similar, identifiable transactions on the host system performed by individual users and programs. Workloads can be grouped by:

- Applications
- User login
- Departmental processes

A workload may be as simple as one user running one program, or as complex as entire departments running many programs.

Identifying and Characterizing Workloads

Make sure workloads are homogeneous. A homogeneous workload consists of processes of a similar type, function, and priority.

Averaging is meaningless for workloads made up of dissimilar transactions. For example, if an average accounts receivable transaction takes 200 milliseconds of the CPU's time, while general ledger transactions average 500 milliseconds, taking an average of the two does not provide a meaningful average for either transaction.

Identifying Workloads

Input from management and system users is essential in identifying and defining workloads. Interview managers and users to determine how the system is used and to identify distinct functions, such as order entry, telemarketing, or accounting. Break down the various departmental functions into essential components, based on your desired result. Identify groupings that will provide you with the needed information. These grouped components make up your workloads.

Characterizing Workloads

Once you have identified your workloads, use the following guidelines to further refine your workload definitions:

1. Limit the components of any workload to users or transactions with service demands of comparable magnitude and similar balance across the system. Do not mix heavy-CPU/low-I/O transactions with light-CPU/heavy-I/O transactions.
2. Do not mix interactive processes and batch processes in the same workload. System resources, priorities, and think times are different for interactive and batch processes.
3. Use separate workloads for specific divisions, branches, or departments as needed.
4. Identify workloads by user logon, if possible.

Creating a Workload Definition File

Once you have identified and refined you workloads, enter the data in a workload definition file.

Workload Definition File

User-defined workloads are created in /etc/opt/lps/cfg/workdefs.

Workload Groups

Four workload groups are defined by default (see Table 3.4). These four workloads should always exist.

Table 3.4 *SOS Performance Advisor default workload groups*

Workload	Description
INTERACT	The INTERACT workload contains any processes attached to a terminal (interactive processes). The INTERACT workload group should be configured by the user.
DAEMON	The DAEMON workload contains any daemon processes. By default, this workload group is configured to include any process not attached to a terminal and owned by the root user. The DAEMON workload group should be configured by the user to reflect the system.
BATCH	The BATCH workload contains any batch job processes. By default, this is configured to include any process outside of the DAEMON workload group that is not attached to a terminal. The BATCH workload group should be configured by the user to reflect the system.
DEFAULT	The DEFAULT workload contains any process that does not match any other workload definition. Note that initially, this will be an empty workgroup (no processes will match), because at least one of the other defaults will include any possible process. However, since those workload groups are configurable, this workload group must exist. The DEFAULT workload cannot be modified. It guarantees a process will fall into at least one workgroup by matching any process that does not fall into any other workgroup definition.

Response Time Calculations

Response time calculations are performed for processes, workload groups, and on a system-wide basis. They include:

- Transactions
- Response time
- Average response time per transaction

The definitions of *transaction* and *response time* are dependent upon the type of workload group to which the process belongs. The response time calculations are described below.

INTERACT Response Time Calculations

- ***Transactions = Terminal reads + Process deaths***
- ***Response time = Process live time - Think time***

Process live time is the amount of time a process is alive during the interval. If the process was created before the interval and doesn't die until after the interval, process live time will equal the interval time.

Think time is defined as the amount of time a process is waiting for user input.

DAEMON Response Time Calculations

- ***Transactions = Voluntary context switches + Process deaths***
- ***Response time = Process live time - Process resource wait time***

Process resource wait time is the amount of time a process is waiting on resources (such as CPU) verses waiting on an event (such as a terminal input).

BATCH Response Time Calculations

- ***Transactions = Process deaths***
- ***Response time = Process live time***

Mix Response Time Calculations

The mix response times vary, based on whether the process is attached to a terminal or not.

- If the process is attached to a terminal, the INTERACT response time calculations are used.
- If the process is not attached to a terminal and it has a high Nice value, the BATCH response time calculations are used.
- If the process is not attached to a terminal and it has a default or low Nice value, the DAEMON response time calculation is used.

Workload Definition Requirements

The workdefs file requires the following information for each workload:

1. The name of the workload, up to ten characters.
2. The type of process or processes included in the workload, such as INTERACT, DAEMON or BATCH.
3. The user or program specification, including one or more of the following:
   - USER (your user ID or logon ID)
   - PROG (the name of the executable program file)
   - TTY (the device name of your terminal)
   - GROUP (the user group identification)

Workload Definition File Configuration Guidelines

Use the following guidelines to create or edit workload definition files:

1. Separate workloads by one or more blank lines.
2. Include comments on any line, if desired, preceded by an exclamation character (!).
3. A workload type specification is needed to indicate the types of processes to include or exclude from the workload definition. This makes it possible to create two workloads for processes that run in both interactive and batch modes. (Refer to Table 3.4.)
4. Program and user specifications are specified by:
   - PROG=program name
   - USER=user name/group name

     System group names are valid specifications. Check the /etc/group file for a list of existing group names.

   For more information about group names, refer to your system documentation or the manpage for *regexp* (Regular Expressions).
5. Device file specifications, such as TTY=tty0p2, are also valid. You can capture activity on a terminal-by-terminal basis, or for multiple terminals.
6. There is no limit to the number of user, program, and tty specifications allowed for each workload.
7. Name and type specification lines are required. All other lines are optional.
8. To be included in a workload group, a process must satisfy the program, user, and tty specifications, if all three are present.
   - If one or more program specification lines are included, a program needs to satisfy only one of these to be included in the group.
   - If no program specifications are entered, all process programs are included in the group, unless the process is somehow disqualified by the user or tty specifications.

9 A process can belong to only one workload group. If it fits the criteria for two or more groups, it is assigned to the first workload in the file for which it qualifies.

10 Four workloads appear by default: INTERACT, DAEMON, BATCH, and DEFAULT. Processes that do not fit into user-defined workloads will be included in one of these pre-defined workloads.

4

SOS

The Real-time Performance Data Utility

SOS is the character-based tool that will monitor and report system performance on-line and in real time.

Figure 4.1 shows the Global Summary screen, the initial screen displayed in SOS.

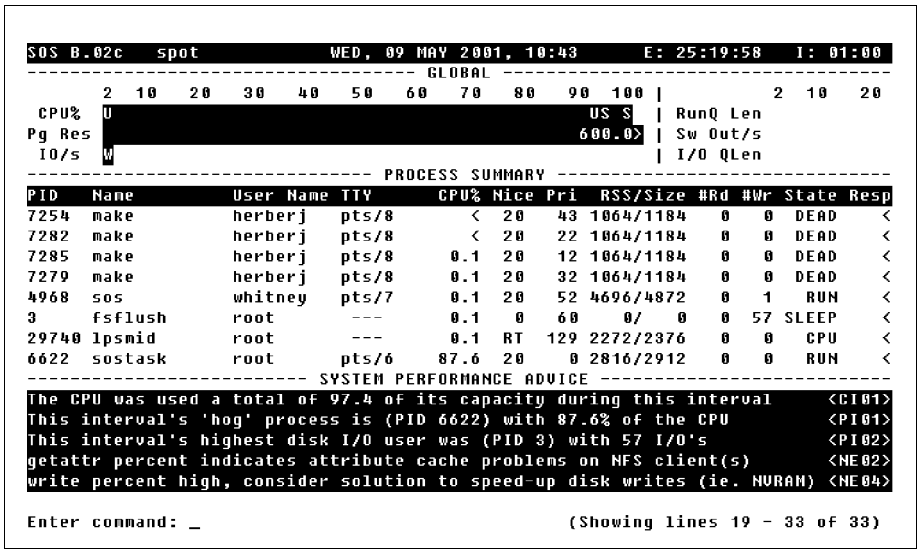


Figure 4.1 *SOS Global Summary screen*

Data Screens

The SOS application generates a variety of useful data screens. Each screen is listed in “SOS Screen Selection Menu” on page 31, then described in detail in Chapters 9 through 28.

Screen Conventions

The conventions used in SOS data screens are listed and described in the next table.

Table 4.1 *SOS screen conventions*

Convention	Description
/	A forward slash character (/) indicates a rate. For example, "Packet In /s" denotes "Packets In per second".
***	Three consecutive asterisk characters (***) indicates a data value that cannot be converted by SOS, because the value is less than or greater than the eligible range.
[nnn.n]	When applicable and possible, cumulative averages are displayed in brackets ([ ]) next to the current interval values. For further information about cumulative averages, see "Displaying Cumulative Statistics" on page 38.
b	A "b" indicates the corresponding value is measured in bytes.
k	A "kb" indicates the corresponding value is measured in kilobytes.
m	An "m" indicates the corresponding value is measured in megabytes.
g	A "g" indicates the corresponding value is measured in gigabytes.
ms	"ms" indicates the corresponding value is measured in milliseconds.
s	An "s" indicates the corresponding value is measured in seconds.
min	"min" indicates the corresponding value is measured in minutes.

5

SOS MAIN COMMANDS

The Main Commands Screen

The Main Commands screen in SOS contains a list of single-key shortcut commands that can be entered from any SOS display screen.

To access the Main Commands screen from any SOS display screen, type **?** at the command prompt.

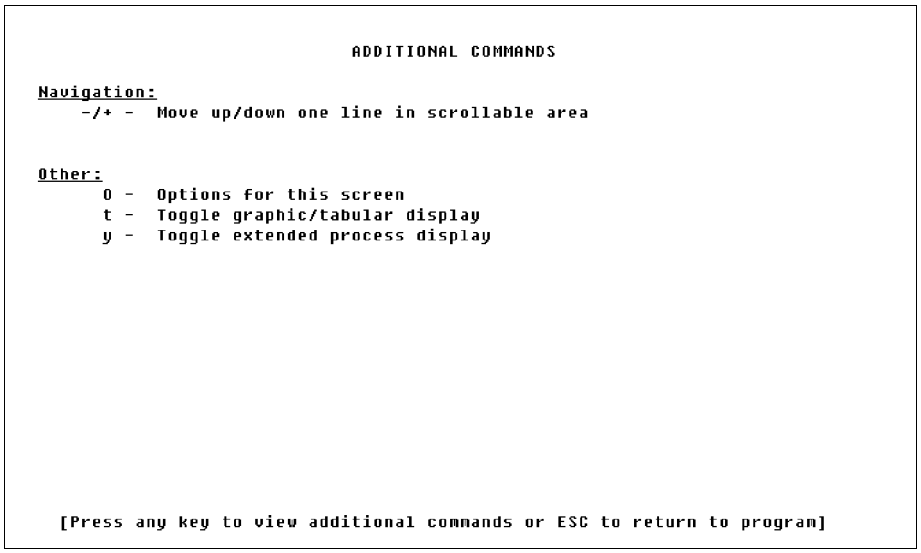


Figure 5.1 *SOS Main Commands screen*

To return to the SOS program from the Main Commands screen, press the Esc key.

To invoke a specific command displayed on the Main Commands screen, type the corresponding command key(s) from any SOS display screen.

NOTE All command keys are case-sensitive.

Main Commands

Each of the SOS commands is listed and explained in the following tables.

Navigation Keys

Table 5.1 *SOS navigation command keys*

Key	Command	Description
g	Go to screen	Type **g** from any SOS display screen to go to another screen of your choice. At the secondary command prompt, enter the screen option code or press the ? key for a list of valid options. For instance, type c to display the CPU Summary screen.
s	Screen menu	Type **s** from any SOS display screen to view the Screen Selection Menu.

Detail Screen Quick Keys

Table 5.2 *SOS Detail screen command keys*

Key	Command	Description
P	Process detail	Type **P** (upper case) from any SOS display screen to view the Process Detail screen for a specific process. At the secondary command prompt, specify the process's identification number (shown in the PID column of the PROCESS SUMMARY section in the Global Summary screen) or press the Enter key to accept the default (shown in brackets).

Key	Command	Description
F	Process file usage	Type **F** (upper case) from any SOS display screen to view the Process File Usage screen for a specific process. At the secondary command prompt, specify the process's identification number (shown in the PID column of the PROCESS SUMMARY section in the Global Summary screen) or press the Enter key to accept the default (shown in brackets).
M	Process memory usage	Type **M** (upper case) from any SOS display screen to view the Process Memory Regions screen for a specific process. Select the specific process at the secondary prompt.
W	Workload detail	Type **W** (upper case) from any SOS display screen to view the Workload Detail screen. Select the workload from the choices displayed in the dialog box (for example, INTERACT, BATCH, SYS, or DEFAULT).
V	Volume group detail	Type **V** (upper case) from any SOS display screen to view the Volume Detail screen for a specific volume. Select the volume from the choices displayed in the dialog box.
D	Disk detail	Type **D** (upper case) from any SOS display screen to view the Disk I/O Detail screen for a specified disk device. Select the physical disk ID from the choices displayed in the dialog box.
Z	Hog process zoom	Type **Z** (upper case) from any SOS display screen to view the "hog" process (the process that consumes the most CPU during the current interval) in the Process Detail screen.

Action Keys

Table 5.3 *SOS action command keys*

Key	Command	Description
u	Update interval data	Type **u** from any SOS display screen to start a new screen refresh and sample interval and update all performance indicator values. For an example, see "Updating Interval Data" on page 37.

Key	Command	Description
r	Reset totals to zero	Type **r** from any SOS display screen to (1) reset all cumulative values (shown in brackets), (2) reset the elapsed time to zero, and (3) update the interval data. For an example, see "Resetting Cumulative Statistics" on page 38.
p	Print screen	Type **p** from any SOS display screen to send the current screen display to a specified printer or a default printer, or to print the screen display to a specified file.
f	Toggle update intervals on/off	Type **f** from any SOS display screen to postpone (freeze) data updates for all SOS screens until the f key is pressed again (to un-freeze).

Configuration Keys

Table 5.4 *SOS configuration command keys*

Key	Command	Description
o	Main option menu	Type **o** from any SOS display screen to display the SOS Main Option Menu.

Other Keys

Table 5.5 *SOS (other) command keys*

Key(s)	Command	Description
H	Main on-line help	Type **H** (upper case) from any SOS display screen to display the main online help facility for SOS. Follow the instructions provided on the Welcome to the SOS/SOLARIS Help Facility screen to navigate throughout the help system.
h	Context-sensitive on-line help	Type **h** (lower case) from any SOS display screen to display the context-sensitive online help for the current screen or menu.
?	Command help	Type **?** (a question mark) from any SOS display screen to display a list of main command keys in the Main Commands screen.

Key(s)	Command	Description
Ctrl+l	Refresh screen	Press the **Ctrl+l** shortcut keys from any SOS display screen to refresh the screen.
e	Exit program	Type **e** from any SOS display screen to exit the SOS program.

Screen-Specific Commands

A second screen of commands, the Additional Commands screen, can be viewed by pressing any key from the Main Commands screen *when additional commands are available* for the active SOS display screen.

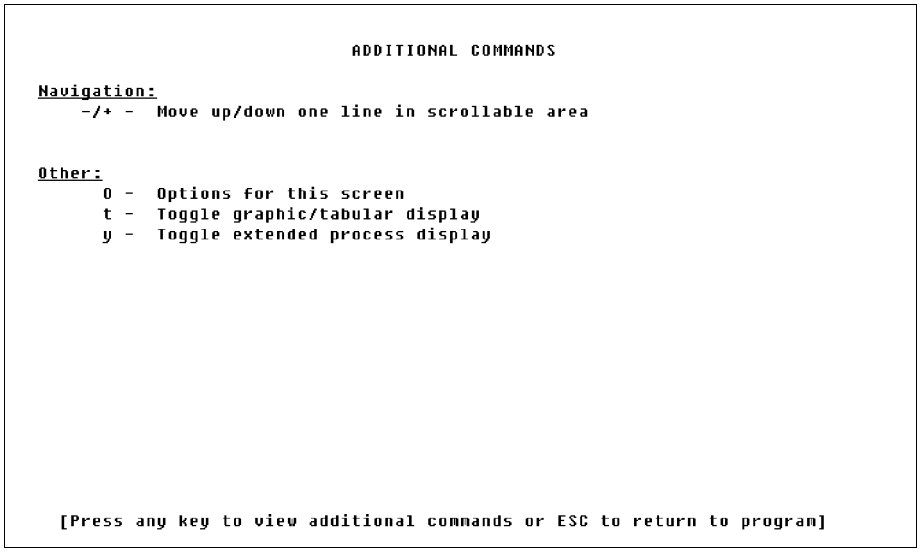


Figure 5.2 *SOS Additional Commands screen (example)*

To return to the Main Commands screen from the Additional Commands screen, press any key. To return to the SOS program, press the Esc key.

To invoke a specific command displayed on the Additional Commands screen, type the corresponding command key(s) from any SOS display screen.

Screen-Specific Navigation Commands

Table 5.6 *SOS screen-specific navigation command keys*

Key(s)	Command	Description
-	Move up in scrollable area	Type the hyphen character (**-**) from any SOS display screen to scroll back to the previous line in the screen display, if additional lines are available. The Up Arrow key can be used on terminals that support navigation keyboard keys.
+	Move down in scrollable area	Type the plus character (**+**) from any SOS display screen to scroll to the next line in the screen display, if additional lines are available. The Down Arrow key can be used on terminals that support navigation keyboard keys.
Ctrl+b	Page up in scrollable area	Press the **Ctrl+b** shortcut keys from any SOS display screen to scroll back through the screen display one "page" at a time, when pages are available. The Page Up key can be used on terminals that support navigation keyboard keys.
Ctrl+f	Page down in scrollable area	Press the **Ctrl+f** shortcut keys from any SOS display screen to scroll ahead in the screen display one "page" at a time when pages are available. The Page Down key can be used on terminals that support navigation keyboard keys.

Screen-Specific Configuration Commands

Table 5.7 *SOS screen-specific configuration command keys*

Key	Command	Description
O	Options for this screen	Type **O** (upper case) from any of the following screens to display the SOS Main Option Menu screen.

Screen-Specific Action Commands

Table 5.8 *SOS screen-specific action command keys*

Key	Command	Description
c	Toggle NFS client/server display	Type **c** from the NFS Summary screen to toggle between NFS client data and NFS server data.
n	Select new...	• Type **n** from the Process Detail screen to select a new process. • Type **n** from the Workload Detail screen to select a new workgroup. • Type **n** from the Disk Detail screen to select a new disk. • Type **n** from the Volume Detail screen to select a new volume.
t	Toggle graphic/ tabular display	Type **t** from most SOS display screens to display screen information in either a graphical or tabular format (if the alternative format is available).
x	Toggle NFS call rates/ percentages display	Type **x** from the NFS Summary screen to toggle between NFS call rates and NFS call percentages.
y	Toggle extended process display	Type **y** from the Global or the Workload Detail screen to turn the Extended Process line display on or off.

6

SOS Screen Selection Menu

Screen Selection Menu Screen

To access the Screen Selection Menu screen from any SOS display screen, type **s** at the SOS Enter command: prompt.

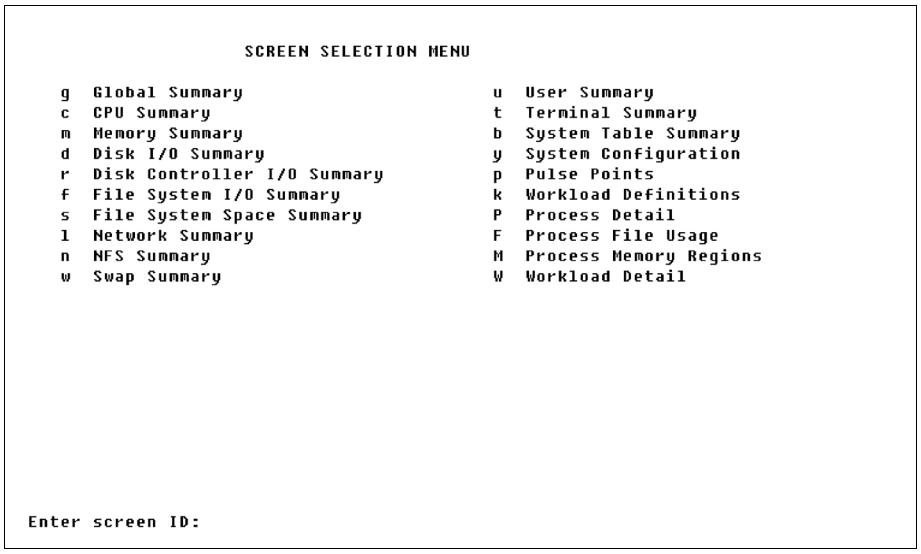


Figure 6.1 *SOS Screen Selection Menu*

To return to the SOS program from the Screen Selection Menu screen, press the Enter key.

Screen Selection Commands

To view one of the screens listed in the Screen Selection Menu, type the screen's corresponding command key at the Enter screen ID: command prompt. Each screen is described briefly in Table 6.1. More detailed explanations are presented later.

NOTE All command keys are case-sensitive.

Table 6.1 *SOS SCREEN SELECTION MENU command keys*

Key	Screen Title	Description
g	Global Summary	The Global Summary displays a basic, overall picture of your system's performance. For more information, see "SOS Global Summary" on page 77.
c	CPU Summary	The CPU Summary reports the general state of one or more CPUs. For more information, see "SOS CPU Summary" on page 101.
m	Memory Summary	The Memory Summary provides a more detailed look at memory performance data. For more information, see "SOS Memory Summary" on page 107.
d	Disk I/O Summary	The Disk I/O Summary displays a summary of performance data for all disks on the system. For more information, see "SOS Disk I/O Summary" on page 111.
r	Disk Controller I/O Summary	The Disk Controller I/O Summary screen provides a summary of the different kinds of disk read and write actions performed per second for each disk controller. The read and write actions are categorized as physical, user, system, virtual memory, or raw. For more information, see "SOS Disk Controller I/O Summary" on page 115.

Key	Screen Title	Description
f	Files System I/O Summary	The File System I/O Summary screen displays the logical and physical read and write rates for each file system. For more information, see “SOS File System I/O Summary” on page 117.
s	File System Space Summary	The File System Space Summary screen shows the block and fragment size, space usage, and inode usage for each file system. For more information, see “SOS File System Space Summary” on page 119.
l	Network Summary	The Network Summary screen displays network performance information, including protocol data and network interface information. For more information, see “SOS Network Summary” on page 121.
n	NFS Summary	The NFS Summary screen provides information about the Network File System (NFS). For more information, see “SOS NFS Summary” on page 125.
w	Swap Summary	The Swap Summary screen provides information on system swap space utilization. For more information, see “SOS Swap Summary” on page 135.
u	User Summary	The User Summary screen reveals how each user is utilizing system resources. For more information, see “SOS User Summary” on page 137.
t	Terminal Summary	The Terminal Summary screen displays information about the activity of the individual terminals. For more information, see “SOS Terminal Summary” on page 139.
b	System Table Summary	The System Table Summary screen reports the configuration and utilization of several system tables and caches. For more information, see “SOS System Table Summary” on page 141.

Key	Screen Title	Description
y	System Configuration	The System Configuration screen shows significant system configuration parameters. For more information, see "SOS System Configuration Summary" on page 149.
p	Pulse Points	The Pulse Points screen lists the key indicators of performance that appear on the Global Summary screen and categorizes each level of performance as acceptable, questionable, or unacceptable. For more information, see "SOS Pulse Points Summary" on page 155.
k	Workload Definitions	The Workload Definitions screen displays the application workload definitions (workdefs) file. For more information, see "SOS Workload Definitions" on page 157.
P	Process Detail	The Process Detail screen displays the performance of one process in detail. For more information, see "SOS Process Detail" on page 159.
F	Process File Usage	The Process File Usage screen lists all of the files currently accessed by a process. For more information, see "SOS Process File Usage" on page 165.
M	Process Memory Regions	The Process Memory Regions screen displays information about the process' memory and virtual memory address space usage. For more information, see "SOS Process Memory Regions" on page 169.
W	Workload Detail	The Workload Detail screen provides detailed information about a specific workload. For more information, see "SOS Workload Detail" on page 173.

7

SOS MAIN OPTION MENU

SOS Main Option Menu Screen

The SOS Main Option Menu screen contains a set (and several subsets) of options that enable the user to configure the SOS program.

To access the SOS Main Option Menu screen, enter **o** from any SOS display screen.

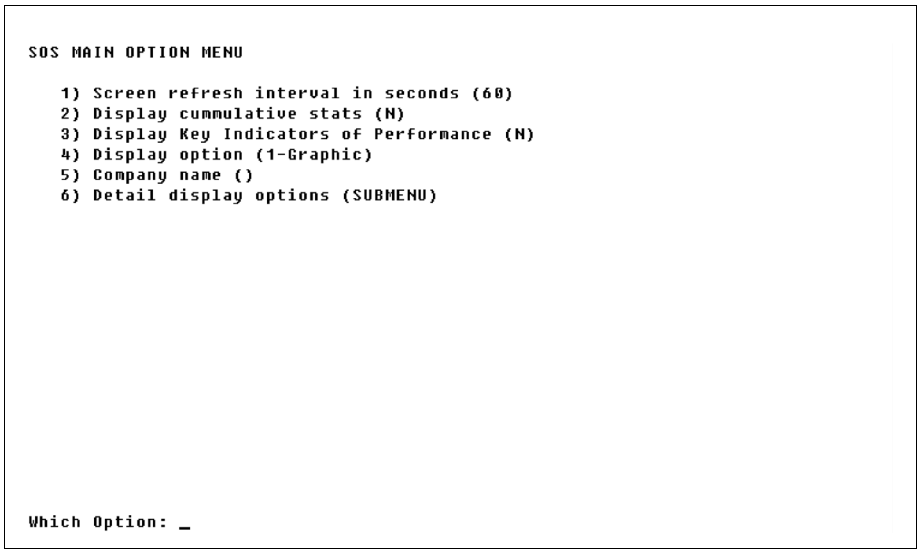


Figure 7.1 *SOS Main Option Menu*

Main Option Commands

To modify a main option, either temporarily or permanently:

1 Type the option command key from the SOS Main Option Menu screen and press the Enter key.

2 Enter a new parameter at the secondary command prompt. Press the Enter key.

3 Press Enter again to exit the SOS Main Options Menu screen.

4 At the Should these options be saved permanently? prompt:

- Press the Enter key to return to the SOS program without saving the modifications permanently.
- Type **Y** (Yes) to save the changes permanently and then press the Enter key.

Information about each of the main options is provided to assist you.

NOTE All command keys are case-sensitive.

Screen refresh interval in seconds

The SOS banner shows the length of the current interval (I: mm:ss) in minutes (mm) and seconds (ss). In the following example, the banner indicates the measurements reported in the screen are updated every minute (60 seconds).

Figure 7.2 *SOS banner: current interval (I: 01:00)*

Setting the Length of the Interval

The SOS program refreshes (updates) the performance measurement data every 60 seconds. This default can be changed to an interval ranging from 10 to 3600 seconds.

IMPORTANT SOS runs at a very high priority. Setting a short refresh interval or updating the screen too frequently may burden the system and result in skewed performance measurements. The default setting of 60 seconds is recommended for most systems.

To adjust the length of the interval:

1 From the SOS Main Options Menu screen, select the Screen refresh interval in seconds option. Press the Enter key.

2 At the next prompt, enter a positive integer from 10 to 3600 (seconds). Press the Enter key.

Updating Interval Data

To update interval data at any time, from any SOS display, type **u** at the prompt.

The current interval indicator in the SOS banner (I: mm:ss) marks the time that passed from the beginning of the interval to the second the data update occurred. The example in Figure 7.3 shows that the interval data was updated after the first 52 seconds (I: 00:52) of the interval. The interval data will be updated again according to the refresh interval rate set in the SOS Main Options Menu (refer to “Setting the Length of the Interval” on page 36).

```
SOS B.02c   spot              WED, 09 MAY 2001, 10:48      E: 25:24:58   I: 00:52
```

Figure 7.3 *SOS banner: current interval after update (I: 00:52)*

Display cumulative stats

Cumulative statistics are accumulated from the instant the SOS program is started or reset until the program is either stopped or reset. By default, cumulative statistics are suppressed—only the statistics for the most recent interval are displayed.

When cumulative statistics are enabled from the SOS Main Option Menu, they will be placed in brackets ([ ]) next to their corresponding current statistics in all tabular screens. For an example, see the Disk I/O Summary screen in Figure 7.4.

```
SOS B.02c   spot              WED, 09 MAY 2001, 10:49      E: 25:25:57   I: 00:59
------------------------------ DISK I/O SUMMARY -------------------------------
                                Wait       Service       Rates (/s)   Avg Size (kb)
Dev       I/O%   Qlen  Util%  Time(ms)   Time(ms)     Read  Write     Read   Write
--------------------------------------------------------------------------------
fd0          0      0      0          0          0        0      0        0       0
           [  0] [   0] [   0] [       0] [       0] [    0][    0] [    0] [    0]
c0t1d0       0      0      0          0          0        0      0        0       0
           [  0] [   0] [   0] [       0] [       0] [    0][    0] [    0] [    0]
c0t2d0       0      0      0          0          0        0      0        0       0
           [  0] [   0] [   0] [       0] [       0] [    0][    0] [    0] [    0]
c0t0d0     100      <      <        6.7       13.5        <    0.6        8       7
           [100] [   <] [   <] [      85] [     136] [    <][    <] [    7] [    7]
--------------------------------------------------------------------------------
TOTALS     100      <      <        6.7       13.5        <    0.6        8       7
           [100] [   <] [   <] [      85] [     136] [    <][    <] [    7] [    7]
```

Figure 7.4 *SOS Disk I/O Summary screen (tabular display) with cumulative stats*

In instances where a cumulative statistic is greater than zero, but its closest rounding value (to the tenth) is less than 0, a less than character ([<]) will be displayed instead of an integer.

Displaying Cumulative Statistics

To display cumulative statistics in all tabular displays:

1 From the SOS Main Options Menu screen, select the Display cumulative stats option. Press the Enter key.

2 At the next prompt, enter **Y** (Yes). Press the Enter key.

Resetting Cumulative Statistics

To reset the cumulative statistics in all tabular displays to zero (0), enter **r** at the SOS Enter command: prompt from any SOS screen. This reset function also updates the current interval (see "Updating Interval Data" on page 37).

Display Key Indicators of Performance

The KIP line can be displayed just below the SOS banner in all SOS screens.

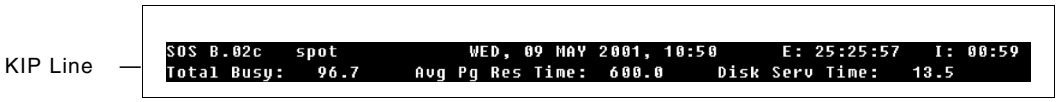


Figure 7.5 *SOS Key Indicators of Performance (KIP) line*

The configuration of the KIP line is discussed in "Key Indicators of Performance (KIP) Line" on page 81.

Displaying Key Indicators of Performance

By default, the key indicators of performance are suppressed. To show the key indicators of performance (KIP) line in all screen displays:

1 From the SOS Main Options Menu screen, select the Display Key Indicators of Performance option. Press the Enter key.

2 At the next prompt, enter **Y** (Yes). Press the Enter key.

Display option

The Display option determines how the GLOBAL statistics portion of the Global Summary screen is formatted. Two choices are available: graphical or tabular.

GLOBAL statistics are discussed further in "GLOBAL" on page 82.

Changing Display Formats

To change the GLOBAL statistics display format:

1 From the SOS Main Options Menu screen, select Display option. Press the Enter key.

2 Enter the option number (1 or 2):

- To view a graphical display, type **1** (1-Graphic). Press the Enter key.
- To view a tabular display, type **2** (2-Tabular). Press the Enter key.

Company name

By default, the company name is not included in the SOS screens, reports or output. It can be added.

Adding a Company Name to the SOS Banner

1 From the SOS Main Options Menu screen, select the Company name option. Press the Enter key.

2 At the next prompt, type a company name or system name (up to 43 alpha-numeric characters) to display just below the SOS banner.

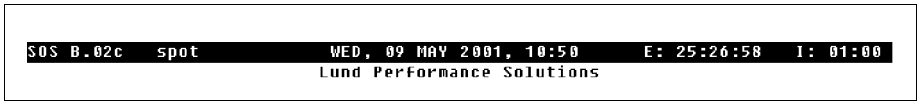


Figure 7.6 *SOS Company Name example (Lund Performance Solutions)*

Detail display options (SUBMENU)

To access the Detail display options submenu screen:

1 From the SOS Main Options Menu screen, enter the command key for Detail display options. Press the Enter key.

2 Select one of the following submenu options:

- 1) Global display options (SUBMENU)
- 2) Process display options (SUBMENU)
- 3) Pulse Points display options (SUBMENU)
- 4) User display options (SUBMENU)
- 5) Terminal display options (SUBMENU)

Each of these submenus is discussed further in the next section, “Detail Display Options” on page 40.

Detail Display Options

Detail display options Submenu Screen

To access the Detail display options submenu screen from any SOS display screen:

1 Type **o** from the SOS Enter command: prompt to view the SOS Main Option Menu screen.

2 From the SOS Main Option Menu screen. select Detail display options and press the Enter key. The Detail display options submenu screen will display.

```
SOS MAIN OPTION MENU
  Detail display options

   1) Global display options (SUBMENU)
   2) Process display options (SUBMENU)
   3) Pulse Points display options (SUBMENU)
   4) User display options (SUBMENU)
   5) Terminal display options (SUBMENU)
```

Figure 7.7 *SOS Detail display options submenu screen*

Detail display option Commands

To open one of the Detail display submenus, use the following procedure.

1 From the Detail display options submenu screen, enter the command key number of the submenu to open.

- Global display options (SUBMENU)

  For information about this screen, see "Global display options Submenu Screen" on page 41.
- Process display options (SUBMENU)

  For information about this screen, see "Process display options Submenu Screen" on page 47.
- Pulse Points display options (SUBMENU)

  For information about this screen, see "Pulse Points display options" on page 53.
- User display options (SUBMENU)

  For information about this screen, see "User Display Options" on page 56.
- Terminal display options (SUBMENU)

  For information about this screen, see "Terminal Display Options" on page 60.

2 Press the Enter key.

Global Display Options

Global display options Submenu Screen

To access the Global display options submenu screen from any SOS display screen:

1. Type **o** from the SOS Enter command: prompt to view the SOS Main Option Menu screen.
2. From the SOS Main Option Menu screen. select Detail display options and press the Enter key.
3. From the Detail display options submenu screen, select Global display options and press the Enter key. The Global display options submenu screen will display (Figure 7.8).

```
SOS MAIN OPTION MENU
  Detail display options
    Global display options

   1) Display advice messages (Y)
   2) Display informational advice messages (Y)
  --- Display CPU information on global screen
  --- Display memory information on global screen
  --- Display miscellaneous information on global screen
  --- Display disk information on global screen
  --- Maximum number of disks to display (0=ALL)
   8) Display process information (Y)
   9) Display workload information (N)
  --- Display only active workloads
  --- CPU percentage required for workload display









Which Option:
```

Figure 7.8 *SOS Global display options submenu screen*

Global display option Commands

To modify a global display option, either temporarily or permanently:

1. Type the option command key from the Global display options submenu screen and press the Enter key.
2. Enter a new parameter at the secondary command prompt. Press the Enter key.
3. Press Enter to exit the Global display options submenu screen.
4. Press Enter to exit the Detail display options submenu screen.
5. Press Enter to exit the SOS Main Options Menu screen.

6 At the Should these options be saved permanently? prompt:

- Press the Enter key to return to the SOS program without saving the modifications permanently.
- Type **Y** (Yes) to save the changes permanently and then press the Enter key.

Information about each of the global display options is provided to assist you.

Display advice messages

SYSTEM PERFORMANCE ADVICE messages displayed in the Global Summary screen deliver a basic interpretation of significant system performance events.

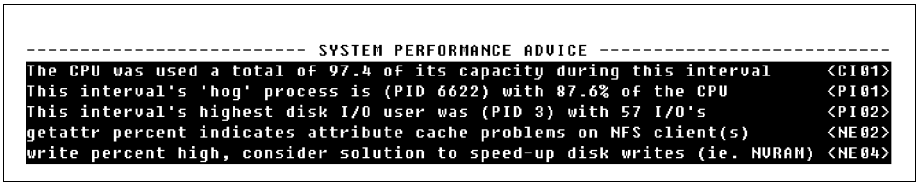


Figure 7.9 *SOS Global Summary screen: SYSTEM PERFORMANCE ADVICE messages*

Advice messages are discussed further in "SYSTEM PERFORMANCE ADVICE" on page 97.

Suppressing All Advice Messages

To suppress all advice messages in the Global Summary screen:

1 From the Global display options submenu screen, select the Display advice messages option. Press the Enter key.

2 At the next prompt, enter **N** (No). Press the Enter key.

Display informational advice messages

By default, SOS provides both informational and excessive use advice messages in the SYSTEM PERFORMANCE ADVICE section of the Global Summary screen.

- An "I" in the message ID code (for example, CI01) denotes an *informational* advice message. Informational messages usually state current performance levels for the current interval.
- An "E" in the message ID code (for example, ME01) denotes an *excessive use* advice message. This type of advice message alerts the user to a situation where system resources are overtaxed.

Suppressing Informational Advice Messages

To suppress informational advice messages from the Global Summary screen:

1 From the Global display options submenu screen, select the Display informational advice messages option.

This option is available only when advice messages are displayed in the Global Summary screen. Press the Enter key.

2 At the next prompt, enter **N** (No). Press the Enter key.

Display memory information on global screen

By default, the GLOBAL section of the Global Summary screen includes memory and virtual memory statistics. These statistics can be suppressed.

```
------------------------------------ MEM/VM -------------------------------------
 Pg Scans :     0[  0]/s    Pg Reclaims:  0.1[  <]/s    Page Outs:     0[  <]/s
 Pg Res Tm: 600.0[600]                                  Swap Outs:     0[  0]/s
```

Figure 7.10 *SOS Global Summary screen: MEM/VM statistics*

Global memory statistics are discussed in “MEM/VM” on page 94.

Suppressing Memory Statistics

To suppress memory statistics from the Global Summary screen:

1 From the Global display options submenu screen, select the Display memory information on global screen option, which is available only when the Global Summary screen is displayed in tabular format. Press the Enter key.

2 At the next prompt, enter **N** (No). Press the Enter key.

Display miscellaneous information on global screen

Miscellaneous global information is provided in the GLOBAL section of the Global Summary screen. These statistics can be suppressed.

```
------------------------------------ MISC -------------------------------------
 #Sessions:    7  #Procs:    78  #Wait I/O:     0   Transactions:5122.4[ 1.8]/s
 #Active:      4  #Active:   17  #Swap:         0   Avg Response Time:      <
```

Figure 7.11 *SOS Global Summary screen: MISC statistics*

Global miscellaneous statistics are discussed further in “MISC” on page 95.

Suppressing Miscellaneous Global Statistics

To suppress miscellaneous global statistics from the Global Summary screen:

1 From the Global display options submenu screen, select the Display miscellaneous information on global screen option, which is available only when the Global Summary screen is displayed in tabular format. Press the Enter key.

2 At the next prompt, enter **N** (No). Press the Enter key.

Display disk information on global screen

Disk information is provided in the GLOBAL section of the Global Summary screen. This information can be suppressed.

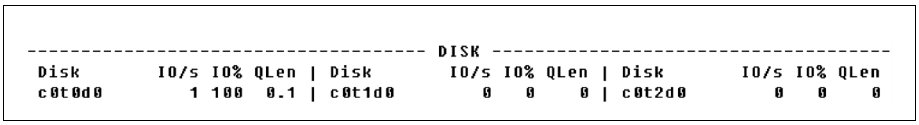


Figure 7.12 *SOS Global Summary screen: DISK statistics*

Global disk statistics are discussed further in "DISK" on page 96.

Suppressing Disk Statistics

To suppress disk statistics from the Global Summary screen:

1 From the Global display options submenu screen, select the Display disk information on global screen option, which is available only when the Global Summary screen is displayed in tabular format. Press the Enter key.

2 At the next prompt, enter **N** (No). Press the Enter key.

Maximum number of disks to display

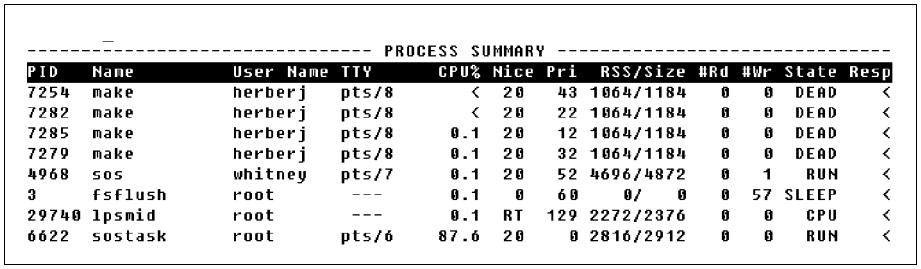
To set the maximum number of disks to display in the DISK portion of the Global Summary screen:

1 From the Global display options submenu screen, select the Maximum number of disks to display option, which is available only when the Global Summary screen is displayed in tabular format. Press the Enter key.

2 At the next prompt, enter the maximum number of disks to display (0-9999). Press the Enter key.

Display process information

Process information is provided in the PROCESS SUMMARY section of the Global Summary screen.This information can be suppressed.



PROCESS SUMMARY

PID	Name	User Name	TTY	CPU%	Nice	Pri	RSS/Size	#Rd	#Wr	State	Resp
7254	make	herberj	pts/8	<	20	43	1064/1184	0	0	DEAD	<
7282	make	herberj	pts/8	<	20	22	1064/1184	0	0	DEAD	<
7285	make	herberj	pts/8	0.1	20	12	1064/1184	0	0	DEAD	<
7279	make	herberj	pts/8	0.1	20	32	1064/1184	0	0	DEAD	<
4968	sos	whitney	pts/7	0.1	20	52	4696/4872	0	1	RUN	<
3	fsflush	root	---	0.1	0	60	0/ 0	0	57	SLEEP	<
29740	lpsmid	root	---	0.1	RT	129	2272/2376	0	0	CPU	<
6622	sostask	root	pts/6	87.6	20	0	2816/2912	0	0	RUN	<

Figure 7.13 *SOS Global Summary screen: PROCESS SUMMARY*

Global process statistics are discussed further in “PROCESS SUMMARY” on page 84.

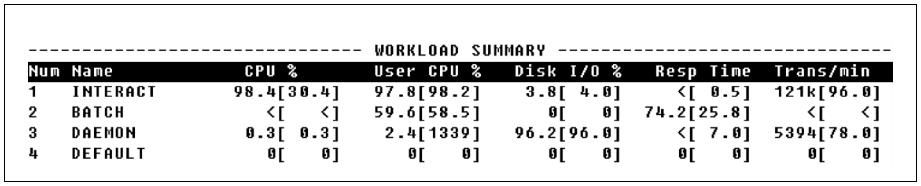
Suppressing PROCESS SUMMARY

To suppress the PROCESS SUMMARY section of the Global Summary screen:

1. From the Global display options submenu screen, select the Display process information option. Press the Enter key.
2. At the next prompt, enter **N** (No). Press the Enter key.

Display workload information

By default, information about application workloads is not included in the Global Summary screen graphical display. This information can be displayed.



WORKLOAD SUMMARY

Num	Name	CPU %	User CPU %	Disk I/O %	Resp Time	Trans/min
1	INTERACT	98.4[30.4]	97.8[98.2]	3.8[4.0]	<[0.5]	121k[96.0]
2	BATCH	<[<]	59.6[58.5]	0[0]	74.2[25.8]	<[<]
3	DAEMON	0.3[0.3]	2.4[1339]	96.2[96.0]	<[7.0]	5394[78.0]
4	DEFAULT	0[0]	0[0]	0[0]	0[0]	0[0]

Figure 7.14 *SOS Global Summary screen: WORKLOAD SUMMARY*

Workload statistics are discussed further in “WORKLOAD SUMMARY” on page 89.

Displaying Workload Summary Information

To display workload information:

1 From the Global display options submenu screen, select the Display workload information option. Press the Enter key.

2 At the next prompt, enter **Y** (Yes). Press the Enter key.

Display only active workloads

This Display only active workloads option is available only when workload information is displayed in the Global Summary screen.

By default, all workloads defined in the workdefs (workload definitions) file are included in the WORKLOAD SUMMARY section of the Global Summary screen, even if they used 0.0% of the total CPU time in the current sample interval. The display can be configured to show only active workloads (workloads that used more than 0.0% of the total CPU time).

Displaying Only Active Workloads

To display active workloads and suppress inactive workloads in the Global Summary screen:

1 From the Global display options submenu screen, select the Display only active workloads option. Press the Enter key.

2 At the next prompt, enter **Y** (Yes). Press the Enter key.

CPU percentage required for workload display

This option is available only when workload information is displayed in the Global Summary screen and eligibility is restricted to active workloads.

When this option is disabled (default setting), all workloads that consumed 0.1% or more of the total CPU time in the current sample interval will be included in the WORKLOAD SUMMARY section of the Global Summary screen. A higher minimum CPU percentage can be specified.

Resetting the Minimum CPU Requirement

To set a new minimum CPU percentage requirement:

1 From the Global display options submenu screen, select the CPU percentage required for workload display option. Press the Enter key.

2 At the next prompt, enter a value from 0.1 to 100 percent. Press the Enter key.

Process Display Options

Process display options Submenu Screen

To access the Process display options submenu screen from any SOS screen:

1. Type **o** from the SOS Enter command: prompt to view the SOS Main Option Menu screen.
2. Ensure the Display process information option is enabled.
3. From the SOS Main Option Menu screen. select Detail display options and press the Enter key.
4. From the Detail display options submenu screen, select Process display options and press the Enter key. The Process Display Options submenu screen will display.

```
SOS MAIN OPTION MENU
  Detail display options
    Process display options

   1) Display extended process line (N)
   2) Display total and I/O percentage instead of read/write counts (N)
   3) Display only active processes (Y)
   4) CPU percentage required for process display (.0)
   5) Display interactive processes (Y)
   6) Display non-interactive processes (Y)
   7) Display processes which have died (Y)
   8) Process logon filter (.*)
   9) Process sort option (4-CPU time)
  10) Display processes sorted in ascending order (Y)
  11) Maximum number of processes to display (0=ALL)  (0)









Which Option:
```

Figure 7.15 *SOS Process display options submenu screen*

Process display option Commands

To modify a process display option, either temporarily or permanently:

1. Type the option command key from the Process display options submenu screen and press the Enter key.
2. Enter a new parameter at the secondary command prompt. Press the Enter key.
3. Press Enter to exit the Process display options submenu screen.
4. Press Enter to exit the Detail display options submenu screen.

5 Press Enter to exit the SOS Main Options Menu screen.

6 At the Should these options be saved permanently? prompt:

- Press the Enter key to return to the SOS program without saving the modifications permanently.
- Type **Y** (Yes) to save the changes permanently and then press the Enter key.

Information about each of the process display options is provided to assist you.

Display extended process line

Additional process information can be displayed in the PROCESS SUMMARY section of the Global Summary screen. The extended PROCESS SUMMARY display includes:

- An extended process line below each process line, which shows the percentage of time the corresponding process spent in each wait state.
- The wait states column headings for the wait state statistics displayed in the extended process lines.

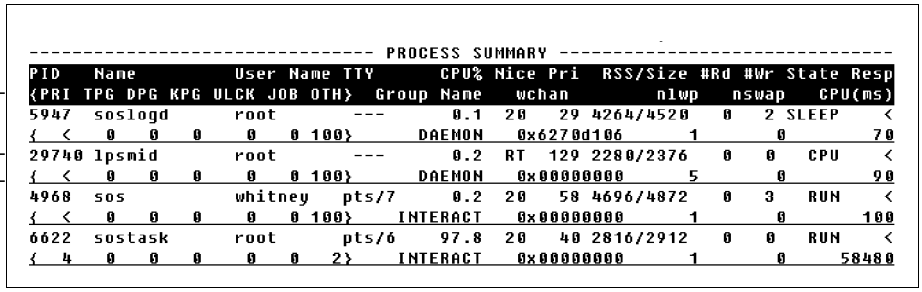


Figure 7.16 *SOS Global Summary screen: wait states headings & extended process lines*

The wait states headings line includes all possible wait states in which the current processes can spend CPU time ({PRI TPG DPG...}). For detailed information about each wait state, see Appendix B, "SOS/SOLARIS Wait States."

Extending the PROCESS SUMMARY

To extend the PROCESS SUMMARY portion of the Global Summary screen:

1 From the Process display options submenu screen, select the Display extended process line option. Press the Enter key.

2 At the next prompt, enter **Y** (Yes). Press the Enter key.

Display total and I/O percentage instead of read/write counts

The default column headings for the PROCESS SUMMARY section of the Global Summary screen are shown in Figure 7.17.

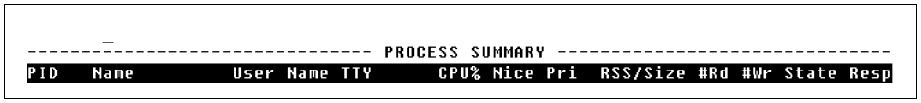


Figure 7.17 *SOS PROCESS SUMMARY column headings (default)*

Switching the PROCESS SUMMARY Column Headings

To replace total reads (#Rd) with total I/O's (#IO) and total writes (#Wr) with I/O percentage (IO%):

1. From the Process display options submenu screen, select the Display total and I/O percentage instead of read/write counts option. Press the Enter key.
2. At the next prompt, enter **Y** (Yes). Press the Enter key.

The new column headings are shown in Figure 7.18.

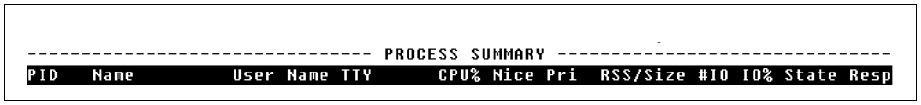


Figure 7.18 *SOS PROCESS SUMMARY column headings (alternative)*

Display only active processes

An *active* process is defined as a process that used more than 0.0 percent of total CPU time during the current sample interval.

By default, only active processes are included in the PROCESS SUMMARY section of the Global Summary screen. Inactive processes can be included.

RECOMMENDATION The default setting, Y (display only active processes), is recommended.

Displaying Both Active and Inactive Processes

To display all processes currently on the system, both active and inactive:

1. From the Process display options submenu screen, select the Display only active processes option. Press the Enter key.
2. At the next prompt, enter **N** (No). Press the Enter key.

CPU percentage required for process display

The CPU percentage required for process display option is possible when only active processes are included in the PROCESS SUMMARY portion of the Global Summary screen. This option enables you to set a minimum threshold value (a minimum percentage of CPU time) that a process must meet or exceed to be included in the PROCESS SUMMARY section of the Global Summary screen.

The default parameter of 0.0 percent will allow all active processes in the current sample interval to be displayed, including processes in the run queue (even though they did not use any CPU time). Entering a greater threshold value, for example 10 percent, will exclude all active processes that used less than 10 percent of the total CPU time.

RECOMMENDATION If you are doing general system monitoring, a CPU threshold value of less than 5.0 percent is recommended. If you are trying to pinpoint the top CPU "hog" processes, a value of 5.0 to 15.0 percent is recommended.

Setting the CPU Percentage Required for a Process to Display

To set the minimum CPU percentage:

1. From the Process display options submenu screen, select the CPU percentage required for process display option. Press the Enter key.
2. At the next prompt, enter a value between 0.0 and 100. Press the Enter key.

Display attached processes

Interactive processes (processes attached to a terminal) are listed in the PROCESS SUMMARY section of the Global Summary screen. These processes can be suppressed.

Suppressing Attached Processes

To exclude attached processes from the screen display:

1. From the Process display options submenu screen, select the Display attached processes option. Press the Enter key.
2. At the next prompt, type **N** (No). Press the Enter key.

Display detached processes

Batch and daemon processes (detached processes) are listed in the PROCESS SUMMARY section of the Global Summary screen. These processes can be suppressed.

Suppressing Detached Processes

To exclude detached processes from the screen display:

1. From the Process display options submenu screen, select the Display detached processes option. Press the Enter key.
2. At the next prompt, type **N** (No). Press the Enter key.

Display system processes

Unix system processes include processes like spooling jobs, loading jobs and logging jobs that usually execute at a very high priority and consume little CPU time.

System processes are listed in the PROCESS SUMMARY section of the Global Summary screen. These processes can be suppressed.

Suppressing System Processes

To exclude system processes from the screen display:

1. From the Process display options submenu screen, select the Display system processes option. Press the Enter key.
2. At the next prompt, type **N** (No). Press the Enter key.

Display processes which have died

The PROCESS SUMMARY section displays all processes which have died. These processes are labeled "Dead" under the column heading, "Wait." These processes can be suppressed.

Suppressing Dead Processes

To exclude dead processes from the screen display:

1. From the Process display options submenu screen, select the Display processes which have died option. Press the Enter key.
2. At the next prompt, type **N** (No). Press the Enter key.

Process login filter

The default login filter (.*) allows all users and all processes to be displayed on the SOS screens.

Specifying a Process Login Filter

To limit displayed processes to those of just one login:

1. From the Process display options submenu screen, select the Process login filter option. Press the Enter key.

2 At the next prompt, enter the logon using any acceptable regular expression. For example, to match the login, "root," you would type **root** at the next prompt. Press the Enter key.

For information about regular expressions, refer to the Unix manpage, "regexp," by typing **man regexp** at the shell prompt.

Process sort option

The process sort option enables the user to select the order in which the qualifying processes will be displayed. By default, the processes are sorted by the amount of CPU time they utilized in the current sample interval.

Selecting a Process Sort Option

1 From the Process display options submenu screen, select Process sort option. Press the Enter key.

2 At the next prompt, type the key command that corresponds to the desired sort option (described in Table 7.1). Press the Enter key.

Table 7.1 *SOS process sort options*

Option	Sort Option Description	Column
1-PID#	Sort by process identification number.	PID
2-Logon terminal	Sort by terminal logon.	Tty
3-Workload group	Sort by the application workload group to which the process belongs. (Displays in the WORKLOAD SUMMARY section of the Global Summary screen.)	N/A
4-CPU time	Sort by the percentage of CPU time utilized by the process in the current sample interval.	CPU%
5-Disk I/O	Sort by the total number of disk I/O's incurred by the process.	#IO
6-Term reads	Sort by the total number of terminal reads.	N/A
7-Priority	Sort by process priority.	Pri
8-Wait state	Sort by the activity or sleep state a process is in during the current sample interval.	Wait

Display processes sorted in ascending order

By default, the processes displayed will be sorted in ascending order.

Displaying Processes in Descending Order

To sort and display processes in descending order:

1. From the Process display options submenu screen, select the Display processes sorted in ascending order option. Press the Enter key.
2. At the next prompt, type **N** (No). Press the Enter key.

Maximum number of processes to display

To specify a maximum number of processes to be displayed:

1. From the Process display options submenu screen, select the Maximum number of processes to display option. Press the Enter key.
2. At the next prompt, enter a whole numeric value between 0 and 999.

For example, to show the ten processes that consume the most CPU time, set the following three parameters:

1. Set the Process sort option to **4-CPU** time to sort the processes by CPU time utilized.
2. Set the Display processes sorted in ascending order option to **N**, to display the processes in descending order.
3. Set the Maximum number of processes to **10**, to display the ten processes using the most CPU time. (The default value, 0, will allow all eligible processes to be displayed.)

Pulse Points display options

Pulse Points display options Submenu Screen

To access the Pulse Points display options submenu screen from any SOS display screen:

1. Type **o** from the SOS Enter command: prompt to view the SOS Main Option Menu screen.
2. Ensure the Display process information option is enabled.
3. From the SOS Main Option Menu screen. select Detail display options and press the Enter key.
4. From the Detail display options submenu screen, select Pulse Points display options and press the Enter key. The Pulse Points display options submenu screen will display (Figure 7.19).

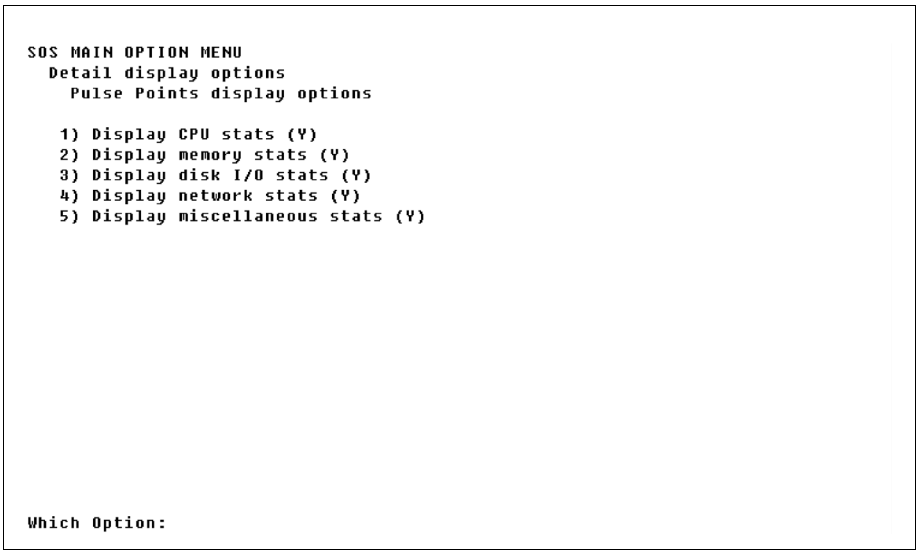


Figure 7.19 *SOS Pulse Points display options submenu screen*

Pulse Points display option Commands

To modify a pulse points display option, either temporarily or permanently:

1. Type the option command key from the Pulse Points display options submenu screen and press the Enter key.
2. Enter a new parameter at the secondary command prompt. Press the Enter key.
3. Press Enter to exit the Pulse Points display options submenu screen.
4. Press Enter to exit the Detail display options submenu screen.
5. Press Enter to exit the SOS Main Options Menu screen.
6. At the Should these options be saved permanently? prompt:
   - Press the Enter key to return to the SOS program without saving the modifications permanently.
   - Type **Y** (Yes) to save the changes permanently and then press the Enter key.

Information about each of the pulse points display options is provided to assist you.

Display CPU stats

CPU statistics are displayed in the Pulse Points screen.

CPU Stats —

Memory Stats —

— Disk I/O Stats

— Network Stats

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:42      E: 26:18:28   I: 02:26
--------------------------------  PULSE POINTS  --------------------------------
    Indicator           |    Green    |   Yellow    |      Red     | Comments
--- CPU ------------------------------------------------------------------------
CPU Busy %                    [ 32.9]                98.6
Queue Busy %                0.7[  4.7]
Run-Q Average                 0[  1.2]
--- Memory ---------------------------------------------------------------------
Ave Page Residence        600.0[600.0]                            secs
Page Scan Rate                0[    0]                            /sec
Page Out Rate                 0[    0]                            /sec
Swap Out Rate                 0[    0]                            /sec
--- Disk I/O -------------------------------------------------------------------
Average Wait Time           9.4[  8.2]                            System Wide
Average Q-Length              0[    0]                            System Wide
Disk Utilization %            0[    0]                            System Wide
Disk I/O Rate (/sec)          0[    0]                            System Wide
--- Network --------------------------------------------------------------------
Defer %                       0[    0]                            System Wide
Collision %                   0[    0]                            System Wide
--------------------------------------------------------------------------------


Enter command: _
```

Figure 7.20 *SOS Pulse Points screen*

Suppressing CPU Statistics

To suppress CPU statistics from the Pulse Points screen:

1. From the Pulse Points display options submenu screen, select the Display CPU stats option. Press the Enter key.
2. At the next prompt, type **N** (No). Press the Enter key.

Display memory stats

Memory statistics are displayed in the Pulse Points screen (refer to Figure 7.20).

Suppressing Memory Statistics

To suppress memory statistics from the Pulse Points screen:

1. From the Pulse Points display options submenu screen, select the Display memory stats option. Press the Enter key.
2. At the next prompt, type **N** (No). Press the Enter key.

Display disk I/O stats

Disk I/O statistics are displayed in the Pulse Points screen. To see an example of this screen, refer to Figure 7.20 on page 55.

Suppressing Disk I/O Statistics

To suppress disk I/O statistics from the Pulse Points screen:

1 From the Pulse Points display options submenu screen, select the Display disk I/O stats option. Press the Enter key.

2 At the next prompt, type **N** (No). Press the Enter key.

Display network stats

Network statistics are displayed in the Pulse Points screen.

Suppressing Network Statistics

To suppress network statistics from the Pulse Points screen:

1 From the Pulse Points display options submenu screen, select the Display network stats option. Press the Enter key.

2 At the next prompt, type **N** (No). Press the Enter key.

Display miscellaneous stats

Miscellaneous statistics, when available, are displayed in the Pulse Points screen. (Miscellaneous statistics are not displayed in the example in Figure 7.20 on page 55.)

Suppressing Miscellaneous Statistics

To suppress miscellaneous statistics from the Pulse Points screen:

1 From the Pulse Points display options submenu screen, select the Display miscellaneous stats option. Press the Enter key.

2 At the next prompt, type **N** (No). Press the Enter key.

User Display Options

User display options Submenu Screen

To access the User display options submenu screen from any SOS display screen:

1 Type **o** from the SOS Enter command: prompt to view the SOS Main Option Menu screen.

2 Ensure the Display process information option is enabled.

3 From the SOS Main Option Menu screen, select Detail display options and press the Enter key.

4 From the Detail display options submenu screen, select User display options and press the Enter key. The User display options submenu will appear (Figure 7.21).

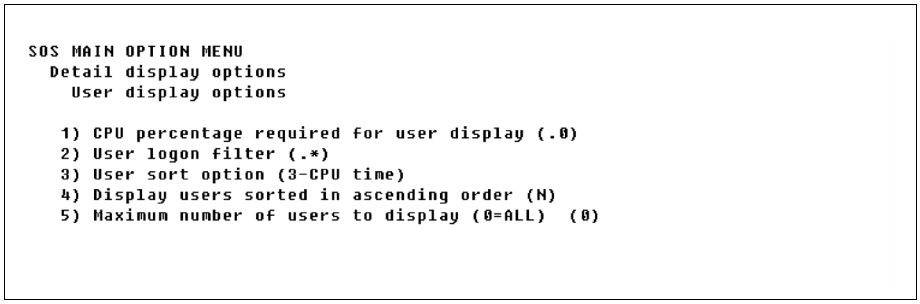


Figure 7.21 *SOS User display options submenu screen*

User display option Commands

The purpose of the user display options is to fine tune the information in the User Summary screen (discussed in “SOS User Summary” on page 137).

To modify a user display option, either temporarily or permanently:

1 Type the option command key from the User display options submenu screen and press the Enter key.

2 Enter a new parameter at the secondary command prompt. Press the Enter key.

3 Press Enter to exit the User display options submenu screen.

4 Press Enter to exit the Detail display options submenu screen.

5 Press Enter to exit the SOS Main Options Menu screen.

6 At the Should these options be saved permanently? prompt:

- Press the Enter key to return to the SOS program without saving the modifications permanently.
- Type **Y** (Yes) to save the changes permanently and then press the Enter key.

Information about each of the user display options is provided to assist you.

CPU percentage required for user display

The CPU percentage required for user display option is used to filter out less-active users from the User Summary display. The option is specified as a percentage (0.0-100). The default setting is .0 (zero) percent, which means that processes that use 0 percent or more of CPU time will be displayed and no users will be filtered out.

RECOMMENDATION If you are performing general system monitoring, a CPU threshold value of less than 5.0 percent is recommended. If you are trying to pinpoint the top CPU "hog" processes, a value of 5.0 to 15.0 percent is recommended.

Setting the CPU Percentage Required for a User Name to Display

To set the minimum CPU percentage:

1. From the User display options submenu screen, select the CPU percentage required for user display option. Press the Enter key.
2. At the next prompt, enter a value between 0.0 and 100. Press the Enter key.

User logon filter

The User logon filter is used to sort out specific users from the User Summary display. The default setting, **.*** (meaning match any number of any character), will allow all user names to be listed in the User Summary screen.

Specifying a User Login Filter

To limit displayed users to those of a single login:

1. From the User display options submenu screen, select the User login filter option. Press the Enter key.
2. At the next prompt, type that user name logon filter (using Unix regular expression syntax) at the User logon filter prompt. For example, to limit the eligible user process to root users, type **root**. Press the Enter key.

For information about regular expressions, refer to the Unix manpage, "regexp," by typing **man regexp** at the shell prompt.

User sort option

The User sort option applies a specific sort option to the users displayed in the User Summary screen. The default, 3-CPU time, sorts the report lines on the screen by the percentage of CPU time utilized by each process in the most-recent interval.

Selecting a User Sort Option

1 From the User display options submenu screen, select User sort option. Press the Enter key.

2 At the next prompt, type the key command that corresponds to the desired sort option (described in Table 7.2). Press the Enter key.

Table 7.2 *SOS user sort options*

Sort Option	Description
1-User Name	Sort users alphabetically by the login name of the user.
2-UID	Sort users by the user ID number from /etc/passwd.
3-CPU time	Sort users by the amount of CPU time utilized during the last interval.
4-Phys I/O	Sort users by the number of physical I/O's accumulated in the last interval.
5-Term I/O	Sort users by the number of terminal I/O's accumulated in the last interval.
6-Process	Sort users by process name.
7-Real Memory RSS / (KB)	Sort users according to real memory usage.
8-Virtual Memory VSS / (KB)	Sort users according to virtual memory usage.

Display users sorted in ascending order

This parameter determines whether the sort order for the sort option applied in Option 3 is ascending or descending. By default, the users will be sorted and displayed in descending order.

Displaying Users in Ascending Order

To sort and display processes in ascending order:

1 From the Process display options submenu screen, select the Display users sorted in ascending order option. Press the Enter key.

2 At the next prompt, type **Y** (Yes). Press the Enter key.

Maximum number of users to display

This setting determines the maximum number of users to be listed in the User Summary screen. The default setting, 0 (zero), allows all users to be displayed.

To specify a maximum number of processes to be displayed in the User Summary screen:

1 From the User display options submenu screen, select the Maximum number of users to display option. Press the Enter key.

2 At the next prompt, enter a whole numeric value between 0 and 999.

Terminal Display Options

Terminal display options Submenu Screen

To access the Terminal display options submenu screen from any SOS display screen:

1 Type **o** from the SOS Main Option Menu screen.

2 Ensure the Display process information option is enabled.

3 From the SOS Main Option Menu screen. select Detail display options and press the Enter key.

4 From the Detail display options submenu screen, select Terminal display options and press the Enter key. The Terminal Display Options submenu screen will display (Figure 7.22).

```
SOS MAIN OPTION MENU
  Detail display options
    Terminal display options

   1) Filter getty processes from terminal display (Y)
   2) Terminal sort option (1-Terminal)
   3) Display terminals sorted in ascending order (N)
   4) Maximum number of terminals to display (0=ALL)  (0)
```

Figure 7.22 *SOS Terminal display options submenu screen*

Terminal display option Commands

The purpose of the terminal display options is to fine-tune the information in the Terminal Summary screen (discussed in "SOS Terminal Summary" on page 139).

To modify a terminal display option, either temporarily or permanently:

1. Type the option command key from the Terminal display options submenu screen and press the Enter key.
2. Enter a new parameter at the secondary command prompt. Press the Enter key.
3. Press Enter to exit the Terminal display options submenu screen.
4. Press Enter to exit the Detail display options submenu screen.
5. Press Enter to exit the SOS Main Options Menu screen.
6. At the Should these options be saved permanently? prompt:
   - Press the Enter key to return to the SOS program without saving the modifications permanently.
   - Type **Y** (Yes) to save the changes permanently and then press the Enter key.

Information about each of the terminal display options is provided to assist you.

Filter getty processes from terminal display

A *getty process* is a process that waits for a login, which corresponds to an inactive terminal. The default setting, **Y,** filters out the getty processes and displays only the active terminals in the Terminal Summary screen.

Including Getty Processes

To include getty processes as well as active terminals in the Terminal Summary screen:

1. From the Terminal display options submenu screen, select the Filter getty processes from the terminal display option. Press the Enter key.
2. At the next prompt, type **N** (No). Press the Enter key.

Terminal sort option

This setting applies a specific sort option to the terminals displayed in the Terminal Summary screen. The default setting, 1-Terminal, sorts the report lines on the screen by terminal device name.

Selecting a Terminal Sort Option

1. From the Terminal display options submenu screen, select Terminal sort option. Press the Enter key.
2. At the next prompt, type the key command that corresponds to the desired sort option (described in Table 7.3). Press the Enter key.

Table 7.3 *SOS terminal sort options*

Sort Option	Description
1-Terminal	Sort terminals by the terminal device name.
2-User Name	Sort terminals by the login user name.
3-Login Time	Sort terminals according to the time of login.
4-Idle Time	Sort terminals according to the current idle time.
5-Processes	Sort terminals according to the number of processes attached to the terminal.
6-TTY In Count	Sort terminals according to the number of characters input on the terminal.
7-TTY Out Count	Sort terminals according to the number of characters output on the terminal.

Display terminals sorted in ascending order

This setting determines whether the sort order for the sort option applied in the previous option is ascending or descending. By default, the terminals will be sorted and displayed in descending order.

Displaying Terminals in Ascending Order

To sort and display terminals in ascending order:

1. From the Terminal display options submenu screen, select the Display terminals sorted in ascending order option. Press the Enter key.
2. At the next prompt, type **Y** (Yes). Press the Enter key.

Maximum number of terminals to display

This setting determines the maximum number of terminals to be listed in the Terminal Summary screen. The default setting, 0 (zero), allows all users to be displayed.

To specify a maximum number of processes to be displayed in the Terminal Summary screen:

1. From the Terminal display options submenu screen, select the Maximum number of terminals to display option. Press the Enter key.
2. At the next prompt, enter a whole numeric value between 0 and 999.

8

SOS HOST-SPECIFIC CONFIGURATION FILES

SOS advice File

In the SYSTEM PERFORMANCE ADVICE portion of the Global Summary screen, advice messages are displayed based upon system activity that occurred during the current interval. The advice messages and display criteria are maintained in the SOS advice file (a portion of which is shown below) located in the /etc/opt/lps/cfg directory.

```
##############################################################################
User Notification Command — echo >/dev/console

Comments — #lpstrap

#uncomment the above line to start sending snmp trap messages with

#notify information.  You must configure lpstrap for you environment also.

#See lpstrap for more info.


Default Advice Specification Block — <CI01>The CPU was used a total of %s of its capacity during this interval

ALWAYS

CPU-BUSY%
```

Figure 8.1 *SOS advice configuration file (example)*

SOS advice File Configuration

The SOS program can display a single-line message for each item-name variable (a data item selected from the /opt/lps/lib/itemlist file) placed in the advice file. For a list of the data items in the itemlist file, see Appendix C.

During each current interval, SOS compares the value of each variable being monitored to the threshold criteria placed in the advice file. If the monitored value meets its threshold criteria, the message associated with that variable is displayed in the SYSTEM PERFORMANCE ADVICE portion of the Global Summary screen.

NOTE Please note that the lower and upper bounds of the thresholds for the moderate, HEAVY, and EXCESSIVE categories of each default advice message in the advice file are suggested values. It may be appropriate to adjust these values to reflect your system's performance criteria.

Advice Message Specification Blocks

Advice message specification blocks are constructed in accordance with specific configuration rules and syntax. The rules for configuring advice message specification blocks within the advice file are listed in "Configuration Rules" on page 65. The syntax of the specification blocks is outlined below using the default ME01 advice message as an example.

Example

```
<ME01>Page out rate reveals %s %s memory load

VM-PAGE-OUT-RATE (10-50)

VM-PAGE-OUT-RATE | 20 an | 15 a | 10 a |

VM-PAGE-OUT-RATE | 20 EXCESSIVE | 15 HEAVY | 10 moderate |
```

Syntax

<message-id><message-text>

item-name (min-max)

item-name [|<value1><string1>|<value2><string2>|<value3><string3>|]

item-name [|<value1><string1>|<value2><string2>|<value3><string3>|]

Where:

- <message-id> is a unique, four-character message identification code.
- <message-text> is the actual advice message text.
- item-name is the itemlist value to be used to determine the text string.
- (min-max) is the minimum and maximum item threshold values required for the message to display.

- The last two lines in the example are each single-line text qualifiers that correspond to the text place-holder(s) (%s) in the message-text.
  - The first place-holder in the message-text corresponds to the first text qualifier in the specification block.

    In the example, the first place-holder in the message-text line:

    <ME01>Page out rate reveals %s %s memory load

    is determined by the value thresholds in the corresponding text-qualifier:

    VM-PAGE-OUT-RATE | 20 an | 15 a | 10 a |
  - The second conversion specifiers in the <message-text> corresponds to the second text qualifier line in the block, and so on.

    In the example, the first place-holder in the message-text line:

    <ME01>Page out rate reveals %s %s memory load

    is determined by the value thresholds in the corresponding text-qualifier:

    VM-PAGE-OUT-RATE | 20 EXCESSIVE | 15 HEAVY | 10 moderate |

  The item-name <value> determines which <string> text is inserted into the printed advice message.

Configuration Rules

1. Comment lines must be preceded by a number sign character (#).
2. The first line of the SOS advice file is followed by any number of user-notification commands, terminated by one or more blank lines.

   User-notification commands can be used to redirect copies of advice messages to another output device. No validation is done to confirm the syntax of these lines. The actual message text should not be included in the command. Instead, the advice message will be appended to the end of it.

   Example

   ```
   echo>/dev/console7
   ```
3. The rest of the file contains any number of message advice specification blocks separated by one or more blank lines. Each advice specification block must contain a message-id code followed by the actual advice message-text on the first line. Subsequent lines contain threshold criteria.
4. The message-id code is made up of the following components:
   - A type code, which denotes the specific system activity monitored.
     - B for buffer cache activity
     - C for CPU activity
     - D for disk activity

- G for global activity
- M for memory activity
- L for network activity
- P for process activity

- A user-defined priority code assigned to the <variable>
  - I indicates the advice message is informational.
  - E indicates the performance level is exceptional or excessive.
- A unique two-digit identification number (00-99)

5 The <message-id> code is followed by the message text (<message-text>).

Example

```
<CE01> The CPU Queue length indicates %s %s CPU bottleneck
```

The message identification code precedes the message text in the specification file, but follows the message text in the actual advice message display.

6 Conversion specifications in the <message-text> specification must be introduced by the percent sign character (%). After the % character, a conversion character (either s or %) will indicate the type of conversion to by applied.

- %s (percent sign followed immediately by a lower-case s) indicates the argument is a string and characters from the string will be printed until the end of the string.
- %% (percent sign followed immediately by a percent sign) will print a % character; no argument is converted.

For *each variable text or value* to be included in the message text, a single-line text qualifier must follow the basic advice specification.

7 If the advice message should always be displayed, the second line of the advice specification block can be replaced with the word ALWAYS to specify the message should always be generated. The <item-name> from the .itemlist file would then be the only entry on the third line of the block.

Example

```
<PI01>This interval's 'hog' process is %s with %s%% of the CPU

ALWAYS

%CPUPCT-PID

%CPUPCT
```

8 The item-name specification used to determine the text string is usually, but not necessarily, the same as the advice threshold item. An item-name can be selected from block types 0, 6, 7, 8, 10, 12, 14, or 15 in the itemlist file. Or, it can be one of six special item-names preceded by a percent sign (%item-name).

The following three items can only be used as variable text item-names. They will be replaced with a string of the form #nnn (nnn=PIN) to identify the appropriate process:

- %CPU-HOG, which identifies the CPU hog process
- %DISC-HOG, which identifies the disk hog process
- %TERM-HOG, which identifies the terminal read hog process

The next three special items can be used anywhere as a regular item-name can be used:

- %HOG-CPU, the CPU percentage used by %CPU_HOG
- %HOG-DISK, the disk I/O's performed by %DISC_HOG
- %HOG-TERM, the terminal reads performed by %TERM_HOG

9 An item-name preceded by an exclamation character (!item-name), specifies that all occurrences of this advice message will be sent through user-notification commands.

SNMP Traps

SOS Performance Advisor provides the ability to send SNMP (Simple Network Management Protocol) traps to an SNMP event browser, such as OpenView Network Node Manager Alarm Browser. The executable program used to accomplish this, `snmptrap`, comes with the event browser—it is not shipped with the SOS Performance Advisor product.

Installing the lpstrap File

Before enabling SNMP traps, you must first install the lpstrap file on your host system.

1 Save the following file as /opt/lps/bin/lpstrap on your host system:

```
#!/bin/ksh -f

MGR_HOST=<host-systemname>

SNMPTRAP_PATH=/opt/OV/bin

$SNMPTRAP_PATH/snmptrap "" .1.3.6.1.4.1.11.2.17.1

$MGR_HOST 6 58916872\""\

.1.3.6.1.4.1.11.2.17.2.1.0 Integer 14 \

.1.3.6.1.4.1.11.2.17.2.5.0 octetstringascii "Major" \

.1.3.6.1.4.1.11.2.17.2.4.0 octetstringascii \

"SOS Performance Advisor: $@"
```

2 Change the file permissions as executable:

```
chmod 755 lpstrap
```

Enabling the SNMP Traps

To enable SNMP traps, perform the following steps.

1 Modify MGR_HOST in /opt/lps/bin/lpstrap to reflect the host that will receive the traps (the system running the browser).

2 Modify SNMPTRAP_PATH in /opt/lps/bin/lpstrap to reflect the path for snmptrap on the host executing SOS Performance Advisor. By default, lpstrap uses /opt/OV/bin/.

3 Modify the /etc/opt/lps/cfg/advice file to enable lpstrap by removing the number sign character (#) in the line: #lpstrap.

4 Modify the /etc/opt/lps/cfg/advice file to specify which messages you wish to be sent as SNMP traps by preceding the threshold specification with a greater than sign (>).

For example, the advice message specification block:

```
<CE01>CPU Queue length indicates %s %s CPU bottleneck

CPU-QUEUE-LEN (5-9999)

CPU-QUEUE-LEN | 10 an | 5 a | 2 a

CPU-QUEUE-LEN | 10 EXCESSIVE | 5 HEAVY | 2 moderate
```

will become:

```
<CE01>CPU Queue length indicates %s %s CPU bottleneck

>CPU-QUEUE-LEN (5-9999)

CPU-QUEUE-LEN | 10 an | 5 a | 2 a

CPU-QUEUE-LEN | 10 EXCESSIVE | 5 HEAVY | 2 moderate
```

NOTE Although you can enable traps for all advice messages, this feature was designed to notify personnel of exceptional performance levels. For instance, enabling an SNMP trap for an advice message that is ALWAYS generated could be excessive and is not recommended

5 Start the SOS Performance Advisor executable program (SOS or SOSLOGD) to which you want to send the traps, and enable advice messages within that program.

- For instructions to enable advice messages in SOS, refer to "Display advice messages" on page 42.
- For instructions to enable advice messages in SOSLOGD, see "Setting Advanced Configuration Parameters" on page 181.

NOTE If advice messages are enabled in more than one executable program or more than one occurrence of the same program, each program will create SNMP traps. To avoid duplication, enable the advice messages in SOSLOGD only.

SOS holidays File

The /etc/opt/lps/cfg/holidays file contains a list of dates to be ignored by SOSLOGX. By default, the file contains exclusion dates for the following holidays in the years1996 through 2010:

- New Years Day (January 1)
- Presidents Day (3rd Monday in February)
- Memorial Day (last Monday in May)
- Independence Day (July 4)
- Labor Day (1st Monday in September)
- Veterans' Day (November 11)
- Thanksgiving Day (4th Thursday in November)
- Christmas Day (December 25)

The portion of the /etc/opt/lps/cfg/holidays file that excludes holidays for the year 2000 is provided as an example:

```
! 2000 Holidays
!
01/01/00    New Year's
02/21/00    President's Day
05/29/00    Memorial Day
07/04/00    Independence Day
09/04/00    Labor Day
11/11/00    Veteran's Day
11/23/00    Thanksgiving
12/25/00    Christmas
```

Figure 8.2 *SOS holidays configuration file (example)*

The purpose of the holidays file is to eliminate atypical computer performance data from the statistical analysis done by SOSLOGX. To add, delete, or modify the contents of this file, use the configuration rules listed below.

Configuration Rules

When you know in advance that computer resources used on particular date will not be typical and don't want that day's performance to skew performance statistics, you can exclude that date from SOSLOGX's computations by doing the following:

1 Add the date to the /etc/opt/lps/cfg/holidays file.
   a Use the format MM/DD/YY.
   b Precede any comment lines with an exclamation character (!).
2 Enable Exclusions in SOSLOGX.
3 Enable Holiday Exclusions in SOSLOGX.

SOS ppoints File

The /etc/opt/lps/cfg/ppoints file contains the configuration information for the Pulse Points screen. For information about pulse points, see "SOS Pulse Points Summary" on page 155.

```
##############################################################################
```

CPU Pulse Points Indicator Lines —

```
$PP_CPU      CPU-BUSY%           "CPU Busy %"            60,85     ""
$PP_CPU      CPU-HIGH-PRI-BUSY%  "Hi-Pri CPU %"          60,85     ""
$PP_CPU      CPU-QUEUE-BUSY%     "Queue Busy %"          75,90     ""
$PP_CPU      CPU-QUEUE-LEN       "Run-Q Average"          5,10     ""
```

Memory Pulse Points Indicator Lines —

```
$PP_MEMORY   VM-PAGE-OUT-RATE    "Page Out Rate"         15,20     "/sec"
$PP_MEMORY   VM-DEACT-BPS        "Deactivate Byte Rate"   1, 200   "bytes/sec"
$PP_MEMORY   CPU-VFLT%           "CPU Memory Mgt %"       3, 7     ""
$PP_MEMORY   BC-RHIT%            "Read Hit %"            90,80     ""
```

Disk Pulse Points Indicator Lines —

```
$PP_DISC     DISC-AVG-WAIT-TIME  "Average Wait Time"     30,40     "System Wide"
$PP_DISC     DISC-QUEUE-LEN      "Average Q-Length"       1, 3    "System Wide"
$PP_DISC     DISC-UTIL%          "Disk Utilization %"    40,60     "System Wide"
$PP_DISC     DISC-IO-RATE        "Disk I/O Rate (/sec)"  40,60     "System Wide"
```

Network Pulse Points Indicator Line —

```
$PP_NET      NETIF-COLLISION%    "Collision %"           15,30     "System Wide"
```

Figure 8.3 *SOS ppoints configuration file (example)*

SOS ppoints File Configuration

An example of the Pulse Points screen is shown in Figure 8.4.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:42      E: 26:18:28   I: 02:26
--------------------------------  PULSE POINTS  --------------------------------
    Indicator           |    Green    |   Yellow    |      Red     | Comments
--- CPU ------------------------------------------------------------------------
CPU Busy %                    [ 32.9]                98.6
Queue Busy %                0.7[  4.7]
Run-Q Average                 0[  1.2]
--- Memory ---------------------------------------------------------------------
Ave Page Residence        600.0[600.0]                          secs
Page Scan Rate                0[    0]                          /sec
Page Out Rate                 0[    0]                          /sec
Swap Out Rate                 0[    0]                          /sec
--- Disk I/O -------------------------------------------------------------------
Average Wait Time           9.4[  8.2]                          System Wide
Average Q-Length              0[    0]                          System Wide
Disk Utilization %            0[    0]                          System Wide
Disk I/O Rate (/sec)          0[    0]                          System Wide
--- Network --------------------------------------------------------------------
Defer %                       0[    0]                          System Wide
Collision %                   0[    0]                          System Wide
--------------------------------------------------------------------------------


Enter command: _
```

Figure 8.4 *SOS Pulse Points screen (example)*

By default, the pulse point thresholds and messages are configured for you. You can edit the /etc/opt/lps/cfg/ppoints file in order to:

- Add, delete, or reorder the pulse point indicators (variables) that appear in each section
- Modify the Green (normal), Yellow (problematic), and Red (unacceptable) threshold values
- Modify the comments associated with each pulse point indicator

Pulse Point Indicator Lines

Example

```
$PP_MEMORY  VM-DEACT-BPS  "Deactivate Byte Rate"   1, 200   "bytes/sec"
```

Syntax

<section><value-spec><label><yellow-threshold, red-threshold><comment>

Configuration Rules

Use the following configuration rules when editing the ppoints file.

1. Any pulse points variable that you want to display in the Pulse Points screen must be defined in the /etc/opt/lps/cfg/ppoints file.
2. The first four specification fields in the pulse points indicator line must be completed. The <comments> field may be omitted.
3. Commas, spaces, or tabs must separate the specification fields in the pulse points indicator line to allow for "white space" in the display.
4. Each indicator line must begin with the name of the section in which the variable will appear in the Pulse Points screen. The section name in the <section> field must be preceded by "$PP_". The valid section names are:

   - $PP_CPU (CPU section)
   - $PP_MEMORY (Memory section)
   - $PP_DISC (Disc I/O section)
   - $PP_NET (Network section)
   - $PP_MISC (Miscellaneous section)

5. The <value-spec> field is composed of a variable and an (optional) operator in the format:

   <variable>[<operator><variable>]...[<operator><variable>]

   Where:

   - <variable> is either the SOS variable name being monitored and displayed in the Pulse Points screen, or the SOS variable being used after the operator. A variable name must meet the following qualifications:
     - It must be included in the /opt/lps/lib/itemlist file.
     - It must have block numbers 1, 2, 3, 6, 7, 8, or 9.
     - It must have item types less than 1000.
   - <operator> is either the addition (+) or subtraction (-) function applied to the corresponding variable within the indicator line. White space (achieved by inserting a comma, a space, or a tab) must exist on both sides of the operator within the indicator line.

   Example

   To subtract CPU-USER-BUSY% from CPU-HIGH-PRI-BUSY%, the indicator line would be:

```
$PP_CPU     CPU-HIGH-PRI-BUSY% - CPU-USER-BUSY%     60,85     ""
```

6 The <label> field is the text that describes the <variable> on the Pulse Points screen. For example, in the indicator line:

```
$PP_MEMORY  VM-DEACT-BPS  "Deactivate Byte Rate"  1, 200 "bytes/sec"
```

"Deactivate Byte Rate" is the <label> that describes the <variable>, VM-DEACT-BPS.

7 The <yellow-threshold, red-threshold> field follows the <label> field in a pulse points indicator line. The values entered for the yellow- and red-thresholds should be in the scale or unit appropriate for the <variable>.

- Green

  To display in the Green (normal) column in the Pulse Points screen, the value of the <variable> must be less than the value for the yellow-threshold when the scale is from low to high (the yellow-threshold value is less than the red threshold value). See Example 1 page 73.

  When the scale is from high to low (the yellow-threshold value is greater than the red-threshold value), the value of the <variable> must be greater than the value for the yellow threshold. See Example 2 on page 73.

- Yellow

  To display in the Yellow (problematic) column in the Pulse Points screen, the value of the <variable> must be equal to or greater than the yellow threshold value and less than the red threshold value when the scale is low to high. See Example 1.

  When the scale is from high to low, the <variable> must be equal to or less than the yellow threshold value and greater than the red threshold value. See Example 2.

- Red

  To display in the Red (unacceptable) column in the Pulse Points screen, the value of the <variable> must be equal to or greater than the red threshold value when the scale is set from low to high. See Example 1.

  When the scale is from high to low, the <variable> must be equal to or less than the red threshold value. See Example 2.

Example 1

```
$PP_CPU   CPU-HIGH-PRI-BUSY%  "Hi-Pri CPU %"         60,85     ""
```

The pulse points for this example indicator line would be interpreted as:

- CPU-HIGH-PRI-BUSY% data values less than 60 will appear in the Green column in the Pulse Points screen.
- CPU-HIGH-PRI-BUSY% data values equal to or greater than 60 and less than 85 will appear in the Yellow column in the Pulse Points screen.
- CPU-HIGH-PRI-BUSY% data values greater than 85 will appear in the Red column in the Pulse Points screen.

Example 2

```
$PP_MEMORY  BC-RHIT%          "Read Hit %"            90,80     ""
```

The pulse points for this second example would be interpreted as:

- BC-RHIT% data values greater than 90 will appear in the Green column in the Pulse Points screen.
- BC-RHIT% data values equal to or less than 90 and greater than 80 will appear in the Yellow column in the Pulse Points screen.
- BC-RHIT% data values less than 80 will appear in the Red column in the Pulse Points screen.

8 The <comment> field (optional) can be used to assist in the interpretation of the pulse points indicator. Any comments must be enclosed in quotation characters (" "). For example, in the indicator line:

```
$PP_MEMORY  VM-DEACT-BPS  "Deactivate Byte Rate"  1,200 "bytes/sec"
```

The comment, "bytes/sec", tells the user the Deactivate Byte Rate is calculated in bytes per second.

SOS soskip File

The /etc/opt/lps/cfg/soskip file contains the configuration information for the KIP (Key Indicators of Performance) line displayed in all SOS screens. For information see "Key Indicators of Performance (KIP) Line" on page 81.

```
# Var_name            row,column,width

CPU-BUSY%             ROW,13,WIDTH

CPU-HIGH-PRI-BUSY%    ROW,31,WIDTH

BC-RHIT%              ROW,49,WIDTH
```

Figure 8.5 *SOS soskip configuration file (example)*

Configuration Rules

The `soskip` configuration file requires one text line for each data item displayed in the KIP line.

Example

```
CPU-BUSY%             ROW,13,WIDTH
```

Syntax

<variable> row,column,width

Where <variable> is the SOS variable name being monitored and displayed in the KIP line.

All soskip variable items:

- Must be found in /opt/lps/lib/itemlist.

- Must have block numbers: 6,7,8,10,12, or 14.
- Must have item types less than 1000.

Attribute Commands

The following attribute commands can be applied when editing the soskip file. The default setting is $LEFT, $INVERSE, $UNDERLINE.

Table 8.1 *SOS soskip attribution commands*

Command	Description
$TEXT	A required line and $END is a required line. Blank lines are not ignored between $TEXT and $END.
$BLINK	Makes the KIP line flash.
$INVERSE	Displays the KIP line in reverse video.
$UNDERLINE	Underlines the KIP line.
$HALF	Displays the line in half bright mode.
$NORMAL	Displays the line in normal text mode (overrides all previous attribute commands).
$LEFT	Left-justifies text lines.
$RIGHT	Right-justifies text lines.
$CENTER	Centers text lines.

9

SOS GLOBAL SUMMARY

The Global Summary Screen

The SOS Global Summary screen provides a summary of activity system-wide:

- Product version and collection interval information
- Key indicators of performance data
- Global statistics
- CPU utilization statistics
- CPU miscellaneous statistics
- Memory and virtual memory statistics
- Miscellaneous statistics
- Disk statistics
- Process statistics
- Workload statistics
- System performance advice

The Global Summary screen is the first screen to display when you start SOS and the usual starting point for any review of system activity and performance. The screen can be displayed in either graphical or tabular format.

To access the Global Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **g** (Global Summary). The Global Summary screen will display.
3. Type **t** from the Global Summary screen to toggle between the graphical and tabular formats.

Graphical Format

Figure 9.1 shows an example of the Global Summary screen in graphical format.

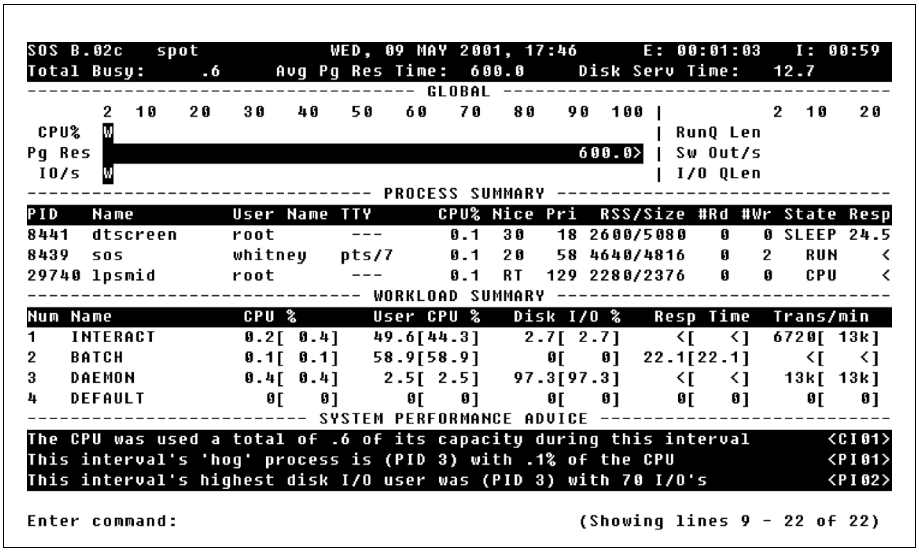


Figure 9.1 *SOS Global Summary screen (graphical format)*

This example screen contains the following components:

- The SOS banner
- The Key Indicators of Performance (KIP) line (optional)
- GLOBAL statistics
- PROCESS SUMMARY (optional)
- WORKLOAD SUMMARY (optional)
- SYSTEM PERFORMANCE ADVICE messages (optional)

Each of these components is described in "Global Summary Screen Display Items" on page 80.

Tabular Format

To toggle between the graphical and tabular format options, press the **t** key from the Global Summary screen. Figure 9.2 shows an example of the Global Summary screen in tabular format.

```
SOS B.02c   spot            WED, 09 MAY 2001, 17:48      E: 00:02:03   I: 00:59
Total Busy:     .3     Avg Pg Res Time:  600.0     Disk Serv Time:   14.3
--------- CPU UTILIZATION ---------------------------- CPU MISC ----------------
       TOTAL BUSY:  0.3[  1]       |  Capture Ratio:                    0.2[  <]
                                   |  RunQ Avg:                           0[  0]
 User:  0.1[  <]   Sys:  0.3[  <] |  5/15 Min Runq Avg:                  0/   0
 Wait:  0.2[  <]  Idle: 99.5[ 99] |  RunQ Busy %:                        0[  1]
------------------------------------ MEM/VM -------------------------------------
 Pg Scans :     0[  0]/s    Pg Reclaims:  0.1[  <]/s    Page Outs:     0[  0]/s
 Pg Res Tm: 600.0[600]                                  Swap Outs:     0[  0]/s
------------------------------------ MISC --------------------------------------
 #Sessions:    5  #Procs:    62  #Wait I/O:     0   Transactions: 337.2[ 394]/s
 #Active:      1  #Active:    7  #Swap:         0   Avg Response Time:      <
------------------------------------ DISK --------------------------------------
 Disk       IO/s IO% QLen | Disk       IO/s IO% QLen | Disk       IO/s IO% QLen
 c0t0d0        0 100    0 | c0t1d0        0   0    0 | c0t2d0        0   0    0
---------------------------------- PROCESS SUMMARY ---------------------------------
PID   Name         User Name TTY      CPU% Nice Pri  RSS/Size #Rd #Wr State Resp
-------------------------- SYSTEM PERFORMANCE ADVICE ---------------------------
The CPU was used a total of .3 of its capacity during this interval       <CI01>
This interval's 'hog' process is (PID 29740) with .1% of the CPU          <PI01>
This interval's highest disk I/O user was (PID 3) with 13 I/O's           <PI02>

Enter command: _                                   (Showing lines 14 - 18 of 18)
```

Figure 9.2 *SOS Global Summary screen (tabular format)*

This example screen contains the following components:

- The SOS banner
- CPU UTILIZATION statistics (including cumulative statistics)
- CPU MISC statistics
- MEM/VM statistics (optional)
- MISC global statistics (optional)
- DISK statistics (optional)
- PROCESS SUMMARY (optional)
- System Performance Advice messages (optional)

Each of these components is described in detail in “Global Summary Screen Display Items” on page 80.

Global Summary Screen Display Items

SOS Banner

The SOS banner is always displayed at the top of all SOS data display screens.

Figure 9.3 *SOS Global Summary screen: SOS banner*

The banner contains information about the SOS program, the host system, the elapsed interval, and the current interval.

Product Version Number (SOS V.nna)

The first item displayed in the SOS banner (reading left to right) is the product version number (SOS V.nna). The version number denotes the following about the product:

- SOS is the name of the product.
- V denotes the major version level.
- n denotes the minor version level.
- a denotes the fix level.

The SOS version number displayed in the example (refer to Figure 9.3) is B.02c. When contacting technical support, please provide the product version number of the software installed on your system.

System Name

The second item displayed in the SOS banner is the name of the system given during the installation of the operating system. The name of the system used in the example shown in Figure 9.3 is "spot."

Current Date and Time (DDD, DD MMM YYYY, HH:MM)

The third item in the SOS banner is the current date and time:

- DDD denotes the day of the week.
- DD denotes the day of the month.
- MMM denotes the month.
- YYYY denotes the year.
- HH:MM denotes the hour and minutes.

Elapsed Time (E: HH:MM:SS)

The fourth item displayed in the SOS banner is the elapsed time (E:HH:MM:SS), which is the time counted in hours, minutes, and seconds that has passed since you started the current session of SOS. This elapsed time measurement is especially valuable when viewing cumulative statistics. For further information, refer to “Display cumulative stats” on page 37.

To reset the elapsed time to zero, type **r** from any SOS display screen.

Current Interval (I: MM:SS)

The last item displayed in the SOS banner is the current interval (I: MM:SS). The current interval is the amount of time in minutes and seconds accumulated since SOS last updated the screen. The measurements reported on any SOS display screen are valid for the current interval.

By default, the interval refresh rate is 60 seconds. You can adjust this rate from the Main Options Menu screen. For further information, refer to “Screen refresh interval in seconds” on page 36.

Assuming the interval refresh rate is 60 seconds, the current interval displayed in the SOS banner should be I: 01:00. However, if at some point during the measurement interval the program has to wait for user input, the interval update will be delayed. For example, when the f key is pressed from an SOS display screen to "freeze" the current interval, the next update is delayed until the user enters the command to "unfreeze" the interval.

If the current interval displayed is less than the interval refresh rate, the user pressed the u key from an SOS display screen to update the performance data mid-interval.

Current Interval Metrics vs. Cumulative Averages

The statistical values expressed in the format "nnn.n" represent measurements for the current interval (I: MM:SS). The values in brackets, [nnn.n], represent cumulative averages for the elapsed interval (E: HH:MM:SS).

Key Indicators of Performance (KIP) Line

The Key Indicators of Performance (KIP) line can be displayed just below the SOS banner. This option is invoked when the Display Key Indicators of Performance option is enabled from the SOS Main Option Menu screen.

KIP Line —

Figure 9.4 *SOS Global Summary screen: Key Indicators of Performance (KIP) line*

The purpose of the KIP line is to display statistics associated with the primary indicators of system performance.

Total Busy

The Total Busy value displayed in the KIP line is the percentage of time the CPU spent executing the following activities instead of being in a pause or idle state:

- Processing user and system process code.
- Processing interrupts.
- Processing context switches.
- Managing main memory.
- Managing traps.

Avg Pg Res Time

The Avg Pg Res Time value displayed in the KIP line is the average response time in seconds of the corresponding process during the current interval.

Disk Serv Time

The Disk Serv Time value displayed in the KIP line is the average number of milliseconds an I/O request takes to be serviced once it begins to be processed by the disk (removed from the disk queue). This value does not include wait time.

NOTE By editing the soskip text file located in the /etc/opt/lps/cfg directory, you can redefine the variables to display in the KIP line. For information about editing the soskip file, see "SOS soskip File" on page 74.

GLOBAL

The GLOBAL statistics portion of the Global Summary screen contains a simple bar graph that summarizes activity levels system-wide.

GLOBAL (Left Column)

CPU%

The CPU% bar graph (the left portion of the GLOBAL statistics) shows the percentage of CPU time expended during the current measurement interval on various activities.

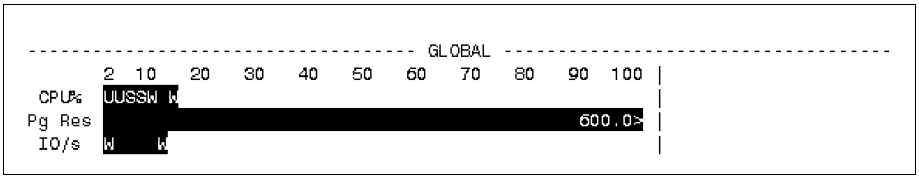


Figure 9.5 *SOS Global Summary screen: GLOBAL (left column)*

Each letter-width space on the CPU% bar graph represents approximately 2 percent of the CPUs time for the current interval. The code letters correspond to the CPU activities described in Table 9.1. Where a block of spaces on the bar graph is bordered by two instances of one code letter (e.g., S...S), that corresponding activity (e.g., executing system calls and code) would account for the CPU% range bordered by the two letters.

For example, the CPU% bar shown in Figure 9.5 indicates the following:

- Approximately 4 percent of CPU time in the current interval was spent executing user code.
- Approximately 4 percent of CPU time in the current interval was spent executing system calls and code (in kernel mode).
- Approximately 6 percent of CPU time in the current interval was spent waiting for disk I/Os to complete.

The code letters used in the CPU% bar graph are described in Table 9.1.

Table 9.1 *CPU% states or activities*

Code	Statistic	Description
W	Wait	The amount of idle time the CPU spent waiting for a disk I/O to complete.
U	User Mode	The percentage of CPU time spent executing user program code with a nice value of 20 and without any special priority.
S	System	The percentage of CPU time spent executing system calls and code (in kernel mode). This does not include time spent performing context switches or idle time.

Pg Res

The Pg Res value represents the average page residence time in milliseconds. This is the average amount of time a page is able to reside in memory. The default Pg Res Tm value is 600.0, which means that pages are not being forced out of memory. Values less than 600.0 mean that pages are being forced from memory.

IO/s

The IO/s bar represents the disk I/O rate. This is the number of physical reads and writes per second for each type of physical I/O. Similarly to the CPU% bar (see “CPU%” on page 82), specific code letters in the bar graph tell you how many of each type of physical I/Os were accumulated in the current interval. Each of these code letters are listed and described in Table 9.2.

Table 9.2 *Physical I/Os*

Code	Physical I/O	Description
R	Physical Reads	The number of physical reads per second.
W	Physical Writes	The number of physical writes per second.

The example screen shown in Figure 9.5 on page 82 shows that 12 physical writes were accumulated during the current interval.

GLOBAL (Right Column)

The scale for the next four global statistics ranges from 2 to 20. A value greater than 20 is represented by a trailing greater than character (>).

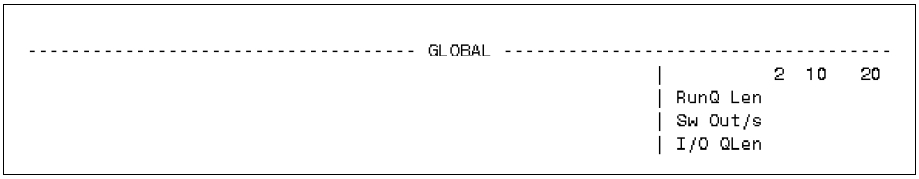


Figure 9.6 *SOS Global Summary screen: GLOBAL (right column)*

RunQ Len

The RunQ Len bar represents the average number of processes in the CPU run queue during the current interval.

Swap Out/s

The Swap Out/s bar represents the number of processes swapped out per second.

I/O QLen

The I/O QLen bar represents the average number of disk I/O requests pending for all disks during the current interval.

PROCESS SUMMARY

After reviewing the general state of global resources, the next logical step in analyzing a system's performance is to observe individual processes. It is important to find out which users are running which programs and what kinds of resources those programs are consuming. The primary purpose of the PROCESS SUMMARY portion of the Global Summary screen is to help you to identify key resources consumed by various processes on the system.

To examine the CPU usage, disk I/O usage, and wait state information for a process, open the Process Detail screen. For further information, see “SOS Process Detail” on page 159.

PROCESS SUMMARY Display Options

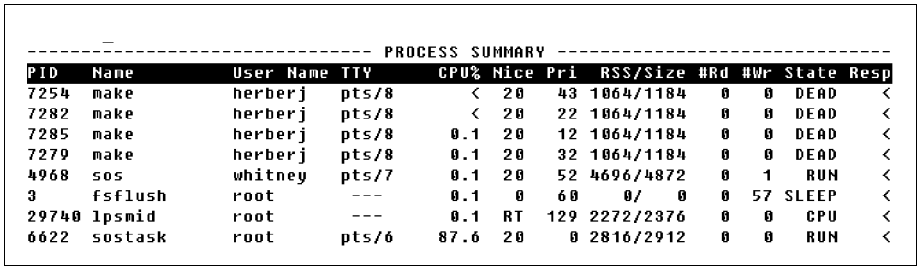
The PROCESS SUMMARY section is included in the Global Summary screen by default when the SOS program is started. However, this information can be suppressed. For instructions, refer to “Display process information” on page 45.

You can configure the PROCESS SUMMARY display in the following ways:

- Display or suppress the extended process line.
- Display either the total and I/O percentages or the read and write counts.
- Display all processes or only the active processes.
- Display or suppress attached processes.
- Display or suppress detached processes.
- Display or suppress system processes.
- Display or suppress processes that have died.
- Apply a process logon filter.
- Apply a process sort option.
- Display sorted processes in either ascending or descending order.
- Set a maximum number of processes to display.

For information about these options, please refer to “Process Display Options” on page 47.

PROCESS SUMMARY Data Items



PROCESS SUMMARY

PID	Name	User Name	TTY	CPU%	Nice	Pri	RSS/Size	#Rd	#Wr	State	Resp
7254	make	herberj	pts/8	<	20	43	1064/1184	0	0	DEAD	<
7282	make	herberj	pts/8	<	20	22	1064/1184	0	0	DEAD	<
7285	make	herberj	pts/8	0.1	20	12	1064/1184	0	0	DEAD	<
7279	make	herberj	pts/8	0.1	20	32	1064/1184	0	0	DEAD	<
4968	sos	whitney	pts/7	0.1	20	52	4696/4872	0	1	RUN	<
3	fsflush	root	---	0.1	0	60	0/ 0	0	57	SLEEP	<
29740	lpsmid	root	---	0.1	RT	129	2272/2376	0	0	CPU	<
6622	sostask	root	pts/6	87.6	20	0	2816/2912	0	0	RUN	<

Figure 9.7 *SOS Global Summary screen: PROCESS SUMMARY*

The contents of each PROCESS SUMMARY column (shown in Figure 9.7) are described in this section.

PID

The PID is the process identification number, which uniquely identifies each process running on the system.

Name

The name of each process running on the system is listed in the Name column.

User Name

The User Name column provides the name of the user that owns (or creates) each process running on the system.

TTY

"TTY" is defined in SOS as the special device file of the terminal to which the process is attached. The TTY column will show three dashes (---) for processes that are not attached to a terminal (processes such as daemons and batch jobs).

CPU%

The CPU% column shows the percentage of CPU time that was used by each process during the current interval.

Nice

The Nice column displays the nice value associated with each process.This value, ranging from 0 to 39 (the default is 20), is a determining factor when a process's priority is recalculated.

- A process with a larger nice value will receive a higher priority (resulting in a lower-priority status).
- A process with a smaller nice value will receive a lower priority (resulting in a higher-priority status).

A process that slows system response time can be "niced" to lower its priority and allow other processes to be executed more quickly.

Pri

The Pri column shows the most-recent priority that each process was given.

As explained earlier, high priority numbers indicate low-priority status, and vice versa. The priority numbers between 0 and 127 indicate high-priority status and are reserved for certain system daemons or real-time processes. The majority of processes are given numbers between 128 and 255, which indicate timeshare-priority status. A typical timeshare process will fluctuate within this priority range, based on the process's CPU demands and the system's load. Processes executing at nice priorities typically have larger numbers (lower priorities).

The system scheduler dynamically sets the priority by considering several factors, such as CPU utilization. Because the scheduler tries to allocate CPU time fairly among the processes, it will

lower the scheduling priority of process that require a lot of CPU time. This means that as a process's CPU usage grows, its priority number in the Pri column will increase.

RSS/Size

The RSS/Size column presents two data items for each process running on the system. The RSS value represents the resident set size—the amount of RAM used by the process. The Size value represents the size in kilobytes of the core image of the process. This includes text, data, and stack space. In other words, the amount of swap or virtual memory the process has reserved.

✔ Performance Tip

Large values in the RSS/Size column indicates the corresponding process uses a lot of memory. Processes in this category may need to be checked for memory usage problems.

#Rd

The #Rd column lists the number of physical reads performed by each process during the current interval.

#Wr

The #Wr column shows the number of physical writes performed by each process during the current interval.

✔ Performance Tip

The #Wr values are important because they can point to processes that are performing excessive disk I/Os. To confirm, check the SYSTEM PERFORMANCE ADVICE portion of the Global Summary screen for a message that reports the high I/O process for the current interval. When high #Rd and #Wr values are evident, determine whether the I/Os are necessary or unnecessary.

State

The State column in the PROCESS SUMMARY portion of the Global Summary screen shows which wait state the corresponding process was in at the end of the current interval. Each wait state is described in the appendix, "SOS/SOLARIS Wait States" on page 233.

✔ Performance Tip

Wait state information is helpful when you want to determine why a process is "stuck." Keep in mind, however, that the wait state of a process can change radically in a manner of seconds. If you suspect a problem, check the information provided for that process in the Process Detail screen.

Extended Process Statistics Lines

The PROCESS SUMMARY portion of the Global Summary screen can be expanded to show the percentage of time each process spent in one or more wait states during the current interval. This additional process information is displayed below each corresponding process statistics line in an extended process line.

The extended process lines together with the extended process headings line can be enabled from the Process Display Options submenu of the SOS Main Options Menu or by typing the y key from the Global Summary screen (toggles the extended process lines on and off).

The statistics in the extended process lines correspond with the column headings in the extended process headings line. Each column heading is described in Table 9.3.

Table 9.3 *Extended process column headings*

Heading	Description
PRI	The percentage of the process' time spent in the PRI state during the current interval. See "Wait State Descriptions" on page 233.
TPG	The percentage of the process' time spent in the TPG state during the current interval. See "Wait State Descriptions" on page 233.
DPG	The percentage of the process' time spent in the DPG state during the current interval. See "Wait State Descriptions" on page 233.
KPG	The percentage of the process' time spent in the KPG state during the current interval. See "Wait State Descriptions" on page 233.
ULCK	The percentage of a process' time spent in the ULCK state during the current interval. See "Wait State Descriptions" on page 233.
JOB	The percentage of the process' time spent in the PRI state during the current interval. See "Wait State Descriptions" on page 233.
OTH	The percentage of the process' time spent in the OTH state during the current interval. See "Wait State Descriptions" on page 233.
Group Name	The name of the group that owns the process.
wchan	The address at which the process is sleeping.
nlwp	The number of light-weight processes (threads).
nswap	The number of times the process was swapped in the current interval.
CPU (ms)	The total CPU time in milliseconds used by the process during the current interval.

The percentage of time the process spent in a wait state is represented by one of the following:

- A number between 0 and 100 (percent).
- A less than character (<), which represents a value less than 0.1 percent.
- An asterisk character (*), which represents a value greater than 100.0 percent.

For example, the extended process line for PID 29983 shown in Figure 9.8 provides the following information:

- Process 29983 spent 100 percent of the current interval in the OTH wait state.
- Process 29983 is in the DETACH workload group. It's address is 0xef007e84.
- Process 29983 has 5 threads. It was swapped 0 (zero) times.
- Process 29983 consumed 150 ms of the CPU time during the current interval.

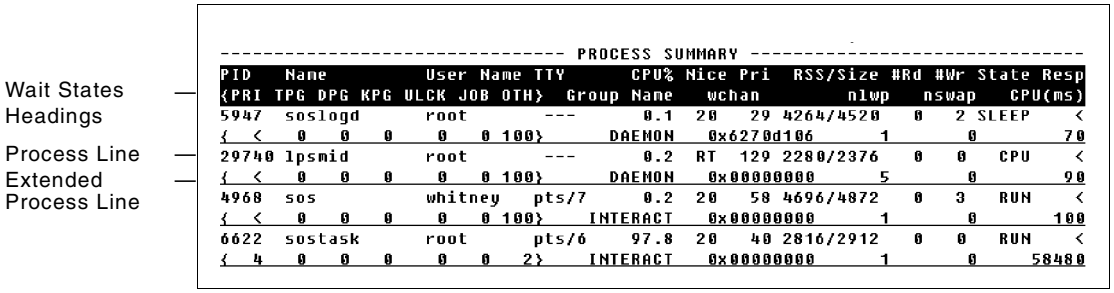


Figure 9.8 *SOS Global Summary screen: extended process column headings and lines*

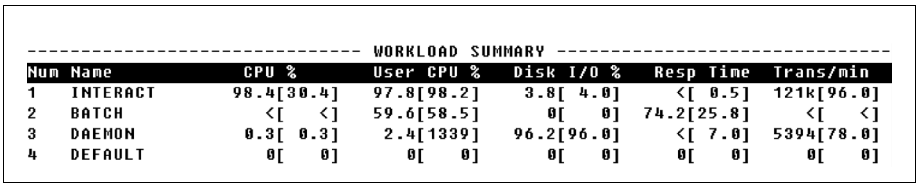
Additional information about a process can be viewed in the Process Detail screen, which is discussed in "SOS Process Detail" on page 159.

WORKLOAD SUMMARY

The SOS program is able to track process statistics by application workloads. Workloads was discussed in "Workload Groups" on page 15. Workload statistics can be displayed in the WORKLOAD SUMMARY portion of the Global Summary screen.

WORKLOAD SUMMARY Display Options

To display the WORKLOAD SUMMARY statistics in the Global Summary screen, first enable the Display workload information option from the SOS Main Options Menu screen.



WORKLOAD SUMMARY

Num	Name	CPU %	User CPU %	Disk I/O %	Resp Time	Trans/min
1	INTERACT	98.4[30.4]	97.8[98.2]	3.8[4.0]	<[0.5]	121k[96.0]
2	BATCH	<[<]	59.6[58.5]	0[0]	74.2[25.8]	<[<]
3	DAEMON	0.3[0.3]	2.4[1339]	96.2[96.0]	<[7.0]	5394[78.0]
4	DEFAULT	0[0]	0[0]	0[0]	0[0]	0[0]

Figure 9.9 *SOS Global Summary screen: WORKLOAD SUMMARY*

By default, all workloads running on the system are included in this process summary. To show only the active workloads, enter **Y** (Yes) for the Display only active workloads option in the SOS Main Options Menu screen, then set the minimum CPU time required for workload display to a value between 0.1 and 99.9 percent.

WORKLOAD SUMMARY Data Items

The data items presented in the WORKLOAD SUMMARY portion of the Global Summary screen are described in the following table.

Table 9.4 *SOS Workload Summary data items*

Data Item	Description
Num	The Num column lists the workload numbers in ascending order as they appear in the workload definition file.
Name	The Name column lists the name assigned to each workload as it appears in the workload definition file.
CPU%	The CPU% column presents the percentage of CPU time used by each workload during the current interval and the elapsed interval.
User CPU%	The User CPU% column shows the percentage of system-wide I/Os performed by this workload.
Disk I/O%	The Disk I/O% column shows the percentage of each workload's CPU percentage that was spent on disk I/O during the current and elapsed intervals.
Resp Time	The values displayed in the Resp Time column represent the average response times (seconds) calculated for each workload during the current and elapsed intervals.
Trans/min	The values displayed in the Trans/min column represent the total number of transactions per minute counted for each workload during the current and elapsed intervals.

CPU UTILIZATION

Information presented in the CPU UTILIZATION portion of the tabular Global Summary screen will help you to evaluate your system's CPU performance by showing you how global activities are expending CPU time.

```
--------- CPU UTILIZATION ---------
       TOTAL BUSY: 98.3[ 30]      |
                                  |
 User: 94.2[ 30]   Sys:  4.1[  1] |
 Wait:    0[  <]  Idle:  1.7[ 69] |
```

Figure 9.10 *SOS Global Summary screen: CPU UTILIZATION*

The statistical values expressed in the format "nnn.n" represent measurements for the current interval. The values in brackets, [nnn.n], represent cumulative averages for the elapsed interval.

CPU UTILIZATION Data Items

The data items presented in the CPU Utilization portion of the Global Summary screen are described in this section.

TOTAL BUSY

The TOTAL BUSY value in the CPU UTILIZATION portion of the Global Summary screen represents the percentage of time the CPU was busy (not idle) during the current (nn.n) and elapsed intervals ([nn]). The TOTAL BUSY value is the sum of the values reported for User, Real, Nice, NNice, Sys, Intr, C SW, Trap, and Mem values reported in the same area of the Global Summary screen.

✔ ***Performance Tip***

When the TOTAL BUSY value is consistently greater than 75 or 80 percent and the majority of this resource is consumed by high-priority interactive user processing, it is possible that the CPU is a bottleneck on your system. It is important to observe this data over time and not base your diagnosis on a brief spike in CPU activity.

If the TOTAL BUSY value is excessive due to batch job activity, there is usually ample CPU capacity for interactive users. To confirm your diagnosis, investigate the average length of the CPU queue (see "RunQ Avg" on page 93).

User

The User value in the CPU UTILIZATION portion of the Global Summary screen represents the percentage of time the CPU spent executing user code with a nice value of 20 and without any special priority status.

✔ ***Performance Tip***

It is usually advantageous to allow the majority of CPU time to be spent processing user code (including real- and nice-level code). To get a feel for the relative impact of productive or nonproductive work, monitor the Capture Ratio value (see "Capture Ratio" on page 93).

Sys

The Sys value in the CPU UTILIZATION portion of the Global Summary screen represents the percentage of time the CPU spent in system (kernel) mode.

✔ ***Performance Tip***

All processes spend some time executing system code. A large Sys value may indicate a problem with programs making unnecessary or inefficient system calls. You may want to identify all system processes and sort them by CPU usage to see which process(es) is (are) causing the problem.

Wait

The Wait value represents the amount of idle time the CPU was waiting for a disk I/O to complete.

Idle

The Idle value represents the percentage of time the CPU was not in use.

✔ ***Performance Tip***

A consistently high Idle value means your CPU is "on vacation" most of the time. Although it is not desirable to swamp the processor, it should "earn its keep" by performing at or near capacity.

If the Idle value is consistently low and the lack of idle time is primarily due to session activity, the system may be overloaded. Either reduce such processing or obtain more CPU horsepower via an upgrade. It is best to observe entire days of idle time values. You may see plenty of idle time at noon, but no idle time between 3:00 and 4:00 P.M. Shifting workloads (batch scheduling, users work hours, etc.) will help bring this type of peak-period utilization down.

CPU MISC

The CPU MISC portion of the tabular Global Summary screen provides statistics to further analyze the condition of your system.

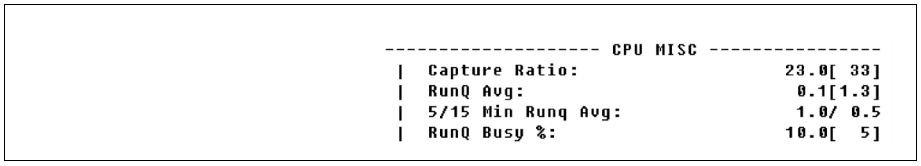


Figure 9.11 *SOS Global Summary screen: CPU MISC*

CPU MISC Data Items

The data items presented in the CPU MISC portion of the Global Summary screen are described in this section.

Capture Ratio

The Capture Ratio value is calculated as:

$$Capture\ Ratio = (User + Real + Nice + NNice) / (Sys + Intr + C\ SW + Trap + Vflt)$$

✔ ***Performance Tip***

A Capture Ratio value equal to one or greater indicates the system is spending more than half it's time on useful system work. A value of less than one means the system is spending more than half it's time on overhead.

RunQ Avg

The RunQ Avg value in the CPU MISC statistics represents the average number of processes present in the CPU run queue during the current interval. The value reported in brackets is the cumulative run queue average for the elapsed interval.

The RunQ Avg values reported in the Global Summary screen are similar to the system load average values retrieved by typing the **uptime** command at the Unix command prompt.

5/15 Min RunQ Avg

The 5/15 Min RunQ Avg values show the load average in the last five minutes and the last 15 minutes, respectively.

RunQ Busy%

The RunQ Busy% value represents the percentage of time that at least one process was waiting for the CPU. A high percentage is not uncommon, but 100 percent is not desirable.

MEM/VM

The MEM/VM statistics reported in the Global Summary screen provide a general overview of memory and virtual memory activities. To view specific memory statistics, refer to the Memory Summary screen. For further information, see "SOS Memory Summary" on page 107.

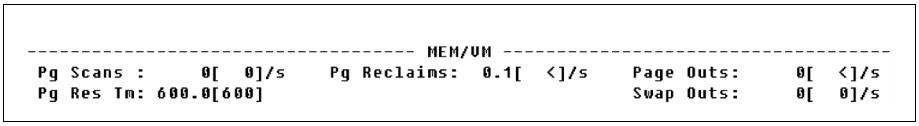


Figure 9.12 *Global Summary screen: MEM/VM*

MEM/VM Display Options

To display or suppress the MEM/VM statistics in the Global Summary screen, enable/disable the Display memory information on global screen option from the SOS Main Options Menu screen.

MEM/VM Data Items

The data items presented in the MEM/VM portion of the Global Summary screen are described in this section.

Pg Scans

The Pg Scans value represents the number of pages scanned by the page scanner per second.

Pg Reclaims

The Pg Reclaims value represents the number of pages reclaimed per second.

Page Outs

The Page Outs value represents the number of page outs per second.

Pg Res Tm

The Pg Res Tm value represents the average page residence time in milliseconds. This is the average amount of time a page is able to reside in memory. The default Pg Res Tm value is 600.0, which means that pages are not being forced out of memory. Values less than 600.0 mean that pages are being forced from memory.

Swap Outs

The Swap Outs value represents the number of swap outs per second.

MISC

The MISC portion of the tabular Global Summary screen displays several miscellaneous data items such as the number of sessions, the number of processes, the number of I/Os in a wait state, and the average response time. These statistics provide a good overview of the system's general workload.

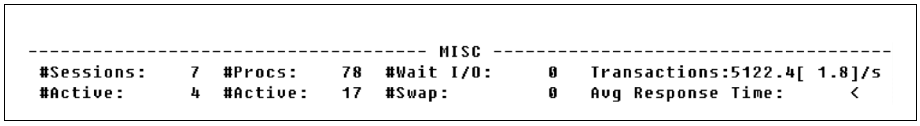


Figure 9.13 *SOS Global Summary screen: MISC*

MISC Display Options

To display or suppress the MISC statistics in the Global Summary screen, enable/disable the Display miscellaneous information on global screen option from the SOS Main Options Menu screen.

MISC Data Items

The data items presented in the MISC portion of the Global Summary screen are described in this section.

#Sessions

The #Sessions value represents the current number of sessions logged on the system.

#Active

The #Active value (displayed below the #Sessions value) represents the current number of active sessions (sessions that used at least 0.0 percent of CPU time).

#Procs

The #Procs value represents the current number of processes present on the system.

#Active

The #Active value (displayed below the #Procs value) represents the current number of active processes (processes that used at least 0.0 percent CPU).

#Wait I/O

The #Wait I/O value represents the current number of processes that waited on disk I/O.

#Swap

The #Swap value represents the current number of processes that were swapped.

Transactions

The Transactions value represents the number of transactions per second that occurred during the current interval. A transaction is defined as a character read or write, or a process death.

Avg Response Time

The Avg Response Time value in the MISC statistics portion of the tabular Global Summary screen represents the average response time for all terminals during the current interval.

Response time is a difficult number to obtain from the Unix operating system. It is defined (as calculated by SOS) as the average number of requests in the system (average number of processes) divided by throughput (the transaction rate).

$$\textit{Response Time} = \textit{Number of Requests} \times \textit{Throughput}$$

DISK

The DISK portion of the tabular Global Summary screen presents a few statistics for each configured disk drive on the system. This information can help answer:

- How balanced are the I/Os between disks?
- Is one disk accessed more than others?
- Is the number of disk I/Os exceeding acceptable limits?

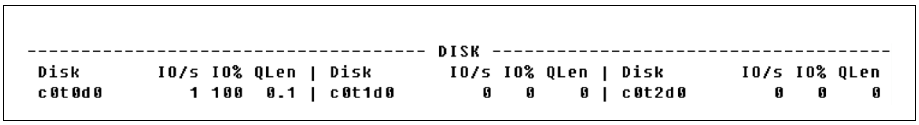


Figure 9.14 *SOS Global Summary screen: DISK*

DISK Display Options

To display or suppress the DISK statistics in the Global Summary screen, enable/disable the Display disk information on global screen option from the SOS Main Options Menu screen.

DISK Data Items

The data items presented in the DISK portion of the Global Summary screen are described in this section.

Disk

The Disk column lists the disk drive in the system's configuration.

IO/s

The IO/s value represents the number of physical disk reads and writes per second that occurred in the current interval.

IO%

The IO% value represents the percentage of disk I/Os performed by the disk compared to all other disks on the system.

QLen

The QLen value represents the average length of the disk's queue.

✔ ***Performance Tip***

An average queue length of 1.0 or greater is not a good sign. While a typical system may experience "rush hour" situations, it is the consistently long queues that are suspect. If the QLen value for a particular drive is consistently high, explore the following possible causes:

- Excessive disk arm movement due to heavily hit files. You might achieve better I/O balance by placing complementary files on separate drives.
- Database inefficiencies. Implement better database maintenance.
- Hardware issues. Upgrade slow disk drives.

SYSTEM PERFORMANCE ADVICE

The final portion of the Global Summary screen contains the SYSTEM PERFORMANCE ADVICE messages. These advice messages are designed to provide current performance information in plain-English "one-liners" in order to help system administrators zero-in on potential performance problems.

```
-------------------------- SYSTEM PERFORMANCE ADVICE ---------------------------
The CPU was used a total of 97.4 of its capacity during this interval     <CI01>
This interval's 'hog' process is (PID 6622) with 87.6% of the CPU          <PI01>
This interval's highest disk I/O user was (PID 3) with 57 I/O's            <PI02>
getattr percent indicates attribute cache problems on NFS client(s)        <NE02>
write percent high, consider solution to speed-up disk writes (ie. NVRAM) <NE04>
```

Figure 9.15 *SOS Global Summary screen: SYSTEM PERFORMANCE ADVICE*

At the end of each advice message is a four-character message identification code (for example, <CI01> or <ME01>). The identification code of any standard advice message can be referenced

in "SYSTEM PERFORMANCE ADVICE Message Interpretations" on page 98 to obtain a more detailed explanation of the ascribed event.

Two types of advice messages can be generated: informational and excessive.

- An informational message (denoted by an uppercase I in the message identification code) summarizes a particular aspect of the system's performance during the current interval.
- An excessive message (denoted by an uppercase E) alerts the user to an excessive condition—a situation or problem that could require immediate action.

To get more information about a situation described in an advice message, refer to the GLOBAL or PROCESS SUMMARY portions of the Global Summary screen.

SYSTEM PERFORMANCE ADVICE Display Options

To enable SYSTEM PERFORMANCE ADVICE messages, enter **Y** for the Display advice messages option in the SOS Main Options Menu screen.

By default, the SYSTEM PERFORMANCE ADVICE messages include both informational messages and excessive use messages. To suppress the informational messages, enter **N** for the Display informational advice messages option in the SOS Main Options Menu screen.

SYSTEM PERFORMANCE ADVICE Message Interpretations

RECOMMENDATION The standard SYSTEM PERFORMANCE ADVICE messages that are contained in the SOS advice file (described below) are generic. These messages should be customized for the system using the instructions found in "SOS advice File" on page 63.

```
<BE01> Buffer cache read hit percent low, increase %s
```

Advice message BE01 is generated to alert the user when the buffer cache read-hit percentage is equal to or less than 90 percent.

- If the number of virtual memory page outs for the current interval is equal to or greater than 5, the message will advise the user to increase memory.
- If the virtual memory page outs number is greater than 0 and less than 5, the message will advise the user to increase the buffer cache size.

```
<BE02> Buffer cache read write hit percent low, increase %s
```

Advice message BE02 is generated to alert the user when the buffer cache write-hit percentage is equal to or less than 65 percent.

- When the number of virtual memory page outs counted in the current interval is equal to or greater than 5, the message will advise the user to increase memory.
- When the virtual memory page outs number is greater than 0 and less than 5, the message will advise the user to increase the buffer cache size.

`<CE01> CPU Queue length indicates %s %s CPU bottleneck`

Advice message CE01 is generated to alert the user when the CPU queue length for the current interval is equal to or greater than 5 processes.

- A CPU queue length equal to or greater than 5 and less than 10 during the current interval is HEAVY.
- A CPU queue length equal to or greater than 10 is EXCESSIVE.

`<CI01> The CPU was used a total of %s of its capacity during this interval`

Advice message CI01 is always generated to inform the user of the CPU busy percentage for the current interval.

`<DE01> Average disk service time indicates possible disk bottleneck`

Advice message DE01 is generated to alert the user when the average disk service time for the current interval is equal to or greater than 30 milliseconds, which can indicate a disk bottleneck.

`<GE01> Global average response time during this interval was %s`

Advice message GE01 is generated to alert the user when the global average response time for the current interval is equal to or greater than 10 milliseconds.

- A global average response time in the range of 10-14 ms is moderate.
- A global average response time in the range of 15-19 ms is HEAVY.
- A global average response time equal to or greater than 20 ms is EXCESSIVE.

`<LE01> Collision percent indicates %s %s network bottleneck`

Advice message LE01 is generated to alert the user when the collision percentage for the current interval is equal to or greater than 5 percent, which indicates a possible network bottleneck.

- A collision percentage in the range of 5-14 percent is moderate.
- A collision percentage in the range of 15-29 percent is HEAVY.
- A collision percentage equal to or greater than 30 percent is EXCESSIVE.

`<ME01> Page out rate reveals %s %s memory load`

Advice message ME01 is generated to alert the user when the virtual memory page out rate for the current interval is in the range of 10-50 page outs per second.

- A virtual memory page out rate in the range of 10-14 is moderate.
- A virtual memory page out rate in the range of 15-19 is HEAVY.
- A virtual memory page out rate equal to or greater than 20 is EXCESSIVE.

`<ME02> CPU consumption due to memory mgt overhead during this interval was %s`

Advice message ME02 is generated to alert the user when the page fault percentage for the current interval is equal to or greater than 10 percent.

- A page fault percentage of 3-4 percent is moderate.
- A page fault percentage of 5-6 is HEAVY.
- A page fault percentage equal to or greater than 7 is EXCESSIVE.

```
<PI01> This interval's 'hog' process is %s with %s%% of the CPU
```

Advice message PI01 is always generated to inform the user of the current interval's largest CPU consumer. The message provides the process PID number and the process's CPU busy percentage.

```
<PI02> This interval's highest disk I/O user was %s with %s I/Os
```

Advice message PI02 is generated to inform the user of the current interval's largest disk I/O user. The message provides the disk PID number and the disk I/O percentage.

SYSTEM PERFORMANCE ADVICE Message Configuration

The SYSTEM PERFORMANCE ADVICE messages are located in the SOS advice configuration file. This file can be edited by the user to add custom advice messages. For example, adding a message to alert personnel when the average system utilization exceeds 90 percent can be accomplished by following the instructions presented in "SOS advice File" on page 63.

10

SOS CPU SUMMARY

The CPU Summary Screen

The CPU Summary screen reports the general state of one or more CPUs in graphical and tabular formats.

To access the CPU Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **c** (CPU Summary). The CPU Summary screen will display.
3. Type **t** to toggle between the graphical and tabular displays.

Examples of the CPU Summary screen are provided in “Graphical Format” on page 102 (next page) and “Tabular Format” on page 103.

CPU Summary Display Items

Graphical Format

The graphical CPU Summary screen contains a horizontal bar graph of the CPU utilization statistics for each CPU on the system. Figure 10.1 shows an example of the screen.

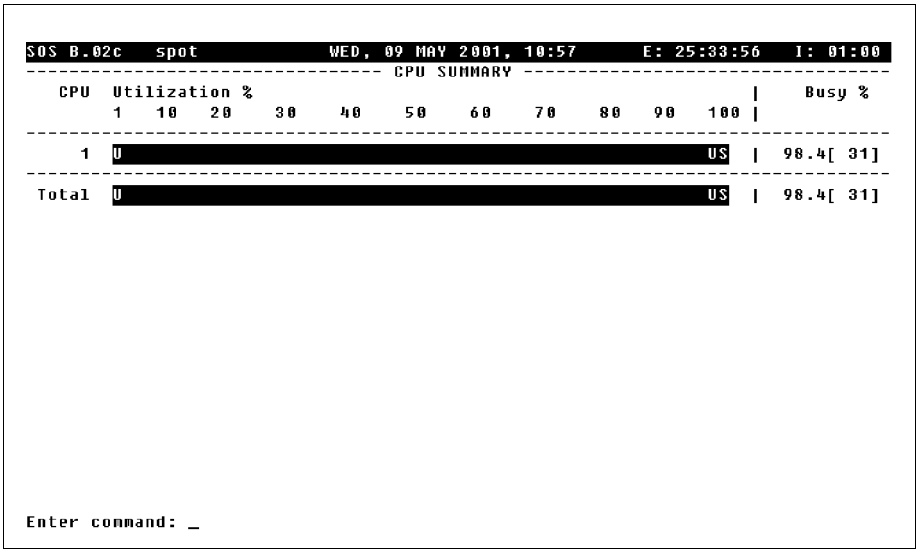


Figure 10.1 *SOS CPU Summary screen (graphical format)*

CPU SUMMARY

Each CPU SUMMARY data item is described in the next table.

Table 10.1 *SOS CPU SUMMARY (graphical format) data items*

Data Item	Description
CPU	The CPU column contains the sequential identification numbers assigned to the individual CPUs by SOS. For example, if the system uses four processors, the graphical CPU summary would include four lines in the bar graph, and these lines would be numbered 1 through 4 in the CPU column.

Data Item	Description
Utilization%	The Utilization% values provided in the CPU SUMMARY bar graph represent the percentage of CPU time expended during the current measurement interval on various activities. The CPU Utilization% data in the CPU Summary screen is reported exactly like the CPU% data in the Global Summary screen. For a description of each possible CPU activity, refer to “CPU%” on page 82.
Busy%	The Busy% value shown on the right portion of the CPU SUMMARY represents the total percentage of time the CPU was busy (not idle) during the current (nnn.n) and elapsed ([nnn]) intervals (if applicable).
Total	The Total value represents the average utilization percentage of all CPUs during the current interval.

Tabular Format

The tabular CPU Summary screen contains CPU utilization information organized into four categories:

- Total CPU utilization statistics (CPU SUMMARY).
- CPU Run queue statistics (RUNQ STATISTICS).
- Miscellaneous CPU statistics (MISC STATISTICS).
- CPU utilization statistics for each CPU on the system (PER CPU UTILIZATION).

Figure 10.2 shows an example of the CPU Summary screen in tabular format.

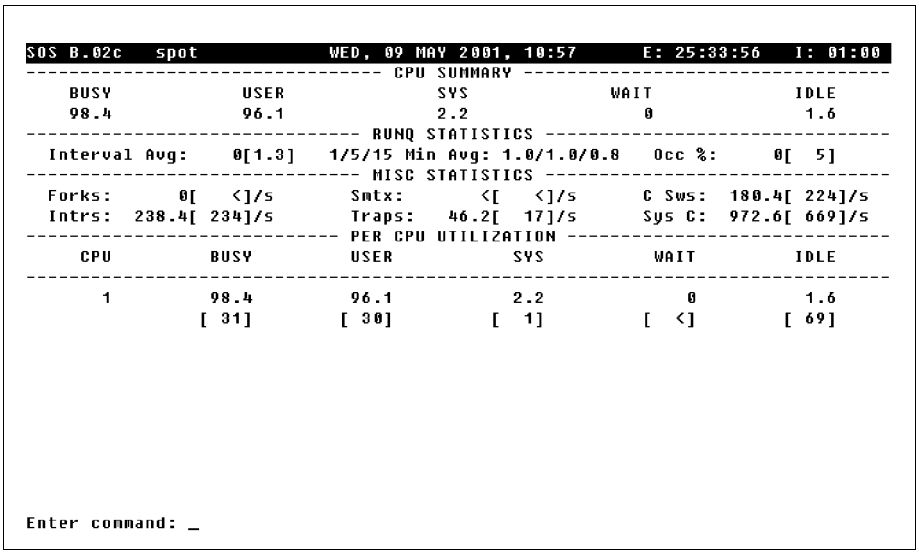


Figure 10.2 *SOS CPU Summary screen (tabular format)*

CPU SUMMARY

The CPU SUMMARY portion of the tabular CPU Summary screen displays the average percentage of CPU time expended on various activities during the current interval. Cumulative averages for the elapsed interval can also be displayed. For instructions, refer to "Display cumulative stats" on page 37. Each data item is described in the following table.

Table 10.2 *SOS CPU SUMMARY (tabular format) data items*

Data Item	Description
BUSY	The total percentage of time the CPU was busy.
USER	The percentage of time the CPU spent executing user program code with a nice value of 20 and without any special priority.
SYS	The percentage of time the CPU spent executing system calls and code (in kernel mode). This value does not include time spent performing context switches or idle time.
WAIT	The percentage of idle time the CPU was waiting for a disk I/O to complete.
IDLE	The percentage of time the CPU was not in use.

RUNQ STATISTICS

The RUNQ STATISTICS portion of the tabular CPU Summary screen contains the CPU run queue statistics for the current interval (and the elapsed interval if cumulative statistics are shown). Each data item is described in the following table.

Table 10.3 *SOS RUNQ STATISTICS data items*

Data Item	Description
Internal Avg	The average number of processes in the run queue.
1/5/15 Min Avg	The average number of processes in the run queue during the current 1-, 5-, and 15-minute periods, respectively.
Occ %	The percentage of time there was one or more processes in the run queue.

MISC STATISTICS

The MISC STATISTICS portion of the tabular CPU Summary screen provides some miscellaneous CPU statistics for the current and /or elapsed interval(s). Each data item is described in the next table.

Table 10.4 *SOS MISC STATISTICS data items*

Data Item	Description
Forks	The number of forks per second.
Smtx	The number of CPU mutual exclusion locks per second. ***✔Performance Tip*** CPU mutual exclusion locks are used to limit access to certain kernel structures to one CPU at a time. An excessive rate could indicate the need for faster CPUs. More CPUs will make the problem worse.
C Sws	The number of context switches per second that occurred in the interval.
Intrs	The number of interrupts per second.
Traps	The number of traps per second.
Sys C	The number of system calls per second.

PER CPU UTILIZATION

The PER CPU UTILIZATION portion of the tabular CPU Summary screen displays the same data listed in the CPU SUMMARY portion of the screen for each CPU on the system. Please refer to "CPU SUMMARY" on page 104 for a description of each data item.

11

SOS MEMORY SUMMARY

The Memory Summary Screen

The Memory Summary screen provides a detailed look at memory and virtual memory performance.

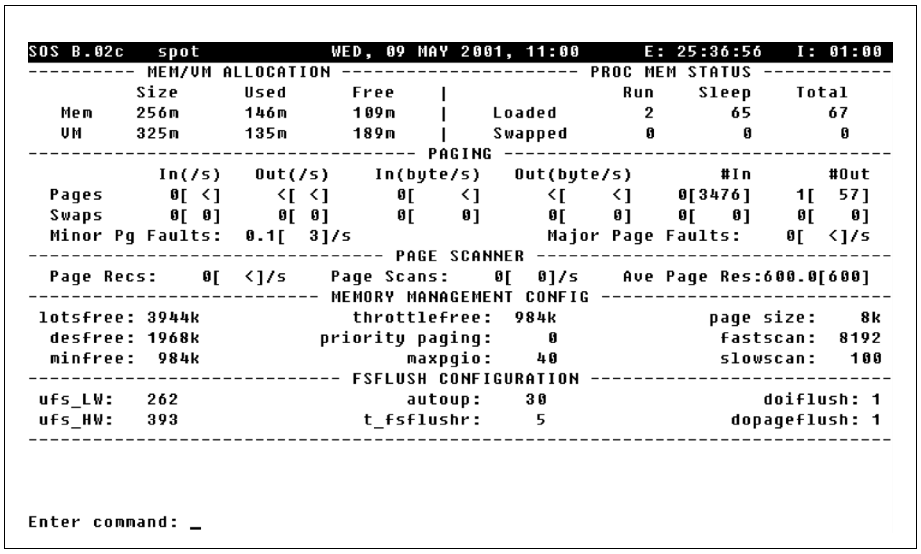


Figure 11.1 *SOS Memory Summary screen*

To access the Memory Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **m** (Memory Summary). The Memory Summary screen will display. Figure 11.1 shows an example of the screen.

Memory Summary Screen Display Items

MEM/VM ALLOCATION

The MEM/VM ALLOCATION portion of the Memory Summary screen shows how RAM and virtual memory are allocated on the system. The data items are described in the following table.

Table 11.1 *SOS MEM/VM ALLOCATION data items*

Data Item	Statistics	Description
Mem	Size	The amount of RAM (MB) installed on the system.
	Used	The amount of RAM (MB) used during the interval.
	Free	The amount of RAM (MB) free (unused) on the system.
VM	Size	The amount of virtual memory (MB) enabled on the system.
	Used	The amount of virtual memory (MB) used during the interval.
	Free	The amount of virtual memory (MB) free (unused) on the system.

PROC MEM STATUS

The PROC MEM STATUS portion of the Memory Summary screen shows where processes are currently located from a memory viewpoint. Each data item is described in the next table.

Table 11.2 *SOS PROC MEM STATUS data items*

Data Item	Description
Run	The number of swapped processes that are ready to run. In other words, the length of the CPU run queue.
Sleep	The number of processes that are sleeping.
Total	The total number of processes swapped during the interval.

PAGING

The PAGING portion of the Memory Summary screen displays detailed statistics on paging activity for the interval. Each data item is described in the following table.

Table 11.3 *SOS PAGING data items*

Data Item	Description
In (/s)	The number of swaps in per second.
Out (/s)	The number of swaps out per second.
In (byte/s)	The number of bytes swapped in per second.
Out (byte/s)	The number of bytes swapped out per second.
#In	The number of swaps in.
#Out	The number of swaps out.

PAGE SCANNER

The PAGE SCANNER portion of the Memory Summary screen displays data the page scanning process for the interval. Each data item is described in Table 11.4.

Table 11.4 *SOS PAGE SCANNER data items*

Data Item	Description
Page Recs	The number of pages reclaimed per second.
Page Scans	The number of pages scanned by the page scanner per second.
Ave Page Res	The average page residence time in milliseconds. The Ave Page Res value the average amount of time a page is able to stay in memory. The default value is 600, which means that pages are not being forced from memory. Lower numbers indicate that pages are being forced out of memory.

MEMORY MANAGEMENT CONFIG

The MEMORY MANAGEMENT CONFIG portion of the Memory Summary screen displays the values of key memory management variables. Each data item is described in the following table.

Table 11.5 *SOS MEMORY MANAGEMENT CONFIG data items*

Data Item	Description
lotsfree	The upper bound for paging. Once paging has started, it will continue until free memory (refer to “MEM/VM ALLOCATION” on page 108) is larger than lotsfree.

Data Item	Description
desfree	The lower bound for paging. When free memory drops below desfree, paging begins.
minfree	The threshold at which the system considers itself to be out of memory. At this point, the system will start deactivating processes.
throttlefree	The threshold at which any process that attempts to get another page will be suspended until the amount of free memory exceeds desfree.
priority paging	The priority paging value is either 0 (zero) or 1. • If 0, priority paging is not enabled. • If 1, priority paging is enabled. Priority paging, when enabled, modifies the paging algorithm to page out data pages before text, heap, and stack.
maxpgio	The maximum number of page I/O operations per second that the system will schedule.
page size	The size of pages in bytes.
fastscan	The fastest scan rate in pages per second. This value corresponds to an empty free list.
slowscan	The initial scan rate in pages per second. The initial scan rate is measured when page scanning first starts.

12

SOS Disk I/O Summary

The Disk I/O Summary Screen

The Disk I/O Summary screen provides a summary of performance data for all disks on the system. This screen is available in graphical and tabular formats.

To access the Disk I/O Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **d** (Disk I/O Summary). The Disk I/O Summary screen will display.
3. Type **t** to toggle between the graphical and tabular displays.

Examples of the Disk I/O Summary screen are provided in “Graphical Format” on page 112 (next page) and “Disk I/O Summary Screen Display Items” on page 112.

Disk I/O Summary Screen Display Items

Graphical Format

Figure 12.1 shows an example of the Disk I/O Summary screen in graphical format.

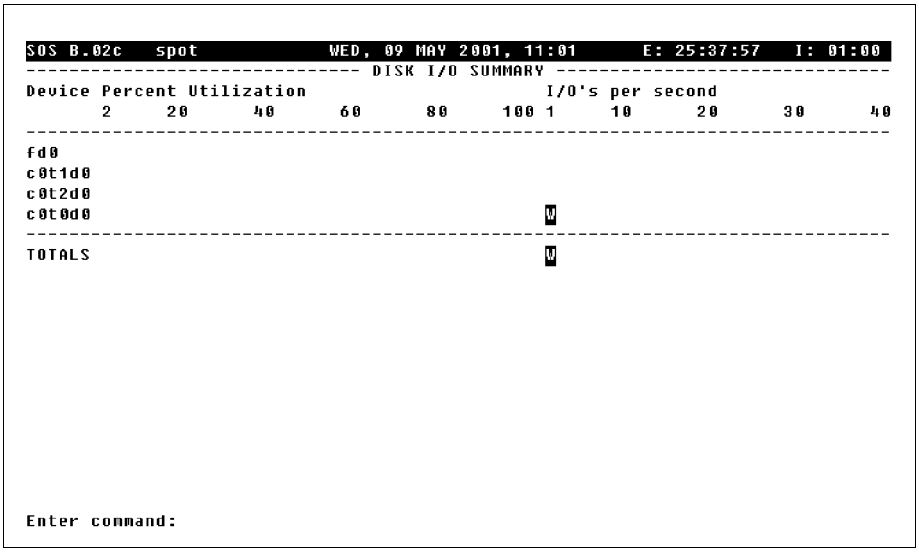


Figure 12.1 *SOS Disk I/O Summary screen (graphical format)*

DISK I/O SUMMARY (graphical format)

The DISK I/O SUMMARY data items are described in the following table.

Table 12.1 *SOS DISK I/O SUMMARY data items*

Data Item	Description
Device	The Device column in the left portion of the graphical DISK I/O SUMMARY lists each of the disk device identification numbers.
Percent Utilization	The Percent Utilization graph shows the percentage of time during the interval that the device was in use.

Data Item	Description
I/Os per second	The I/Os per second value in the graphical DISK I/O SUMMARY represents the number of physical disk I/Os on the disk per second. Similarly to the IO/s bar graph in the Global Summary screen, specific code letters in the bar graph tell you how many of each type of physical I/Os were accumulated in the current interval. The code letters are: • **R** represents the number of physical reads per second. • **W** represents the number of physical writes per second.
TOTALS	The TOTALS line shows the total utilization and disk I/Os per second for all disks.

The tabular Disk I/O Summary screen is discussed on page 113.

Tabular Format

Figure 12.2 shows an example of the Disk I/O Summary screen in tabular format.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:00      E: 25:36:56   I: 01:00
------------------------------ DISK I/O SUMMARY -------------------------------
                                 Wait       Service       Rates (/s)   Avg Size (kb)
Dev      I/O%   Qlen  Util%   Time(ms)   Time(ms)    Read  Write    Read    Write
-------------------------------------------------------------------------------
fd0         0      0      0          0          0       0      0       0        0
c0t1d0      0      0      0          0          0       0      0       0        0
c0t2d0      0      0      0          0          0       0      0       0        0
c0t0d0    100      <      <        8.7       14.1       0    0.4       0        7
-------------------------------------------------------------------------------
TOTALS    100      <      <        8.7       14.1       0    0.4       0        7









Enter command: _
```

Figure 12.2 *SOS Disk I/O Summary screen (tabular format)*

DISK I/O SUMMARY (tabular format)

The data items in the DISK I/O SUMMARY portion of the Disk I/O Summary screen are described in the following table.

Table 12.2 *SOS DISK I/O SUMMARY data items*

Data Item	Description
Dev	The device identification number for each disk on the system.
I/O%	The percentage of all disk I/Os on the system performed by each disk during the interval.
Qlen	The average number of disk requests waiting to be serviced by each disk.
Util%	The percentage of time each disk was in use during the interval.
Wait Time (ms)	The average number of milliseconds an I/O request had to wait in the disk queue before being serviced for each disk.
Service Time (ms)	The average number of milliseconds an I/O request takes to be serviced once it is removed from the disk queue and processed.
Read Rate (/s)	The number of physical reads from the disk per second.
Write Rate (/s)	The number of physical writes from the disk per second.
Avg Size (kb) Read	The average size of the physical reads from the disk.
Avg Size (kb) Write	The average size of the physical writes from the disk.
TOTALS	The totals for each column in the tabular DISK I/O SUMMARY.

13

SOS DISK CONTROLLER I/O SUMMARY

The Disk Controller I/O Summary Screen

The Disk Controller I/O Summary screen displays a tabular summary of I/O activity for each disk controller on the system.

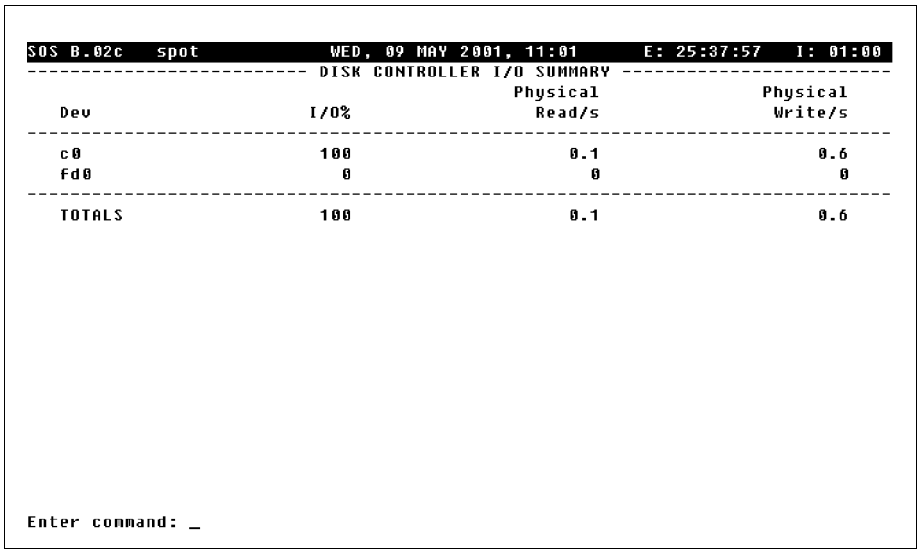


Figure 13.1 *SOS Disk Controller I/O Summary screen*

To access the Disk Controller I/O Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **r** (Disk Controller I/O Summary). The Disk Controller I/O Summary screen will display (refer to Figure 13.1).

Disk Controller I/O Summary Screen Display Items

DISK CONTROLLER I/O SUMMARY

The data items in the Disk I/O Summary screen are described in the following table.

Table 13.1 *SOS DISK CONTROLLER I/O SUMMARY data items*

Data Item	Description
Dev	The device identification number for each disk controller on the system.
I/O%	The percentage of all disk I/Os on the system performed by each disk controller during the interval.
Physical Read/s	The number of physical reads per second performed by each disk controller during the interval.
Physical Write/s	The number of physical writes per second performed by each disk controller during the interval.
TOTALS	Sums up the activities of all disk controllers for the interval.

14

SOS File System I/O Summary

The File System I/O Summary Screen

The File System I/O Summary screen displays a tabular summary of I/O activity for each file system on the system.

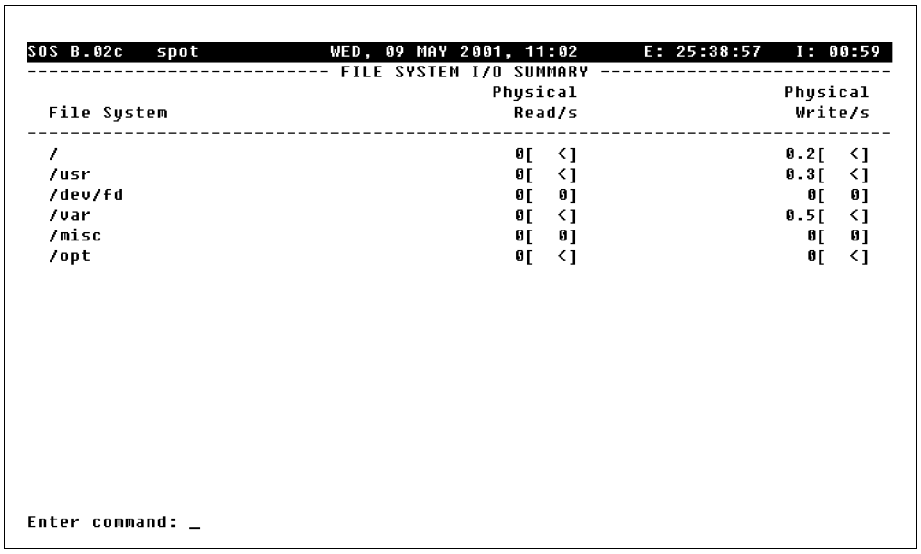


Figure 14.1 *SOS File System I/O Summary screen*

To access the File System I/O Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **f** (File System I/O Summary). The File System I/O Summary screen will display. Figure 14.1 shows an example of the screen.

File System I/O Summary Screen Display Items

FILE SYSTEM I/O SUMMARY

The data items presented in the File System I/O Summary screen are described in the following table.

Table 14.1 *SOS FILE SYSTEM I/O SUMMARY data items*

Data Item	Description
File System	The mount points from the file system.
Physical Read/s	The number of physical reads from the file system per second.
Physical Write/s	The number of physical writes from the file system per second.

15

SOS File System Space Summary

The File System Space Summary Screen

The File System Space Summary screen displays file system space information for each file system.

```
SOS B.02c   spot              WED, 09 MAY 2001, 11:02      E: 25:38:57   I: 00:59
--------------------------- FILE SYSTEM SPACE SUMMARY --------------------------
                      Block Frag                                    Total   Free
File System           Size/Size    Size    Free  Free(su)  Used%  Inodes  Inodes
--------------------------------------------------------------------------------
/                     8192/1024   78039   44616     52419     33   39424   37882
/usr                  8192/1024  518943   88527    140421     73  265216  234224
/proc                  512/ 512       0       0         0      0    3948    3879
/dev/fd               1024/1024       0       0         0      0      66       0
/var                  8192/1024  576656  446531    504196     13  293888  291440
/misc                 8192/1024   1193m   1134m     1193m      0  311808  311804
/opt                  8192/1024   1452m  907991    967475     35  378624  368396
/tmp                  8192/8192  193592  192184    192184      1   41732   41706









Enter command:
```

Figure 15.1 *SOS File System Space Summary screen*

To access the File System Space Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **s** (File System Space Summary). The File System Space Summary screen will display. Figure 15.1 shows an example of the screen.

File System Space Summary Screen Display Items

FILE SYSTEM SPACE SUMMARY

The data items in the File System Space Summary screen are described in the following table.

Table 15.1 *SOS FILE SYSTEM SPACE SUMMARY data items*

Data Item	Description
File System	The mount points from the file system.
Block Size	The file system block size in bytes.
Free	The number of file space kilobytes available to non-super users.
Free (su)	The number of file space kilobytes available to super users.
Used%	The percentage of the file system currently being used. This value is based on the Free (su) value.
Total Inodes	The total number of inodes on the file system.
Free Inodes	The number of free inodes on the file system.

16

SOS NETWORK SUMMARY

The Network Summary Screen

The Network Summary screen displays network performance information.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:03      E: 25:38:57   I: 00:59
------------------------------ NETWORK SUMMARY ------------------------------
  Protocol          Packets In/s    Packets Out/s      Errors In%      Errors Out%
-----------------------------------------------------------------------------
  IP                  0.7[    1]      0.4[    1]        0[    0]        0[    0]
  TCP/IP              1.3[    1]      0.9[    <]        0[    0]        0[ 0.03]
  ICMP                  0[    0]        0[    0]        0[    0]        0[    0]
  UDP                 0.2[    <]      0.1[    <]        0[    0]      N/A[  N/A]
---------------------------- NETWORK INTERFACES -----------------------------
 Interf    Packets In/s  Packets Out/s  Defer%   Coll%  Err In%  Err Out%  Nocan
    lo0      0.9[    0]     0.9[    0]       0       0        0         0      0
   hme0      1.1[    1]     0.5[    1]       0       0        0         0      0
-----------------------------------------------------------------------------
 TOTALS      2.0[    2]     1.5[    1]       0       0        0         0      0




Enter command: _
```

Figure 16.1 *SOS Network Summary screen*

To access the Network Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **l** (Network Summary). The Network Summary screen will display. Figure 16.1 shows an example of the screen.

Network Summary Screen Display Items

NETWORK SUMMARY

The NETWORK SUMMARY portion of the screen displays the network traffic information from the perspective of each protocol. Each data item is described in the next table.

Table 16.1 *SOS NETWORK SUMMARY data items*

Data Item	Description
Protocol	The network protocols used for communication between systems.
Packets In/s	The number of packets received per second. (The value in brackets is cumulative.)
Packets Out/s	The number of packets sent per second.
Errors In%	The percentage of packets read during the interval that resulted in error.
Errors Out%	The percentage of packets written during the interval that resulted in error.

NETWORK INTERFACES

The NETWORK INTERFACES portion of the Network Summary screen displays performance information on a per-network-interface basis. Each data item is described in Table 16.2.

Table 16.2 *SOS NETWORK INTERFACES data items*

Data Item	Description
Interf	The names of the network interfaces.
Packets In/s	The number of packets received per second for the specific interface. (The value in brackets is cumulative.)
Packets Out/s	The number of packets sent per second for the specific interface.
Defer%	The percentage of output packets deferred during the interval. A packet is deferred when the LAN card is too busy with other incoming and outgoing packets.

Data Item	Description
Coll%	The percentage of output packets sent that resulted in a collision. A network collision occurs when the system sends a packet at the same time as another system. When collisions occur, the system dispatching them waits a random amount of time to retransmit the packet. Excessive collision percentages indicate a network bottleneck.
Err In%	The percentage of packets read during the interval that resulted in error.
Err Out%	The percentage of packets written during the interval that resulted in error.
Nocan	The count of incoming packets that were dropped per second.
TOTALS	The TOTALS line provides data values from a system-wide perspective.

17

SOS NFS SUMMARY

The NFS Summary Screen

The NFS Summary screen displays information about the network file system (NFS). A system can be a server (a system that provides its local disks to other systems), a client (a system that uses non-local disks), or both. An example of the NFS CLIENT SUMMARY display is shown in Figure 17.1.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:03      E: 25:39:57   I: 01:00
------------------------------ NFS CLIENT SUMMARY ------------------------------
                                Bad NFS Calls     <
--------------------------------- NFS V2 PERCENT ---------------------------------
NULL       0 GTATTR     0 STATTR     0 ROOT       0 LOOKUP     0 RDLINK     0
READ       0 WCACHE     0 WRITE      0 CREATE     0 REMOVE     0 RENAME     0
LINK       0 SLINK      0 MKDIR      0 RMDIR      0 RDDIR      0 STATFS     0
--------------------------------- NFS V3 PERCENT ---------------------------------
NULL       0 GTATTR     0 STATTR     0 LOOKUP     0 ACCESS     0 RDLINK     0
READ       0 WRITE      0 CREATE     0 MKDIR      0 SLINK      0 MKNOD      0
REMOVE     0 RMDIR      0 RENAME     0 LINK       0 RDDIR      0 RDDIRP     0
FSSTAT     0 FSINFO     0 PCONF      0 COMMIT     0
------------------------------------ RPC -------------------------------------
 Calls     0   Bad Calls     0   Retrans     0   Timeouts     0   Badxids     0
--------------------------------- NFS SERVERS ---------------------------------
                         No Resp  Rd Rate  Wr Rate   Wt Time  Srv Time  Avg QLen
-------------------------------------------------------------------------------
condor                   0[   0]        0        0         0         0         0
lynx                     0[   0]        0        0         0         0         0



Enter command: _
```

Figure 17.1 *SOS NFS Summary screen: NFS CLIENT SUMMARY*

To access the NFS Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **n** (NFS Summary). The NFS Summary screen will display.

Additional Command Keys for the NFS Summary Screen

In addition to the command keys listed in the Main Commands screen, the following commands keys can be used to modify the display of the NFS Summary screen:

- The x command key can be used to toggle between NFS call rates and NFS call percentages. The section headings indicate which data is shown.
- The c command key can be used to toggle between NFS client data and NFS server data. The screen title indicates which data is displayed.

NFS Client Summary Screen Display Items

The NFS CLIENT SUMMARY data items are described in this section. The data items for the NFS SERVER SUMMARY are described in the next section, "NFS Server Summary Screen Display Items" on page 131.

NFS CLIENT SUMMARY

The NFS CLIENT SUMMARY portion of the NFS Summary screen provides bad NFS call information associated with the NFS client.

Bad NFS Calls

The Bad NFS Calls data item represents:

- The number of bad NFS calls accumulated during the current interval, when the screen is set to display NFS call rates (see "Additional Command Keys for the NFS Summary Screen" on page 126).
- The percentage of NFS calls that are bad NFS calls, when the screen is displaying NFS call percentages.

NFS V2 RATE or PERCENT

The NFS V2 RATE/PERCENT portion of the NFS CLIENT SUMMARY provides rate and percentage information for the NFS V2 calls. To toggle between rates and percentage displays, type the x command key. Each data item is defined in the next table.

Table 17.1 *SOS (Client) NFS V2 RATE and PERCENT data items*

Data Item	RATE Definition	PERCENT Definition
NULL	The number of null calls per second.	The percentage of all NFS V2 calls that are null calls.
GTATTR	The number of getattr calls per second.	The percentage of all NFS V2 calls that are getattr calls.

Data Item	RATE Definition	PERCENT Definition
SETATTR	The number of setattr calls per second.	The percentage of all NFS V2 calls that are setattr calls.
ROOT	The number of root calls per second.	The percentage of all NFS V2 calls that are root calls.
LOOKUP	The number of lookup calls per second.	The percentage of all NFS V2 calls that are lookup calls.
RDLINK	The number of readlink calls per second.	The percentage of all NFS V2 calls that are readlink calls.
READ	The number of read calls per second.	The percentage of all NFS V2 calls that are read calls.
WCACHE	The number of writecache calls per second.	The percentage of all NFS V2 calls that are writecache calls.
WRITE	The number of write calls per second.	The percentage of all NFS V2 calls that are write calls.
CREATE	The number of create calls per second.	The percentage of all NFS V2 calls that are create calls.
REMOVE	The number of remove calls per second.	The percentage of all NFS V2 calls that are remove calls.
LINK	The number of link calls per second.	The percentage of all NFS V2 calls that are link calls.
SLINK	The number of symlink calls per second.	The percentage of all NFS V2 calls that are symlink calls.
MKDIR	The number of mkdir calls per second.	The percentage of all NFS V2 calls that are mkdir calls.
RMDIR	The number of rmdir calls per second.	The percentage of all NFS V2 calls that are rmdir calls.
RDDIR	The number of readdir calls per second.	The percentage of all NFS V2 calls that are readdir calls.
STATFS	The number of statfs calls per second.	The percentage of all NFS V2 calls that are statfs calls.

NFS V3 RATE or PERCENT

The NFS V3 PERCENT portion of the NFS CLIENT SUMMARY provides rate and percentage information for the NFS V3 calls. Each data item is defined in Table 17.2.

Table 17.2 *SOS (Client) NFS V3 RATE and PERCENT data items*

Data Item	RATE Definition	PERCENT Definition
NULL	The number of null calls per second.	The percentage of all NFS V3 calls that are null calls.
GTATTR	The number of getattr calls per second.	The percentage of all NFS V3 calls that are getattr calls.
STATTR	The number of setattr calls per second.	The percentage of all NFS V3 calls that are setattr calls.
LOOKUP	The number of lookup calls per second.	The percentage of all NFS V3 calls that are lookup calls.
ACCESS	The number of access calls per second.	The percentage of all NFS V3 calls that are access calls.
RDLINK	The number of readlink calls per second.	The percentage of all NFS V3 calls that are readlink calls.
READ	The number of read calls per second.	The percentage of all NFS V3 calls that are read calls.
WRITE	The number of write calls per second.	The percentage of all NFS V3 calls that are write calls.
CREATE	The number of create calls per second.	The percentage of all NFS V3 calls that are create calls.
MKDIR	The number of mkdir calls per second.	The percentage of all NFS V3 calls that are mkdir calls.
SLINK	The number of symlink calls per second.	The percentage of all NFS V3 calls that are symlink calls.
MKNOD	The number of mknod calls per second.	The percentage of all NFS V3 calls that are mknod calls.
REMOVE	The number of remove calls per second.	The percentage of all NFS V3 calls that are remove calls.
RMDIR	The number of rmdir calls per second.	The percentage of all NFS V3 calls that are rmdir calls.

Data Item	RATE Definition	PERCENT Definition
RENAME	The number of rename calls per second.	The percentage of all NFS V3 calls that are rename calls.
LINK	The number of link calls per second.	The percentage of all NFS V3 calls that are link calls.
RDDIR	The number of readdir calls per second.	The percentage of all NFS V3 calls that are readdir calls.
RDDIRP	The number of readdirplus calls per second.	The percentage of all NFS V3 calls that are readdirplus calls.
FSSTAT	The number of fsstat calls per second.	The percentage of all NFS V3 calls that are fsstat calls.
FSINFO	The number of fsinfo calls per second.	The percentage of all NFS V3 calls that are fsinfo calls.
PCONF	The number of pathconf calls per second.	The percentage of all NFS V3 calls that are pathconf calls.
COMMIT	The number of commit calls per second.	The percentage of all NFS V3 calls that are commit calls.

RPC

The RPC portion of the NFS CLIENT SUMMARY provides remote procedure call (RPC) information. Each RPC data item is described in the following table.

Table 17.3 *SOS (Client) RPC data items*

Data Item	Description
Calls	The number of client RPC calls made per second.
Bad Calls	The number per second of client RPC calls that returned with an error. This number includes time-outs and interruptions.
Retrans	The number per second of client RPC calls that were retransmitted. A call is retransmitted when no response is received from the server within the time-out period.
Timeouts	The number of RPC calls that timed-out per second. This number includes all retransmissions and timeouts that are counted as bad calls (with no retransmission).

Data Item	Description
Badxids	The number of duplicate requests per second. A badxid is defined in SOS as a duplicate transmission. Every outgoing NFS request is assigned a unique sequential identifier. Requests are retransmitted if the server does not respond within a set time-out period. When the server eventually does respond, it is possible for the client to respond to the same request multiple times. Each duplicate transmission is counted as a badxid. Badxids are an indication that the server is not responding quickly enough.

NFS SERVERS

The following data is provided for each NFS server in the NFS CLIENT SUMMARY. Each NFS SERVER data item is described in the following table.

Table 17.4 *SOS (Client) NFS SERVER data items*

Data Item	Description
No Resp	The number of major timeouts incurred by NFS servers per second. (A major time-out will not result in a retransmission.)
Rd Rate	The number of read requests per second.
Wr Rate	The number of write requests per second.
Wt Time	The average number of milliseconds consumed while a request waited in the outgoing requests queue before processing.
Srv Time	The average number of milliseconds taken to process an NFS request.
Avg QLen	The average number of client requests waiting for server response.

The NFS SERVER SUMMARY is discussed on page 131.

NFS Server Summary Screen Display Items

An example of the NFS SERVER SUMMARY screen display is shown in Figure 17.2.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:04      E: 25:40:57   I: 01:00
------------------------------ NFS SERVER SUMMARY ------------------------------
                                Bad NFS Calls     0
-------------------------------- NFS V2 PERCENT --------------------------------
NULL        0 GTATTR      0 STATTR      0 ROOT        0 LOOKUP      0 RDLINK      0
READ        0 WCACHE      0 WRITE       0 CREATE      0 REMOVE      0 RENAME      0
LINK        0 SLINK       0 MKDIR       0 RMDIR       0 RDDIR       0 STATFS      0
-------------------------------- NFS V3 PERCENT --------------------------------
NULL        0 GTATTR      0 STATTR      0 LOOKUP      0 ACCESS      0 RDLINK      0
READ        0 WRITE       0 CREATE      0 MKDIR       0 SLINK       0 MKNOD       0
REMOVE      0 RMDIR       0 RENAME      0 LINK        0 RDDIR       0 RDDIRP      0
FSSTAT      0 FSINFO      0 PCONF       0 COMMIT      0
------------------------------------ RPC -------------------------------------
 Calls      0                                                 Bad Calls      0




Enter command: _
```

Figure 17.2 *SOS NFS Summary screen: NFS SERVER SUMMARY*

NFS SERVER SUMMARY

The NFS SERVER SUMMARY portion of the NFS Summary screen provides bad NFS call information.

Bad NFS Calls

The Bad NFS Calls data item represents:

- The number of bad NFS calls accumulated during the current interval.
- The percentage of NFS calls that are bad NFS calls.

NFS V2 RATE or PERCENT

The NFS V2 RATE/PERCENT portion of the NFS SERVER SUMMARY provides rate and percentage information for the NFS V2 calls. To toggle between rates and percentage displays, type the x command key. Each data item is defined in Table 17.1.

Table 17.5 *SOS (Server) NFS V2 RATE and PERCENT data items*

Data Item	RATE Definition	PERCENT Definition
NULL	The number of null calls per second.	The percentage of all NFS V2 calls that are null calls.
GTATTR	The number of getattr calls per second.	The percentage of all NFS V2 calls that are getattr calls.
STATTR	The number of setattr calls per second.	The percentage of all NFS V2 calls that are setattr calls.
ROOT	The number of root calls per second.	The percentage of all NFS V2 calls that are root calls.
LOOKUP	The number of lookup calls per second.	The percentage of all NFS V2 calls that are lookup calls.
RDLINK	The number of readlink calls per second.	The percentage of all NFS V2 calls that are readlink calls.
READ	The number of read calls per second.	The percentage of all NFS V2 calls that are read calls.
WCACHE	The number of writecache calls per second.	The percentage of all NFS V2 calls that are writecache calls.
WRITE	The number of write calls per second.	The percentage of all NFS V2 calls that are write calls.
CREATE	The number of create calls per second.	The percentage of all NFS V2 calls that are create calls.
REMOVE	The number of remove calls per second.	The percentage of all NFS V2 calls that are remove calls.
LINK	The number of link calls per second.	The percentage of all NFS V2 calls that are link calls.
SLINK	The number of symlink calls per second.	The percentage of all NFS V2 calls that are symlink calls.
MKDIR	The number of mkdir calls per second.	The percentage of all NFS V2 calls that are mkdir calls.
RMDIR	The number of rmdir calls per second.	The percentage of all NFS V2 calls that are rmdir calls.
RDDIR	The number of readdir calls per second.	The percentage of all NFS V2 calls that are readdir calls.

Data Item	RATE Definition	PERCENT Definition
STATFS	The number of statfs calls per second.	The percentage of all NFS V2 calls that are statfs calls.

NFS V3 RATE or PERCENT

The NFS V3 PERCENT portion of the NFS SERVER SUMMARY provides rate and percentage information for the NFS V3 calls. Each data item is defined in Table 17.2.

Table 17.6 *SOS (Server) NFS V3 RATE and PERCENT data items*

Data Item	RATE Definition	PERCENT Definition
NULL	The number of null calls per second.	The percentage of all NFS V3 calls that are null calls.
GTATTR	The number of getattr calls per second.	The percentage of all NFS V3 calls that are getattr calls.
STATTR	The number of setattr calls per second.	The percentage of all NFS V3 calls that are setattr calls.
LOOKUP	The number of lookup calls per second.	The percentage of all NFS V3 calls that are lookup calls.
ACCESS	The number of access calls per second.	The percentage of all NFS V3 calls that are access calls.
RDLINK	The number of readlink calls per second.	The percentage of all NFS V3 calls that are readlink calls.
READ	The number of read calls per second.	The percentage of all NFS V3 calls that are read calls.
WRITE	The number of write calls per second.	The percentage of all NFS V3 calls that are write calls.
CREATE	The number of create calls per second.	The percentage of all NFS V3 calls that are create calls.
MKDIR	The number of mkdir calls per second.	The percentage of all NFS V3 calls that are mkdir calls.
SLINK	The number of symlink calls per second.	The percentage of all NFS V3 calls that are symlink calls.
MKNOD	The number of mknod calls per second.	The percentage of all NFS V3 calls that are mknod calls.

Data Item	RATE Definition	PERCENT Definition
REMOVE	The number of remove calls per second.	The percentage of all NFS V3 calls that are remove calls.
RMDIR	The number of rmdir calls per second.	The percentage of all NFS V3 calls that are rmdir calls.
RENAME	The number of rename calls per second.	The percentage of all NFS V3 calls that are rename calls.
LINK	The number of link calls per second.	The percentage of all NFS V3 calls that are link calls.
RDDIR	The number of readdir calls per second.	The percentage of all NFS V3 calls that are readdir calls.
RDDIRP	The number of readdirplus calls per second.	The percentage of all NFS V3 calls that are readdirplus calls.
FSSTAT	The number of fsstat calls per second.	The percentage of all NFS V3 calls that are fsstat calls.
FSINFO	The number of fsinfo calls per second.	The percentage of all NFS V3 calls that are fsinfo calls.
PCONF	The number of pathconf calls per second.	The percentage of all NFS V3 calls that are pathconf calls.
COMMIT	The number of commit calls per second.	The percentage of all NFS V3 calls that are commit calls.

RPC

The RPC portion of the NFS SERVER SUMMARY provides remote procedure call (RPC) information.Each RPC data item is described in the following table.

Table 17.7 *SOS (Server) RPC data items*

Data Item	Description
Calls	The number of server RPC calls made per second.
Bad Calls	The number per second of server RPC calls that returned with an error. This number includes time-outs and interruptions.

18

SOS SWAP SUMMARY

The Swap Summary Screen

The Swap Summary screen displays information on system swap space utilization. Swap space is used for paging and deactivating.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:36      E: 26:13:02   I: 01:00
---------------------------------- SWAP SUMMARY ----------------------------------
  Total:   332m      Used:   128m      Reserved:   135m      Available:   189m
------------------------------ PER SWAP UTILIZATION ------------------------------
Dev/Mount                      Type  Size(mb)   Used(mb)   Alloc(mb)   Free(mb)
--------------------------------------------------------------------------------
/dev/dsk/c0t0d0s3               DEV      147         84         N/A         63




Enter command: _
```

Figure 18.1 *SOS Swap Summary screen*

To access the Swap Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **w** (Swap Summary). The Swap Summary screen will display. Figure 18.1 shows an example of the screen.

Swap Summary Screen Display Items

SWAP SUMMARY

Table 18.1 *SOS SWAP SUMMARY data items*

Data Item	Description
Total	The total swap space (megabytes) configured for the system.
Used	The total amount of swap space (megabytes) used by all processes.
Reserved	The total amount of swap space (megabytes) reserved by all processes. When a process is created, it reserves enough space for itself to be completely paged-out in the swap space.
Available	The amount of swap space (megabytes) remaining that is not reserved.

PER SWAP UTILIZATION

The PER SWAP UTILIZATION portion of the Swap Summary screen displays information for each swap device and file system. Each data item is described in the next table.

Table 18.2 *SOS PER SWAP UTILIZATION data items*

Data Item	Description
Dev/Mount	The device file or mount point for swap device or file system swap, respectively. If it is a memory swap, "PSEUDO" will be displayed.
Type	The type of swap: • DEV = device swap • MEM = memory swap • FS = file system swap
Size (mb)	The amount of swap space (megabytes) configured for the device/ file system.
Used (mb)	The amount of swap space used in the device/file system.
Alloc (mb)	The amount of file system swap space (megabytes) allocated. This value is not applicable to device or memory swap.
Free (mb)	The amount of swap space (megabytes) currently not used. This value differs from the Available data. The Free value is the amount not actually used. The Available value is the amount not reserved.

19

SOS USER SUMMARY

The User Summary Screen

The User Summary screen displays information about resource usage on a per-user basis.

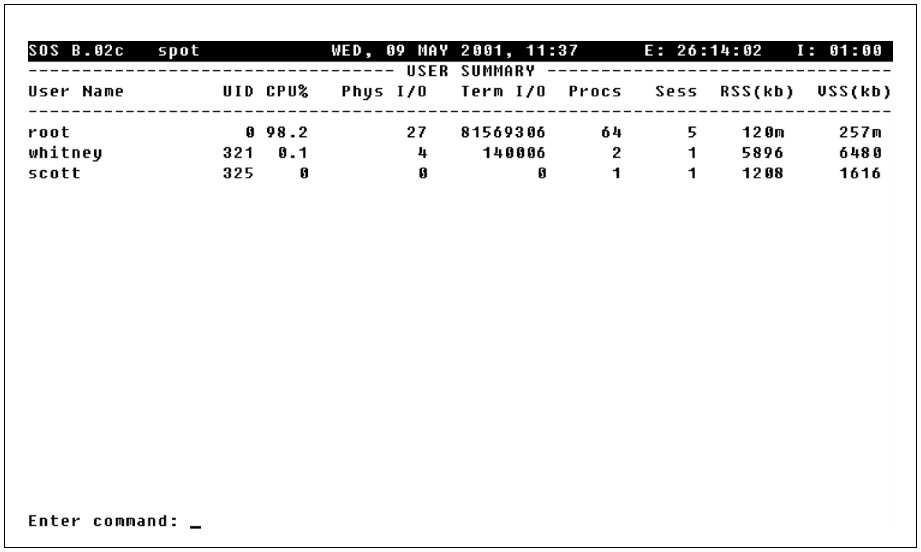


Figure 19.1 *SOS User Summary screen*

To access the User Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **u** (User Summary). The User Summary screen will display. An example of the screen is shown in Figure 19.1.

User Summary Screen Display Items

The data displayed in the User Summary screen is provided for each user on the system.

USER SUMMARY

Each data item presented in the USER SUMMARY is described in the following table.

Table 19.1 *SOS USER SUMMARY data items*

Data Item	Description
User Name	The name of the user.
UID	The Unix user identification number associated with the user.
CPU%	The total percentage of the CPU resources consumed by the user.
Phys I/O	The total number of physical I/Os by the user.
Term I/O	The total number of terminal I/Os by the user.
Procs	The number of processes owned by the user.
Sess	The number of sessions opened by the user.
RSS (kb)	The amount of RAM (kilobytes) consumed by the user. (This data may underestimate memory usage, because shared pages are not counted.)
VSS (kb)	The amount of virtual memory (kilobytes) consumed by the user.

20

SOS TERMINAL SUMMARY

The Terminal Summary Screen

The Terminal Summary screen displays information about resource usage for each terminal on the system.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:37      E: 26:14:02   I: 01:00
------------------------------ TERMINAL SUMMARY ------------------------------
                              Login        Idle
Terminal     User Name         Time        Time     Processes             ioch/s
-------------------------------------------------------------------------------
pts/8           herberj      0:15:22     0:49:20       0[    0]          0[     0]
pts/7           whitney     26:14:10    46:27:51       2[    0]     2332.5[   3.0]
pts/6             scott      1:02:04     1:01:53       4[    0]     132.0k[1674.0]
pts/5              root    459:25:08   289:44:32       1[    0]          0[     0]
pts/4              root    126:07:27   125:46:03       2[    0]          0[     0]
pts/2               N/A    127:52:06   317:46:42       3[    0]       15.7[     <]
ptmajor             N/A    127:51:59   486:33:50       1[    0]          0[     0]




Enter command:
```

Figure 20.1 *SOS Terminal Summary screen*

To access the Terminal Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **t** (Terminal Summary). The Terminal Summary screen will display. An example of the screen is shown in Figure 20.1.

Terminal Summary Screen Display Items

The data displayed in the Terminal Summary screen is provided for each active terminal on the system.

TERMINAL SUMMARY

Each data item presented in the TERMINAL SUMMARY is described in the following table.

Table 20.1 *SOS TERMINAL SUMMARY data items*

Data Item	Description
Terminal	The controlling terminal device file associated with the terminal.
User Name	The name of the user that is logged in at the terminal.
Login Time	The amount of time (hh:mm) passed since the oldest process on the terminal was started. The Login Time value for a process that was already running when SOS was started will equal the elapsed time (E: hh:mm) displayed in the SOS banner (the time elapsed since SOS was started).
Idle Time	The amount of time passed since the terminal has had a character read or write.
Processes	The number of processes attached to the terminal.
ioch	The number of characters read and written to the terminal.

21

SOS System Table Summary

The System Table Summary Screen

The System Table Summary screen reports configuration and utilization information of system tables and caches. The screen is available in graphical and tabular formats.

To access the System Table Summary screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **b** (System Table Summary). The System Table Summary screen will display.
3. Type **t** to toggle between the graphical and tabular formats.

Examples of the Disk I/O Summary screen are provided in “Graphical Format” on page 142 and “Tabular Format” on page 143.

System Table Summary Screen Display Items

Graphical Format

An example of the System Table Summary in graphical format is shown in Figure 21.1.

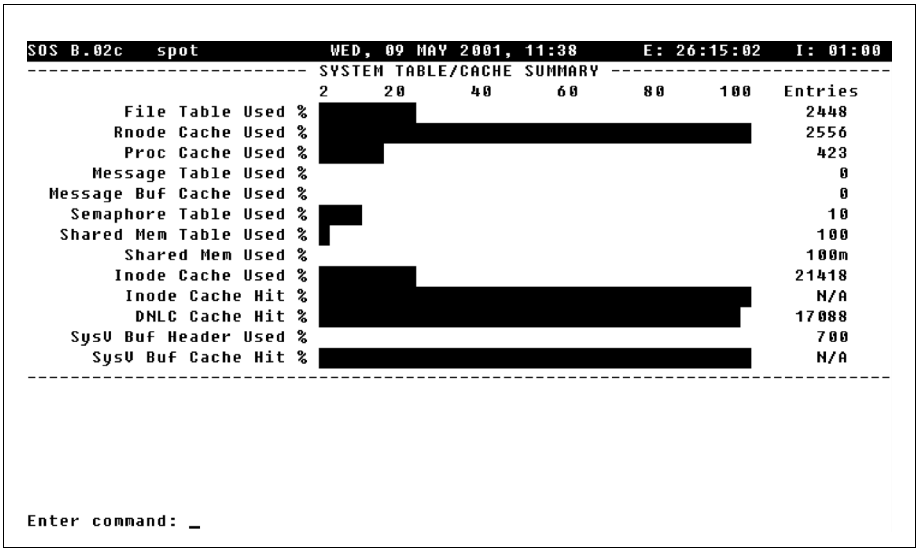


Figure 21.1 *SOS System Table Summary screen (graphical format)*

SYSTEM TABLE/CACHE SUMMARY

Table 21.1 *SOS SYSTEM TABLE/CACHE SUMMARY data items*

Data Item	Description
File Table Used%	The percentage of the file table used.
Rnode Cache Used %	The percentage of rnode entries used.
Proc Cache Used %	The percentage of process table entries used.
Message Table Used %	The percentage of message table entries used.
Message Buf Cache Used %	The percentage of message buffer cache used.
Semaphore Table Used %	The percentage of SysV semaphore identifiers used.

Data Item	Description
Shared Mem Table Used %	The percentage of shared memory identifiers used.
Shared Mem Used %	The percentage of shared memory pool used.
Inode Cache Used %	The percentage of inode entries used.
Inode Cache Hit %	The percentage of inode entries found in memory instead of on disk.
DNLC Cache Hit %	The percentage of file name lookups satisfied in the dynamic name lookup cache (DNLC).
SysV Buf Header Used %	The percentage of buffer headers used.
SysV Buf Cache Hit %	The percentage of page faults satisfied in the buffer cache.

Tabular Format

An example of the System Table Summary in tabular format is shown in Figure 21.2.

```
SOS B.02c   spot          WED, 09 MAY 2001, 11:38      E: 26:15:02   I: 01:00
 Rnode Cache          1104k          2556        2537        99.3         14562
---------------------------- IPC TABLE/CACHE SUMMARY ----------------------------
                       Size         Entries        Used      Used %         High
 Message Table          N/A               0           0           0            0
 Message Buffer Cache     0             N/A           0           0            0
 Semaphore Table        N/A              10           1        10.0            2
 Shared Memory Table    N/A             100           3         3.0            4
 Shared Memory         100m             N/A        476k           0         953k
---------------------------- PROCESS CACHE SUMMARY ----------------------------
                       Size        Entries        Used      Used %         High
  max_nproc: 3946      730k            423          66        15.6          423
----------------------------- INODE CACHE SUMMARY -----------------------------
                       Size        Entries        Used      Used %         High
 ufs_ninode: 17088    7027k          21418        4866        22.7        21418
 Hit %:100.0                                                        ipf %:    0
------------------------------ DNLC CACHE SUMMARY -----------------------------
 Entries                              Hit %                            Lookups/s
   17088                              98.0                                42.4
--------------------------- SYSV BUFFER CACHE SUMMARY --------------------------
 bufhwm                               nbuf                               Hit %
   5048                               700                               100.0
--------------------------------------------------------------------------------
Enter command:                                    (Showing lines 4 - 25 of 25)
```

Figure 21.2 *SOS System Table Summary screen (tabular format)*

MISC TABLE/CACHE SUMMARY

Table 21.2 *SOS MISC TABLE/CACHE SUMMARY data items*

Data Item	Statistics	Description
File Table	Size	The configured size (bytes) of the file table.
	Entries	The configured number of entries for the file table.
	Used	The number of file table entries used.
	Used %	The percentage of file table entries used.
	High	The highest number of file table entries used.
Rnode Cache	Size	The configured size (bytes) of the rnode cache.
	Entries	The configured number of entries for the rnode cache.
	Used	The number of rnode cache entries used.
	Used %	The percentage of rnode cache entries used.
	High	The highest number of rnode cache entries used.

IPC TABLE/CACHE SUMMARY

Table 21.3 *SOS IPC TABLE/CACHE SUMMARY data items*

Data Item	Statistics	Description
Message Table	Size	Not applicable.
	Entries	The number of message queue entries configured.
	Used	The number of message queues used.
	Used %	The percentage of message queues used.
	High	The highest number of message queues used.

Data Item	Statistics	Description
Message Buffer Cache	Size	The configured size (bytes) of the message buffer cache.
	Entries	Not applicable.
	Used	The amount of message buffer cache used.
	Used %	The percentage of message buffer cache used.
	High	The highest amount of message buffer cache used.
Semaphore Table	Size	Not applicable.
	Entries	The number of SysV semaphore identifiers configured.
	Used	The number of SysV semaphore identifiers used.
	Used %	The percentage of SysV semaphore identifiers used.
	High	The highest number of SysV semaphore identifiers used.
Shared Memory Table	Size	Not applicable.
	Entries	The number of shared memory identifiers configured.
	Used	The number of shared memory identifiers used.
	Used %	The percentage of shared memory identifiers used.
	High	The highest number of shared memory identifiers used.

Data Item	Statistics	Description
Shared Memory	Size	The configured size of shared memory pool. This value can exceed the size of virtual memory.
	Entries	Not applicable.
	Used	The amount of shared memory pool used.
	Used %	The percentage of shared memory pool used.
	High	The highest amount of shared memory pool used.

PROCESS CACHE SUMMARY

The max_nproc data item in the System Table Summary screen represents the maximum number of entries possible in the process table. The size of the process table is dynamic.

Table 21.4 *SOS PROCESS CACHE SUMMARY data items*

Data Item	Statistics	Description
max_nproc	Size	The size (bytes) of the process table.
	Entries	The current configured number of entries in the process table.
	Used	The current number of process table entries used.
	Used %	The current percentage of process table entries used.
	High	The highest number of process table entries used.

INODE CACHE SUMMARY

The ufs_ninode data item represents the maximum possible number of entries in the inode cache. The size of the inode cache is dynamic.

Table 21.5 *SOS INODE CACHE SUMMARY data items*

Data Item	Statistics	Description
ufs_ninode	Size	The current configured size (bytes) of the inode cache.
	Entries	The current configured number of inode cache entries.
	Used	The current number of inode cache entries used.
	Used %	The percentage of inode cache entries used.
	High	The highest number of inode cache entries used.
Hit %		The percentage of inodes found in memory instead of on disk.
ipf%		The percentage of inodes freed that still had pages attached.

DNLC CACHE SUMMARY

The DNLC CACHE SUMMARY portion of the System Table Summary screen displays information about the DNLC (dynamic name lookup cache).

Table 21.6 *SOS DNLC CACHE SUMMARY data items*

Data Item	Description
Entries	The configured number of entries for DNLC.
Hit %	The percentage of file name lookups found in DNLC, thereby avoiding expensive lookup.
Lookups/s	The number of file name lookups per second.

SYSV BUFFER CACHE SUMMARY

The SYSV BUFFER CACHE SUMMARY portion of the System Table Summary screen displays information about the SysV buffer cache.

Table 21.7 *SOS SYSV BUFFER CACHE SUMMARY data items*

Data Item	Description
bufhwm	The maximum threshold number of buffers configured in the SysV buffer cache.
nbuf	The current number of buffers configured for the SysV buffer cache. The size of the SysV buffer cache is dynamic.
Hit %	The percentage of reads and writes satisfied in the SysV buffer cache instead of on disk. Note that the SysV buffer cache is only used for file metadata (not file data).

22

SOS System Configuration Summary

The System Configuration Screen

The System Configuration screen displays various configurable kernel parameters. Figure 22.1 shows an example of the screen.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:41      E: 26:18:28   I: 02:26
----------------------------- SYSTEM CONFIGURATION -----------------------------
 system name: spot        os version: 5.6                    cpu type: sun4u
  serial num: 2157976951   boot time: 18:04 08 MAR 2001     run level: 3
--------------------------- MEMORY MANAGEMENT CONFIG ---------------------------
 lotsfree:   493             throttlefree:   123              page size:  8192
  desfree:   246           priority paging:     0               fastscan:  8192
  minfree:   123                 maxpgio:    40               slowscan:   100
------------------------------ FSFLUSH CONFIGURATION -----------------------------
 ufs_LW:  262k                      autoup:   30                    doiflush: 1
 ufs_HW:  393k                  t_fsflushr:    5                  dopageflush: 1
---------------------------- CACHE/BUF CONFIGURATION ----------------------------
 ufs_ninode: 17088       |         nbuf:    700        |       ncallout:      0
     ncsize: 17088       |       bufhwm:   5048        |                :
---------------------------- PROCESS CONFIGURATION -----------------------------
 rlim_fd_cur:   64    rlim_fd_max: 1024     maxuprc:  3941     max_nproc:  3946
------------------------------ IPC CONFIGURATION -------------------------------
     MESSAGES      msgmap:    0 |   SEMAPHORES     semvmx: 32767 |   SHARED MEM
 msgmax:     0     msgmni:    0 | semmap:   10     semaem: 16384 | shmmax:   1m
 msgmnb:     0     msgseg:    0 | semmni:   10     semmnu:    30 | shmmni:  100
 msgssz:     0     msgtql:    0 | semmns:   60     semume:    10 | shmseg:    6
--------------------------------------------------------------------------------

Enter command:
```

Figure 22.1 *SOS System Configuration screen*

To access the System Configuration screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **y** (System Configuration). The System Configuration screen will display.

System Configuration Screen Display Items

SYSTEM CONFIGURATION

The SYSTEM CONFIGURATION portion of the System Configuration screen displays system configuration parameters.

Table 22.1 *SOS SYSTEM CONFIGURAITON data items*

Data Item	Description
system name	The specific name of the system assigned during the system installation.
serial num	The serial number of the system.
os version	The version of the operating system.
boot time	The time of the last system reboot.
cpu type	The type of CPU hardware and model.
run level	The Unix state of operation. For information about run levels, please refer to the "inittab" Unix man page.

MEMORY MANAGEMENT CONFIG

The MEMORY MANAGEMENT CONFIG portion of the System Configuration screen displays memory management parameters.

Table 22.2 *SOS MEMORY MANAGEMENT data items*

Data Item	Description
lotsfree	The upper bound for paging. Once paging has started, it will continue until the amount of free memory is larger than the set lotsfree parameter.
desfree	The lower bound for paging. When the amount of free memory drops below the set desfree parameter, paging begins.
minfree	The threshold value at which the system considers itself to be out of memory. At this point, the system will start to deactivate processes.
throttlefree	The value at which the amount of free memory pages reaches throttlefree pages. At this point, any process that attempts to get another page will be suspended until the amount of free memory exceeds desfree.

Data Item	Description
priority paging	The priority paging value indicates whether or not priority paging is enabled. • 0 indicates priority paging is disabled. • 1 indicates priority paging is enabled. When priority paging is enabled, the paging algorithm is modified to page out data pages before text, heap, and stack.
maxpgio	The maximum number of page I/O operations per second that the system will schedule.
page size	The size (bytes) of the pages.
fastscan	The fastest scan rate (pages per second). The fastscan value corresponds to an empty free list.
slowscan	The initial scan rate (pages per second). This rate occurs when page scanning starts.

FSFLUSH CONFIGURATION

The FSFLUSH CONFIGURATION portion of the System Configuration screen displays information about the file system flush configuration.

Table 22.3 *SOS FSFLUSH CONFIGURATION data items*

Data Item	Description
ufs_LW	The minimum threshold value (kilobytes) for unflushed data. If the amount of data pending to be flushed to a file is less than the ufs_LW value (kilobytes), the data will be flushed by fsflush. If the amount of data pending to be flushed to a file is between the ufs_LW value and the ufs_HW value (the maximum threshold), writes to disk are scheduled, bypassing fsflush. If the amount of data pending to be flushed is greater than the ufs_LW value, any additional writes will result in suspension of the process until the amount pending drops below the ufs_LW value.
ufs_HW	Refer to the description of ufs_LW.
autoup	The maximum number of seconds that a modified page will remain in memory without being written to disk by fsflush.
t_fsflushr	The set interval (number of seconds) between instances when fsflush scans 1/6 of RAM.

Data Item	Description
doiflush	The doiflush parameter indicates whether or not fsflush is enabled to flush the inode cache. • 0 indicates inode cache flushing is disabled. • 1 indicates inode cache flushing is enabled.
dopageflush	The dopageflush parameter indicates whether or not fsflush is enabled. • 0 indicates page flushing is disabled. • 1 indicates page flushing is enabled.

CACHE/BUF CONFIGURATION

The CACHE/BUF CONFIGURATION portion of the System Configuration screen displays information about the SYSV buffer cache parameters.

Table 22.4 *SOS CACHE/BUF CONFIGURATION data items*

Data Item	Description
ufs_ninode	The maximum possible number of entries in the inode cache. The size of the inode cache is dynamic.
ncsize	The configured number of entries for the DNLC cache.
nbuf	The configured number of buffer cache headers on the system. This number will change over time if the DBC (dynamic buffer cache) is configured.
bufhwm	The maximum threshold value for the number of buffers configured in the SYSV buffer cache.
ncallout	The number of callout structures configured.

PROCESS CONFIGURATION

The PROCESS CONFIGURATION portion of the System Configuration screen displays information about the process configuration parameters.

Table 22.5 *SOS PROCESS CONFIGURATION data items*

Data Item	Description
rlim_fd_cur	The soft limit maximum of open files allowed by a process.

Data Item	Description
rlim_fd_max	The hard limit maximum of open files allowed by a process. Only processes with root privileges can exceed rlim_fd_cur and use rlim_fd_max.
maxuprc	The maximum number of processes any one user can own.
max_nproc	The maximum possible number of entries for the process table. The size of the process table is dynamic.

IPC CONFIGURATION

The IPC CONFIGURATION portion of the System Configuration screen displays information about the SYSV IPC (interprocess communication) configuration parameters.

Table 22.6 *SOS IPC CONFIGURATION data items*

Data Item	Statistics	Description
MESSAGES	msgmax	The maximum size (bytes) of a single message.
	msgmnb	The maximum number of bytes on the message queue (at one time).
	msgssz	The size (bytes) of each message segment. The message buffer cache size is calculated: Message Buffer Cache Size (bytes) = msgseg * msgssz
	msgseg	The number of segments allocated in the message buffer cache.
	msgmap	The configured number of message map entries.
	msgmni	The configured number of message queue identifiers.
	msgtql	The configured number of message headers. A message header is used for each message queued in the system.

Data Item	Statistics	Description
SEMAPHORES	semmap	The configured number of SYSV semaphore map entries.
	semmni	The configured number of SYSV semaphore identifiers. A semaphore identifier may refer to multiple semaphores.
	semmns	The configured number of SYSV semaphores available.
	semvmx	The maximum value that a SYSV semaphore is allowed to reach.
	semaem	The maximum value at which at a SYSV semaphore can be undone.
	semmnu	The configured number of "undo's" on a system.
	semume	The maximum number of "undo's" entries per process.
SHARED MEM	shmmax	The maximum shared memory segment size (bytes).
	shmmni	The configured number of shared memory identifiers.
	shmseg	The maximum number of shared memory segments that can be attached to a process.

23

SOS Pulse Points Summary

The Pulse Points Screen

The Pulse Points screen displays the current performance levels of key performance indicators. The performance level of each indicator is categorized as acceptable (Green), questionable (Yellow), or unacceptable (Red), based on criteria set in the ppoints configuration file.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:42      E: 26:18:28   I: 02:26
--------------------------------  PULSE POINTS  --------------------------------
    Indicator           |    Green    |    Yellow    |      Red     | Comments
--- CPU ------------------------------------------------------------------------
CPU Busy %                    [ 32.9]                98.6
Queue Busy %                0.7[  4.7]
Run-Q Average                 0[  1.2]
--- Memory ---------------------------------------------------------------------
Ave Page Residence        600.0[600.0]                          secs
Page Scan Rate                0[    0]                          /sec
Page Out Rate                 0[    0]                          /sec
Swap Out Rate                 0[    0]                          /sec
--- Disk I/O -------------------------------------------------------------------
Average Wait Time           9.4[  8.2]                          System Wide
Average Q-Length              0[    0]                          System Wide
Disk Utilization %            0[    0]                          System Wide
Disk I/O Rate (/sec)          0[    0]                          System Wide
--- Network --------------------------------------------------------------------
Defer %                       0[    0]                          System Wide
Collision %                   0[    0]                          System Wide
--------------------------------------------------------------------------------


Enter command: _
```

Figure 23.1 *SOS Pulse Points screen*

To access the Pulse Points screen from any SOS display screen:

1. Type s from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **p** (Pulse Points). The Pulse Points screen will display. An example of the screen is shown in Figure 23.1.

Pulse Points Screen Display Items

Data items displayed in the Pulse Points screen are described elsewhere in this manual and in the online help, therefore, the pulse point indicators are not documented in this chapter. If the meaning of a pulse point indicator is unclear, please refer to the documentation for the indicator's corresponding SOS screen. For example, for information about the CPU Busy % indicator, refer to "SOS CPU Summary" on page 101.

The pulse points indicators are configurable. For configuration guidelines, refer to "SOS ppoints File" on page 70.

Pulse Points Screen Column Headings

Each of the column headings for the Pulse Points screen is described in the next table.

Table 23.1 *SOS Pulse Points screen column headings*

Heading	Description
Indicator	The Indicator column in the Pulse Points screen displays the name associated with each pulse point data item.
Green	All pulse point indicator values that are within the range configured as "acceptable" are displayed in the Green column.
Yellow	All pulse point indicator values that are within the range configured as "questionable" are displayed in the Yellow column.
Red	All pulse point indicator values that are within the range configured as "unacceptable" are displayed in the Red column.
Comments	Any comments provided for a pulse point indicator will be displayed in the Comments column.

24

SOS WORKLOAD DEFINITIONS

The Workload Definitions Screen

The Workload Definitions screen displays the application workload definitions. Theses definitions can also be found in the /etc/opt/lps/cfg/workdefs file.

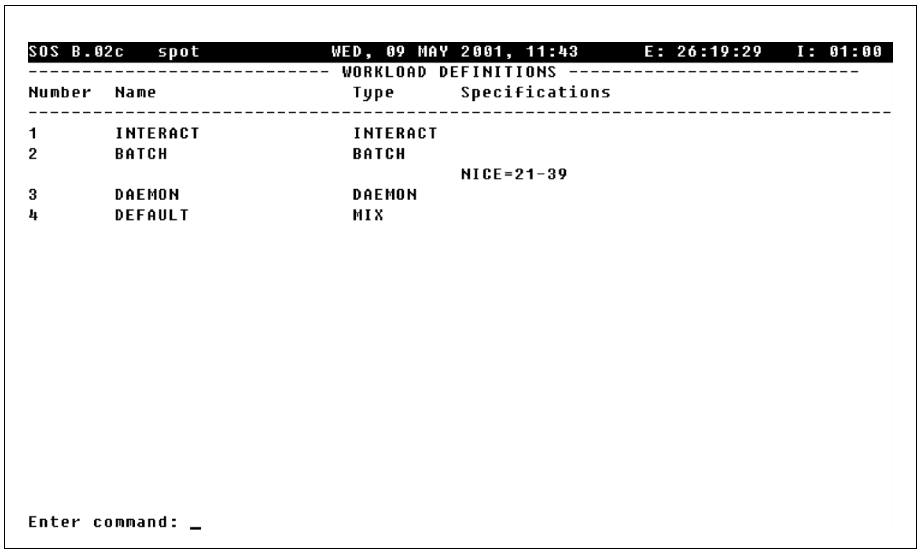


Figure 24.1 *SOS Workload Definitions screen*

To access the Workload Definitions screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **k** (Workload Definitions). The Workload Definitions screen will display. An example of the screen is shown in Figure 24.1.

Workload Definitions Screen Display Items

WORKLOAD DEFINITIONS

The data items presented in the Workload Definitions screen are described in the following table.

Table 24.1 *SOS WORKLOAD DEFINITIONS data items*

Data Item	Description
Number	The unique, sequential identification number assigned to the workload.
Name	The name of the workload group.
Type	The type of workload. For information about workload types, refer to "Workload Groups" on page 17.
Specifications	The other specifications that define the workload. For information about workload types, refer to "Creating a Workload Definition File" on page 16.

25

SOS PROCESS DETAIL

The Process Detail Screen

The Process Detail screen displays detailed information about a specific process.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:43      E: 26:19:29   I: 01:00
---- PID -------------- ID -------------- SCHEDULING ----------- TERMINAL ------
  Pid:  6622 |   Cmd: sostask         |  Nice: 20          |    tty: pts/6
 PPID:  6621 |  User: root            |   Pri: 0           |  State: ATT
     :       | Group: other           | Sched: TS          | ioch/s: 3906.5
     :       |      :                 | wchan: 0x00000000 |       :
---------- CPU ------------ MEMORY ---------- LWP/CSW ---------- DISK ---------
   CPU %:   98.0[  4.1] |    RSS:  2816  |   nlwp:     1 |    Phyio in:     0
  CPU ms:  59470[3872k] |    VSS:  2912  |  csw/s:     < |   Phyio out:     0
       :       [     ] |  State:  LOAD  | icsw/s:  45.2 |  Phyio in/s:     0
  User %:   97.9[ 97.9] |  Min/s:     0  |       :       | Phyio out/s:     0
   Sys %:    2.0[  2.0] |  Maj/s:     0  |       :       |         IO%:     0
  Trap %:    0.1[  0.1] |  Swp/s:     0  |       :       |           :
---------------------------------- WAIT STATES ----------------------------------
   JOB:  0[  0]                      CPU: 95[ 93]                    OTHR:  2[  4]
   PRI:  4[  3]   TFLT:  0[  0]   DFLT:  0[  0]   KFLT:  0[  0]   ULCK:  0[  0]
--------------------------------------------------------------------------------




Enter command:
```

Figure 25.1 *SOS Process Detail screen*

To access this screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **P** (Process Detail).
3. At the secondary prompt:
   - Press the Enter key to display the process detail information for the given process.
   - Or, enter the PID of another process.

   The Process Detail screen will display. An example of the screen is shown in Figure 25.1.

Process Detail Screen Display Items

PID

The PID portion of the Process Detail screen displays process identification. Each data item is described in the following table.

Table 25.1 *SOS PID data items*

Data Item	Description
Pid	The identification number for the specified process.
PPID	The identification number for the parent process.

ID

The ID portion of the Process Detail screen displays additional identification information. Each data item is described in the following table.

Table 25.2 *SOS ID data items*

Data Item	Description
Cmd	The command that was invoked to create the process (does not include arguments).
User	The real user name of the user that owns the process.
Group	The name of the group that owns the process.

SCHEDULING

The SCHEDULING portion of the Process Detail screen displays scheduling information. Each data item is described in the following table.

Table 25.3 *SOS SCHEDULING data items*

Data Item	Description
Nice	The nice value. A value of R indicates the process has a real time priority—the nice value is not used. For information about the nice utility, see the Unix man page, "nice."
Pri	The priority of the process. The value depends on the scheduling policy.

Data Item	Description
Sched	The scheduling policy of the process. Possible values are: • TS - timeshare scheduling. • SYS - system process scheduling. • RT - real-time scheduling. • IA - interactive scheduling. For information about the scheduling, see the Unix man page, "priocntl."
wchan	The kernel address of the resource on which the process is waiting.

TERMINAL

The TERMINAL portion of the Process Detail screen displays terminal information related to the process. Each data item is described in the next table.

Table 25.4 *SOS TERMINAL data items*

Data Item	Description
tty	The device file associated with the terminal device. If the process is not attached to a terminal, three dashes (---) is displayed.
State	The terminal state: • DET - detached from a terminal. • ATT - attached to a terminal.
ioch /s	The number of character I/Os to or from the terminal, per second.

CPU

The CPU portion of the Process Detail screen displays process and workload CPU information. Using the c command key toggles between two sets of data: a detailed breakdown of CPU usage and a list of response and transaction data. Each data item is described in the following table.

Table 25.5 *SOS CPU data items*

Data Item	Description
CPU %	The percentage of the current interval that the process was executing. This value is normalized for multiple processors—the sum of the CPU% values should not exceed 100.

Data Item	Description
CPU ms	The number of milliseconds the process was executing. The value in brackets, [ ], is a cumulative value, not an averaged cumulative value.
User %	The percentage of the process' execution time spent in user mode. This includes real, nice, and negative nice time.
Sys %	The percentage of the process' execution time spent in system/ kernel mode. This includes memory and trap time.
Trap %	The percentage of the process' execution time spent processing traps.

MEMORY

The MEMORY portion of the Process Detail screen displays process and workload memory information. Each data item is described in the following table.

Table 25.6 *SOS MEMORY data items*

Data Item	Description
RSS	The resident set size, which is equal to the amount of RAM the process is using. This value does not include shared memory.
VSS	The amount of virtual memory the process has reserved, which is equal to the size of the process' core image including text, data, and stack.
State	The process state with respect to memory (not applicable to workloads). The possible values are: • Dead - the process is dead. • LOAD - the process is loaded in memory. • DEACT - the process is deactivated.
Min /s	The number of minor page faults experienced by the process, per second.
Maj /s	The number of major page faults experienced by the process, per second.
Swp /s	The number of processes swapped out per second.

LWP/CSW

The LWP/CSW portion of the Process Detail screen displays information about lightweight processes and context switches. Each data item is described in the following table.

Table 25.7 *SOS LWP/CSW data items*

Data Item	Description
nwlp	The number of lightweight processes (threads).
csw/s	The number of voluntary context switches per second. A voluntary context switch will occur when a process' relinquishes the CPU and its time slice is not yet expired.
icsw/s	The number of involuntary context switches per second. Involuntary switches occur when a process' time slice expires.

DISK

The DISK portion of the Process Detail screen displays various process and workload disk statistics. Each data item is described in Table 25.8.

Table 25.8 *SOS DISK data items*

Data Item	Description
Phyio in	The number of physical disk reads.
Phyio out	The number of physical disk writes.
Phyio in/s	The number of physical disk reads per second.
Phyio out/s	The number of physical disk writes per second.
IO%	The percentage of I/Os performed on the disk, system-wide.

WAIT STATES

The WAIT STATES portion of the Process Detail screen displays various process and workload wait state information. Each data item is described in the following table.

Table 25.9 *SOS PID data items*

Data Item	Description
JOB	The percentage of a process' time spent in the JOB state, waiting for job control or tracing signals.
CPU	The percentage of a process' time spent in the CPU state.

Data Item	Description
OTHR	The percentage of a process' time spent in the OTHR state, waiting on all other resources and events.
PRI	The percentage of a process' time spent in the PRI state, waiting for the CPU.
TFLT	The percentage of a process' time spent in the TFLT state, waiting on text page faults.
DFLT	The percentage of a process' time spent in the DFLT state, waiting on data page faults.
KFLT	The percentage of a process' time spent in the KFLT state, waiting on kernel page faults.
ULCK	The percentage of a process' time spent in the UFLT state, waiting on user locks.

26

SOS PROCESS FILE USAGE

The Process File Usage Screen

The Process File Usage screen displays information of each file opened by a specific process.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:43      E: 26:19:29   I: 01:00
------------------------------ PROCESS FILE USAGE -------------------------------
    PID:  6622   Name: sostask          User Name: root         Tty: pts/6
---------------------------------- OPEN FILES -----------------------------------
  Filename                      Type    Access   Offset      Size Comp %   #Refs
-------------------------------------------------------------------------------
/dev/pts/6                      Char      RW       1325         0      0      12
/dev/pts/6                      Char      RW       1325         0      0      12
/dev/pts/6                      Char      RW       1325         0      0      12
/load00                         Regular   R          29        29    100       2
/sostas00                       Regular   R          43        43    100       1
N/A                             Regular   RW     887808   1130664     79       1


Enter command:
```

Figure 26.1 *SOS Process File Usage screen*

To access this screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **F** (Process File Usage).
3. At the secondary prompt:
   - Press the Enter key to display the process file usage information for the given process.
   - Or, enter the PID of another process.

An example of the screen is shown in Figure 26.1.

Process File Usage Screen Display Items

PROCESS FILE USAGE

The PROCESS FILE USAGE portion of the Process File Usage screen displays process identification information. Each data item is described in the next table.

Table 26.1 *SOS PROCESS FILE USAGE data items*

Data Item	Description
PID	The product identification number of the process.
Name	The name of the process—the command used to create the process.
User Name	The name of the user that owns the process.
Tty	The device file associated with the terminal to which the process is attached. If no terminal is associated with the process, three dashes (---) will display.

OPEN FILES

The OPEN FILES portion of the Process File Usage screen displays information about each open file. Each data item is described in Table 26.1.

Table 26.2 *SOS OPEN FILES data items*

Data Item	Description
Filename	The name of the open file. The SOS application searches the DNLC for the name of the file. If the name is not in the DNLC, "N/A" will display on the screen.
Type	The type of file: • Block (a block device file) • Char (a character device file) • Dir (a directory) • Door (a door) • FIFO (a FIFO (first in, first out) file) • Link (a symbolic link) • Proc (a process) • Regular (a regular file) • Socket (a socket)

Data Item	Description
Access	The type of access the process has to the open file: • R (read only) • W (write only) • RW (read and write)
Offset	The offset (bytes) into the file.
Size	The size of the file (bytes).
Comp %	The percentage of offset into the file: Comp % = (Offset/Size) x 100
#Refs	The current number of references to the open file.

27

SOS Process Memory Regions

The Process Memory Regions Screen

The Process Memory Regions screen displays information about the memory regions accessed by a specific process.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:44      E: 26:20:29   I: 01:00
---------------------------- PROCESS MEMORY REGIONS ----------------------------
 PID:  6622       Name: sostask         User Name: root              Tty: pts/6
--------------------------------- MEMORY REGIONS ---------------------------------
Front Store File                        Type     RSS     VSS  Virtual Address
-------------------------------------------------------------------------------
/dev/rdsk/c0t0d0s0:161                  MMAP      40      40  0000000000010000
/dev/rdsk/c0t0d0s0:161                  MMAP       8       8  0000000000028000
<HEAP>                                  HEAP    2072    2072  000000000002a000
/dev/rdsk/c0t0d0s6:35847                MMAP      16      16  0000000000ef6e0000
/dev/rdsk/c0t0d0s6:3677                 MMAP     592     592  0000000000ef700000
/dev/rdsk/c0t0d0s6:3677                 MMAP      32      32  0000000000ef7a2000
/dev/rdsk/c0t0d0s6:3684                 MMAP       8       8  0000000000ef7b0000
<ANON>                                  ANON       8       8  0000000000ef7c0000
/dev/rdsk/c0t0d0s6:3671                 MMAP     112     112  0000000000ef7d0000
/dev/rdsk/c0t0d0s6:3671                 MMAP       8       8  0000000000ef7fa000
<STACK>                                 STACK     16      16  0000000000efffc000



Enter command:
```

Figure 27.1 *SOS Process Memory Regions screen*

To access the Process Memory Regions screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **M** (Process Memory Regions).
3. At the secondary prompt:
   - Press the Enter key to display the process memory regions information for the given process.

- Or, enter the PID of another process.

The Process Memory Regions screen will display. An example of the screen is shown in Figure 27.1.

Process Memory Regions Screen Display Items

PROCESS MEMORY REGIONS

The PROCESS MEMORY REGIONS portion of the Process Memory Regions screen contains identification information about the selected process. Each data item is described in the following table.

Table 27.1 *SOS PROCESS MEMORY REGIONS data items*

Data Item	Description
PID	The product identification number of the process.
Name	The name of the process—the command used to create the process.
User Name	The name of the user that owns the process.
Tty	The device file associated with the terminal to which the process is attached. If no terminal is associated with the process, three dashes (---) will display.

MEMORY REGIONS

The MEMORY REGIONS portion of the Process Memory Regions screen contains information pertaining to each memory region used by the specified process. Each data item is described in the following table.

Table 27.2 *SOS MEMORY REGIONS data items*

Data Item	Description
Front Store File	The file path that corresponds to the memory region. This is the program name for data and text regions and the library name for shared libraries. If a file name is not associated with the region, the type of region will be displayed. If the file name is not obtainable, the device and inode will be displayed. This information can be used with the ncheck (IM) command to look up the file name.

Data Item	Description
Type	The type of memory region: • HEAP (the region is a heap) • STACK (the region is a stack) • ANON (the region is anonymous; not associated with a file) • MMAP (the region is mapped in memory)
RSS	The size of region in RAM (KB).
VSS	The size of region in virtual memory (KB).
Virtual Address	The virtual address of memory region in hex format. This number represents the address of the space and space offset of the region.

28

SOS WORKLOAD DETAIL

The Workload Detail Screen

The Workload Detail screen displays detailed information about a specific workload. For information about workloads, refer to “Workload Groups” on page 15.

```
SOS B.02c   spot            WED, 09 MAY 2001, 11:44      E: 26:21:31   I: 01:01
-------------------------------- WORKLOAD DETAIL --------------------------------
 Workload: INTERACT                                      Proc Count:   16.0[  14.0]
---------- CPU ------------ MEMORY --------- RESP TIME --------- DISK ---------
   CPU %:   98.1[ 32.6]  |    RSS:   31m  | Tran/s:  4636 |    Phyio in:      0
  CPU ms: 60770[30889k]  |    VSS:   44m  | Resp T:     < |   Phyio out:      4
        :       [     ]  |       :        |        :      |  Phyio in/s:      0
  User %:   97.2[ 98.2]  |  Min/s:     0  |        :      | Phyio out/s:    0.1
   Sys %:    2.8[  1.8]  |  Maj/s:     0  |        :      |          IO%:    6.8
  Trap %:    0.1[  0.1]  |  Swp/s:     0  |        :      |            :
---------------------------------- WAIT STATES ----------------------------------
   JOB:  0[  2]                      CPU:  6[  2]                    OTHR: 94[ 93]
   PRI:  <[  3]   TFLT:  0[  <]   DFLT:  0[  <]   KFLT:  0[  <]   ULCK:  0[  0]
-------------------------------- PROCESS SUMMARY --------------------------------
PID   Name         User Name TTY      CPU% Nice Pri  RSS/Size #Rd #Wr State Resp
4968  sos          whitney   pts/7     1.0  20   58 5648/5824   0   4   RUN    <
6622  sostask      root      pts/6    97.1  20    0 2816/2912   0   0   RUN    <




Enter command: _
```

Figure 28.1 *SOS Workload Detail screen*

To access the Workload Detail screen from any SOS display screen:

1. Type **s** from the SOS Enter command: prompt to view the Screen Selection Menu screen.
2. From the Screen Selection Menu screen, enter **W** (Workload Detail).
3. At the secondary prompt:
   - Press the Enter key to display the workload detail information for the given workload.

- Or, select another workload from the list.

The Workload Detail screen will display. An example of the screen is shown in Figure 28.1.

4 Use the **y** command key to toggle between the normal and extended process displays.

Workload Detail Display Items

WORKLOAD DETAIL

The WORKLOAD DETAIL portion of the Workload Detail screen displays workload identification information. The data items are described in the next table.

Table 28.1 *SOS WORKLOAD DETAIL data items*

Data Item	Description
Workload	The name of the workload.
Proc Count	The average number of processes that exists within the workload.

CPU

The CPU portion of the Workload Detail screen displays process and workload CPU information. The data items are described in Table 28.2.

Table 28.2 *SOS CPU data items*

Data Item	Description
CPU %	The percentage of the current interval that the process was executing. This value is normalized for multiple processors—the sum of the CPU% values should not exceed 100.
CPU ms	The number of milliseconds the process was executing. The value in brackets, [ ], is a cumulative value, not an averaged cumulative value.
User %	The percentage of the process' execution time spent in user mode. This includes real, nice, and negative nice time.
Sys %	The percentage of the process' execution time spent in system/ kernel mode. This includes memory and trap time.
Trap %	The percentage of the process' execution time spent processing traps.

MEMORY

The MEMORY portion of the Workload Detail screen displays process and workload memory information. The data items are described in the following table.

Table 28.3 *SOS MEMORY data items*

Data Item	Description
RSS	The resident set size, which is equal to the amount of RAM the process is using. This value does not include shared memory.
VSS	The amount of virtual memory the process has reserved, which is equal to the size of the process' core image including text, data, and stack.
State	The process state with respect to memory (not applicable to workloads). The possible values are: • Dead (the process is dead) • LOAD (the process is loaded in memory) • DEACT (the process is deactivated)
Min /s	The number of minor page faults experienced by the process, per second.
Maj /s	The number of major page faults experienced by the process, per second.
Swp /s	The number of processes swapped out per second.

RESP TIME

The RESP TIME portion of the Workload Detail screen displays process and workload response time and transaction information. The data items are described in Table 28.4.

Table 28.4 *SOS RESP TIME data items*

Data Item	Description
Tran /s	The number of transactions per second.
Resp T	The average time (milliseconds) for a transaction to complete.

DISK

The DISK portion of the Workload Detail screen displays process and workload disk statistics. The data items are described in Table 28.5.

Table 28.5 *SOS DISK data items*

Data Item	Description
Phyio in	The number of physical disk reads.
Phyio out	The number of physical disk writes.
Phyio in/s	The number of physical disk reads per second.
Phyio out/s	The number of physical disk writes per second.
IO%	The percentage of I/Os performed on the disk, system-wide.

WAIT STATES

The WAIT STATES portion of the Workload Detail screen displays various process and workload wait state information. The data items are described in the following table.

Table 28.6 *SOS WAIT STATES data items*

Data Item	Description
JOB	The percentage of a process' time spent in the JOB state, waiting for job control or tracing signals.
CPU	The percentage of a process' time spent in the CPU state.
OTHR	The percentage of a process' time spent in the OTHR state, waiting on all other resources and events.
PRI	The percentage of a process' time spent in the PRI state, waiting for the CPU.
TFLT	The percentage of a process' time spent in the TFLT state, waiting on text page faults.
DFLT	The percentage of a process' time spent in the DFLT state, waiting on data page faults.
KFLT	The percentage of a process' time spent in the KFLT state, waiting on kernel page faults.
ULCK	The percentage of a process' time spent in the UFLT state, waiting on user locks.

PROCESS SUMMARY

The PROCESS SUMMARY portion of the Workload Detail screen displays general information about the processes on the system. By default, any process that was active in the interval will be displayed. The information display can be reconfigured using the commands described in “Process display option Commands” on page 47. The data items are described in Table 28.7.

Table 28.7 *SOS WORKLOAD DETAIL data items*

Data Item	Description
PID	The product identification number of the process.
Name	The name of the process—the command used to create the process.
User Name	The name of the user that owns the process.
Tty	The device file associated with the terminal to which the process is attached. If no terminal is associated with the process, three dashes (---) will display.
CPU%	The percentage of system-wide CPU time that was used by the process. This value is normalized for multiple processors—the sum of the CPU% values should not exceed 100.
Nice	The nice value. A value of R indicates the process has a real time priority—the nice value is not used. For information about the nice utility, see the Unix man page, "nice."
Pri	The priority of the process. The value depends on the scheduling policy.
RSS/Size	The resident set size—the amount of RAM used by the process. The Size value represents the size in kilobytes of the core image of the process. This includes text, data, and stack space. In other words, the amount of swap or virtual memory the process has reserved.
#Rd	The number of physical reads performed by the process.
#Wr	The number of physical writes performed by the process.

Data Item	Description
State	The State data item shows the current state of the process. Possible values are: • CPU (the process is waiting for CPU) • RUN (the process is running on the CPU) • SLEEP (the process is waiting for a resource or event) • STOP (the process is suspended by job control because it is being traced) • ZOMB (the process is dead, but still contains a process table entry)

29

SOSLOGD

The Historical Performance Data Logging Utility

The SOS Performance Advisor application suite includes a data logging utility called SOSLOGD. SOSLOGD enables the user to collect historical system performance data for analysis of performance problems and trends.

Data can be logged three ways:

- A single, one-time-only, session.

  The length of the data collection period is determined by the user.
- Continuously, 24 hours a day.

  The logging job must be stopped manually with the lpskill command.
- Scheduled, using the cron facility.

  For example, Monday through Friday, 06:30 AM to 6:30 PM.

The data is collected and stored in SL (system log) files for later use by SOSLOGX.

SL Files

SOSLOGD creates one logical file record for every batch interval. The default interval is 10 minutes (600 seconds). The log file is saved in the SOS Performance Advisor log directory (/var/opt/lps/log is the default location) and named using the format *SLyyjjjs*.

- *SL* represents the SOS log file.
- *yy* represents the current year.
- *jjj* represents the Julian day of the year.
- *s* represents the sequence of the log (up to 26 characters, from a through z).

Starting the Logging Process

To begin the collection process, enter **soslogd** at the shell prompt of your home directory. It is assumed that your path statements are set up properly.

Command Line Switches

Use command line switches to modify the SOSLOGD configuration. Enter **soslogd -h** at the shell prompt of your home directory to view all available command line switches. The effects of the command line switches vary depending on whether you are using the default or advanced configuration parameters.The functions of each command line switch is summarized in the next table.

Table 29.1 *SOSLOGD command line switch functions*

Switch	Default Configuration	Advanced Configuration
-c	Log continuously by restarting at 00:00 hours.	Log continuously until midnight.
-o	Display the default configuration.	Display the configuration parameters in the .soslogdrc file.

Viewing Default Configuration Parameters

To view the default configuration parameters for your system, type **soslogd -o** from your home directory. The default parameters are described in Table 29.2.

Table 29.2 *SOSLOGD default configuration parameters*

Parameter	Description
Enter duration of job in minutes (0)	The duration of the job is 24 hours.
Interval time in seconds (600)	The program will take a sample and write a log record every 10 minutes.
Company name ( )	The company name is blank, by default.
Display advice messages (Y)	SOSLOGD will display advice messages.

Setting Advanced Configuration Parameters

To create a custom configuration parameter file:

1 Create a custom file (soslogrc) with your editing program, listing the parameters as described:

- •RunTime — The amount of time (minutes) SOS Performance Advisor will monitor your system's processes.
- •CycleTime — The amount of time (seconds) between samples.
- •CompanyName — Your company name (added to the title of each log report). (This can be the name of your system or another subheading, if desired.)

All parameters listed above are optional, and their order in the .soslogdrc file is not important.

2 Place the .soslogdrc file in your home directory to enable batch logging parameters.

3 To change the configuration, edit the parameters in the .soslogdrc file. For example:

- To collect data in one-hour batches, change the batch run time to 60 minutes by typing **RunTime=60**.
- To shorten the interval time to five minutes (300 seconds), type **CycleTime=300**.
- To add the name of your company (or another subheading) to the title of each log report, type **CompanyName=<your company's name>**.

Configuration Variables

The configurations outlined in Table 29.3 can be found in the .soslogdrc file.

Table 29.3 *SOSLOGD default configuration variables*

Variable	Type	Min	Max	Description
RunTime	integer	0	1440	Duration of job in minutes
CycleTime	integer	10	3600	Interval time in seconds
CompanyName	string	N/A	N/A	Company name
DisplayAdvice	Y/N	N/A	N/A	Display advice messages
ProcLog	Y/N	N/A	N/A	Log processes
ProcCPUThreshold	integer	0	100	CPU percentage required for process display

Variable	Type	Min	Max	Description
LogOnlyActProc	Y/N	N/A	N/A	Log only active processes
LogInteractProc	Y/N	N/A	N/A	Display attached processes
LogNonInteractProc	Y/N	N/A	N/A	Log non-interactive processes, including daemons and batch processes).
LogDeadProc	Y/N	N/A	N/A	Log processes that died
ProcLogonFilter	reg exp	N/A	N/A	Process logon filter
ProcSortOpt	integer	1	8	Process sort options: 1 - sort by PID# 2 - sort by Logon Terminal 3 - sort by Workload group 4 - sort by CPU time 5 - sort by Disc I/O 6 - sort by Term reads 7 - sort by Priority 8 - sort by Wait State
ProcSortAscend	Y/N	N/A	N/A	Log processes sorted in ascending order
ProcLogLimit	integer	1	127	Maximum number of processes to be logged per interval

30

SOSLOGX

The Historical Performance Data Extraction Utility

SOSLOGX is the historical data counterpart to SOS. It provides the means for reviewing performance data stored in the log files that soslogd has collected. The user interface is similar in many ways to SOS. The main difference is that the SOSLOGX screens do not display current samples of online performance data. Instead, they display historical data collected by SOSLOGD.

The primary functions of SOSLOGX are:

- To browse through the data recorded in your log files using a variety of screen reports. This is usually done to identify periods of system activity that may require further analysis.
- To prepare logged performance data from the log files for Performance Gallery Gold, a 32-bit, full-color graphical analysis and reporting application from Lund Performance Solutions.

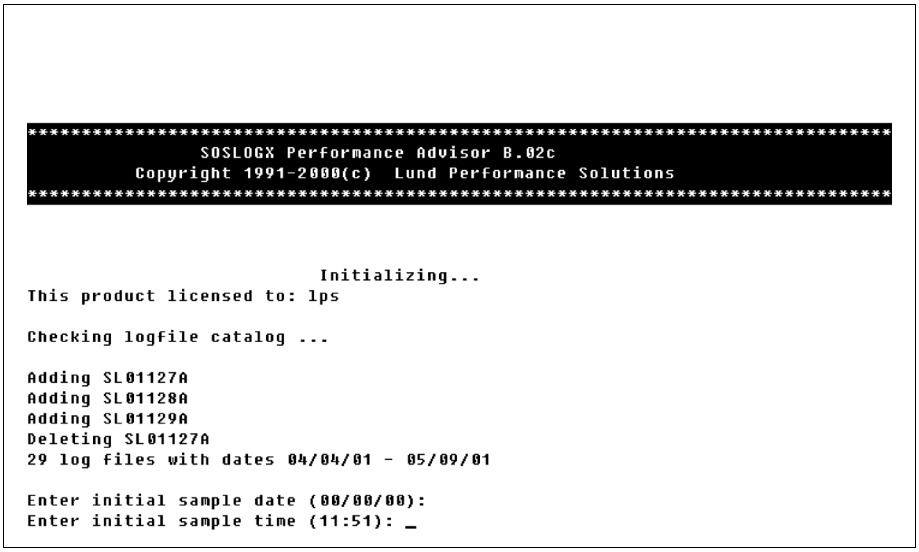
Getting Started

To run SOSLOGX:

1 Enter **soslogx** (lowercase) at the shell prompt. The initial SOSLOGX screen will display (see).

NOTE To view the screen without soft function keys, add the -k command key switch.

SOSLOGX initial screen



2 When SOSLOGX is run for the first time on a system, it creates a catalog of the SL files located in the working directory. The catalog is saved as a file (SLLOGCAT) in the same location as the SL files. At subsequent startups, SOSLOGX will update the catalog file, or it will create a new catalog if the previous catalog cannot be found.

3 Enter the following information as prompted:

   a The start date of the initial sample using the format mm/dd/yy. If you do not provide a date, the program will retrieve the earliest sample date recorded by default. Press Enter.

   b The start time using the format hh:mm. If you do not provide a start date, the program will retrieve the start time of the earliest sample data recorded, by default.

The first SOSLOGX data report, the CPU Summary screen, will display. Information about each SOSLOGX report is provided in "SOSLOGX Reports" on page 213.

The SOSLOGX commands and menus are described in "SOSLOGX Menus and Options" on page 195.

Command Line Switches

Use command line switches to modify the SOSLOGX configuration. Enter **soslogx -h** at the shell prompt to view all available command line switches. The function of each command line switch is summarized in Table 30.1.

Table 30.1 *SOSLOGX command line switch functions*

Switch	Function
-h	Displays available command line switches
-j	Forces job mode
-k	Disables function keys (when function keys are available)
-o	Displays configuration options on startup (batch mode)
-u<filename>	Specifies alternate user configuration filename
-x	Enables process export file report
-y<filename>	Specifies alternate system configuration filename
-z	Disables the "Are you sure you want to exit?" dialog

Browsing SOSLOGX Reports

1. The first SOSLOGX report displayed is the CPU Summary report. Begin by scrolling through this report using the commands keys.
   - The commands shown in the SOSLOGX Main Commands screen are discussed in “SOSLOGX Menus and Options” on page 195.
   - Look for points within the data that show high CPU utilization percentages and/or high response time rates.
2. Compare the CPU data with information displayed in other SOSLOGX reports, which can be selected from the SOSLOGX Report Format Selection Menu.
   - The Report Format Selection Menu is explained in “SOSLOGX Menus and Options” on page 195.
   - Each SOSLOGX report is described in “SOSLOGX Reports” on page 213.
3. The appearance of the reports displayed can be modified. Use the display options described in “The SOSLOGX Main Option Menu” on page 200.

Preparing Logged Data for Export

The data logged by SOSLOGD can be prepared in SOSLOGX for export to either Performance Gallery Gold or another third-party application.

Exporting Data to Performance Gallery Gold

Setting the Performance Gallery Configuration

If needed, you can change the configuration of the export file with the options provided in SOSLOGX.

1. From any SOSLOGX report display, type **o** to access the SOSLOGX MAIN OPTION MENU.
2. Select the Performance Gallery configuration (SUBMENU) option.
3. Select the Export Data configuration (SUBMENU) option.
4. Check the configuration of the export data. Make modifications as needed. (For more information about this configuration menu, see "Export Data configuration Submenu" on page 210.) Press the Enter key to exit the submenu.
5. From the Performance Gallery configuration submenu, select the Export Thresholds configuration (SUBMENU) option.
6. Set the export thresholds. (The options in the Export Thresholds configuration submenu are described in "Export Thresholds configuration Submenu" on page 212.) Press the Enter key to exit the submenu.
7. Press the Enter key to exit the Performance Gallery configuration submenu.
8. Press the Enter key again to exit the SOSLOGX MAIN OPTION MENU.

Creating the PGG Export File

From any SOSLOGX report display, type **P** to start the process. Respond to the following prompts:

- Enter Performance Gallery export file (SOSLOGX will append a .pfg file extension to the file name)
- Enter start date for Performance Gallery (mm/dd/yy)
- Enter start time for Performance Gallery (hh:mm)
- Enter end date for Performance Gallery (mm/dd/yy)
- Enter end time for Performance Gallery (hh:mm)

SOSLOGX will read the log files that meet the date and time criteria entered, then write the eligible data to the specified export file. If a directory path is not given for the export file, the file will be written to the current working directory.

Exporting Data to Third-party Applications

Setting the Export File Configuration

If needed, you can change the configuration of the export file with the options provided in SOSLOGX.

1. From any SOSLOGX report display, type **o** to access the SOSLOGX MAIN OPTION MENU.
2. Select the Export file configuration (SUBMENU) option.
3. Check the configuration of the export data. Make modifications as needed. (For more information about this configuration menu, see “Export Data configuration Submenu” on page 210.) Press the Enter key to exit the submenu.
4. Press the Enter key again to exit the SOSLOGX MAIN OPTION MENU.

Creating the Export File

From any SOSLOGX display, type **R** to start the process. Reply to the following prompts:

- Enter data export file
- Enter start ascii dump date (mm/dd/yy)
- Enter start ascii dump time (hh:mm)
- Enter end ascii dump date (mm/dd/yy)
- Enter end ascii dump time (hh:mm)
- Single record extract (Y/N)

SOSLOGX will read the log files that meet the date and time criteria entered, then write the eligible data to the specified export file. If a directory path is not given for the export file, the file will be written to the current working directory.

Creating Custom Reports

The log reports generated by SOSLOGX are user-configurable.

To create a custom SOSLOGX report, create an ASCII report configuration file that defines the report, then use the sosrcom report compiler to compile the ASCII files into a master report definition file called reprtdef.

NOTE The sosrcom report compiler must be run in the lps file structure in order to update the report definition file, reprtdef, used by SOSLOGX

The sosrcom report compiler uses the commands listed in the following table.

Table 30.2 *sosrcom report compiler commands*

Command	Description
ADD <file name>	Adds the specified configuration file to the master report definition file, reprtdef
DEL <report name>	Deletes the specified configuration file from reprtdef
DUMP <report name>	Dumps existing report internal information
EXIT	Exits the report compiler, sosrcom
HELP	Displays the online help information
LIST	Displays a brief list of all reports in the reprtdef file
REBUILD	Rebuilds the report configuration file
UPDATE <file name>	Updates the existing configuration file to reprtdef

SOSLOGX Report Configuration Rules

Delimiters

In all file specification lines, blanks and commas can be used interchangeably for delimiters. Blank lines can be inserted anywhere except in the text specifications associated with $HEAD and $TEXT lines.

Order of Items

Items must be specified in the following order:

1. TITLE, KEY, LENGTH, and LINES
2. HEAD specifications, if any
3. TEXT specifications, if any
4. ITEM and BAR specifications

Syntax of Specification Lines

The various specification lines are formatted using the following syntax.

$TITLE "<report name>"

Required. This line specifies the name of the report.

$KEY "<line 1>," "<line 2>," <keycode>

Required. This line specifies the function key used to select this report format (when function keys are available).

- <line 1> is the first function key label line.
- <line 2> is the second function key label line.
- <keycode> is the two-digit code that specifies which function key should be used. The first digit specifies the keyset. The second digit identifies a function key with that keyset (1-5). This field is optional. If not entered, the default is the first available function key.

$LENGTH <length>

Optional. This line specifies the maximum report line length. The <length> value cannot exceed 132. The default is 80.

$LINES <lines>

Optional. This line specifies the number of lines required for each log report. The default value for <lines> is the number of lines specified for $TEXT. If there is no $TEXT specification, the default is 1 (one).

$HEAD <start>

...text lines...

$END

Optional. This line specifies the report heading text lines. <start> specifies the column in which the specified text starts. The default is 1 (one).

This is used to facilitate entry of long hardcopy report lines with 80-character screen editors. The number of heading lines is defined by the first $HEAD specification encountered—subsequent $HEAD specifications may not exceed this number of lines.

$TEXT <start>

...text lines...

$END

Optional. These lines specify the fixed text label lines to appear in the log report. <start> specifies the column in which specified text starts. The restrictions for $HEAD also apply to $TEXT.

$DEFINE <identifier> <expression>

Optional. This line associates as an identifier with a string or numeric expression value. The identifiers can be used as item qualifiers in the next section.

- <identifier> is any string sequence up to 32 characters, starting with an alphabetical character.
- <expression> is one of the following:
  - A decimal, hexadecimal, or octal constant.
  - A sequence of up to 4 numerical constants, separated by periods.
  - A string of consecutive, non-blank characters, starting with a non-numeric character.
  - A quoted string, using either double or single quotation marks.
  -

<item-name>[:<qualifier>]<row> <col> <length> <label>

This line specifies on item display.

- <item-name> is the name of the item. Global block items cannot have an item qualifier. All other items must have one.
- <qualifier> is a value that identifies which block in a multiple-block-type item is requested. This can be:
  - The word "Total" (the case must match).
  - A decimal, hexadecimal, or octal constant.
  - An identifier defined in a previous $DEFINE statement.
- <row> is the row in which the item should be displayed.
- <col> is the column in which the item should be displayed.
- <length> is the width of the field displayed.
- <label> is the unique text string (optional). It is not used by the log reporting program, but will be used by the report editor.
-

$BAR <row>,<col>,<length>,<label>,<item-name>,"<code>"

.

.

$END <scale>

This set of lines specifies a horizontal bar chart display, in which:

- <row> is the row in which the bar should be displayed.
- <col> is the column in which the bar should be displayed.
- <length> is the length of the bar chart displayed.

- <label> is a unique text string (optional). This is not used by the log reporting program, but will be used by the report editor.
- <item_name> is the name of the item to display. Disk and workload group items must be qualified. If multiple items are specified, they must all contain the same number of decimal places. This is generally not a problem, because only similar items will be combined in one bar graph, and similar items will all have the same number of decimal places.
- <code> is a single character to be used to represent this item in the bar graph. This can be blank.
- <scale> is the scaling factor. In other words, the total cumulative item value which completely fills the bar chart. It can contain as many decimal places as the specified items.

SOSLOGX Report File Example

There are several SOSLOGX reports stored in /etc/opt/lps/rpt/reprtdef. An example is provided here, for your convenience.

```
$TITLE "Global Summary"

$KEY " GLOBAL ","SUMMARY ",12


$TEXT

*** hh:mm ***************************************************************************

+---------------- CPU Utilization % ----------------+-------- CPU Misc --------+

|     TOTAL BUSY: nnn.n       HIGH PRI:  nnn.n      |  Capture         nnn.n   |

|  User   nnn.n      Sys   nnn.n      Vflt  nnn.n   |  RunQ Avg        nnn.n   |

|  Real   nnn.n      Intr  nnn.n      Idle  nnn.n   |  5 Min RunQ Avg  nnn.n   |

|  Nice   nnn.n      C Sw  nnn.n                    |  RunQ Busy %     nnn.n   |

|  NNice  nnn.n      Trap  nnn.n                    |                          |

|------------------------- Global MEM/VM Statistics -------------------------|

|  Read Hit %   nnn.n           Page Outs   nn.n/s           Mem Used %  nn.n  |

|  Write Hit %  nnn.n           Deact Byte nnnnn/s           VM Used %   nn.n  |

|------------------------- Global Misc Statistics -------------------------|

| #Sessions:nnnnn  #Procs: nnnnn  #Wait IO:  nnnnn  Ttyin:       nnnnnn(nnnnn) |

| #Active:  nnnnn  #Active:nnnnn  #Deact:     nnnn  Avg Response Time: nnnn.n  |

|------------------------- Global Disk Statistics -------------------------|

|Disk:Rt/IO%/QL       c0t5d0: nn/nnn/nnnn.n            c0t6d0: nn/nnn/nnnn.n   |
```

```
+--------------------------------------------------------------------------+
$END

$DEFINE D1 c0t5d0
$DEFINE D2 c0t6d0

TIME                  1,  5, 5



CPU-BUSY%             3, 19, 5
CPU-HIGH-PRI-BUSY%    3, 42, 5

CPU-USER%             4, 11, 5
CPU-REAL%             5, 11, 5
CPU-NICE%             6, 11, 5
CPU-NNICE%            7, 11, 5

CPU-SYS%              4, 28, 5
CPU-INTR%             5, 28, 5
CPU-CSW%              6, 28, 5
CPU-TRAP%             7, 28, 5

CPU-VFLT%             4, 45, 5
CPU-IDLE%             5, 45, 5

CPU-CAPTURE           3, 72, 5
CPU-QUEUE-LEN         4, 72, 5
CPU-QUEUE-5M          5, 72, 5
CPU-QUEUE-BUSY%       6, 72, 5

VM-READ-HIT%          9, 17, 5
VM-WRITE-HIT%        10, 17, 5
```

```
VM-PAGE-OUT-RATE      9, 45, 4
VM-DEACT-BPS         10, 44, 5
VM-USED-MEM%          9, 74, 4
VM-USED-VM%          10, 74, 4

MISC-SESSIONS        12, 13, 5
MISC-ACT-SESSIONS    13, 13, 5
MISC-PROCESSES       12, 28, 5
MISC-ACT-PROCESSES   13, 28, 5
MISC-PROC-BLOCK-IO   12, 46, 5
MISC-PROC-DEACT      13, 47, 4
MISC-TTYIN-COUNT     12, 66, 6
MISC-TTYIN-RATE      12, 73, 5
MISC-RESP-TIME       13, 72, 6

DISC-IO-RATE:D1      15, 31, 2
DISC-IO%:D1          15, 34, 3
DISC-QUEUE-LEN:D1    15, 38, 6

DISC-IO-RATE:D2      15, 64, 2
DISC-IO%:D2          15, 67, 3
DISC-QUEUE-LEN:D2    15, 71, 6
```

31

SOSLOGX MENUS AND OPTIONS

The SOSLOGX Main Commands Screen

The MAIN COMMANDS screen in SOSLOGX contains a list of single-key shortcut commands that can be invoked from any SOSLOGX display screen.

To display the MAIN COMMANDS menu, type **?** from any SOSLOGX screen.

```
                                MAIN COMMANDS
Navigation Keys:
  +  -  Scroll ahead                        >  -  Skip forward
  -  -  Scroll back                         <  -  Skip back
  s  -  Report selection menu               t  -  Select time prompt

Logfile Commands:
  i  -  Display file index                  l  -  Display logfile list
  p  -  Print report                        r  -  Reload report definitions
  u  -  Update

Configuration:
  d  -  Toggle process display              y  -  Toggle ext. process display
  o  -  Options menu

Exporting Data:
  R  -  Export report                       P  -  Perfgall export
  c  -  Report compiler

Other:
  m  -  More func keys                     ^L  -  Refresh screen
  ?  -  Command help (this screen)          e  -  Exit program

                      [Press ESC to return to program]
```

Figure 31.1 *SOSLOGX MAIN COMMANDS screen*

Each command is described in the next section of this chapter.

Main Commands

The Curses library enables SOS Performance Advisor to run with non-HP terminals. Host systems using non-HP terminals will not have function keys available to them, therefore, the SOSLOGX key commands have been modified to be more intuitive. However, because the function keys could be removed from the application altogether in the future, use of the command keys is recommended.

Navigation Commands

Table 31.1 *SOSLOGX navigation command keys*

Key(s)	Command
+	Scroll ahead
-	Scroll back
<	Skip backward
>	Skip forward
s	Display the report selection menu
t	Select the time prompt

Logfile Commands

Table 31.2 *SOSLOGX logfile command keys*

Key(s)	Command
i	Display the file index
l	Display the logfile list
p	Print the report
r	Reload the report definitions
u	Update the report

Configuration Commands

Table 31.3 *SOSLOGX configuration command keys*

Key(s)	Command
d	Toggle the process display
o	Display the Options menu
y	Toggle the extended process display

Data Export Commands

Table 31.4 *SOSLOGX data export command keys*

Key(s)	Command
c	Compile the report
R	Export Performance Gallery Gold data

Other Commands

Table 31.5 *SOSLOGX other command keys*

Key(s)	Command
?	Display the Main Commands screen
Ctrl+l	Refresh the screen
e	Exit the program
m	Cycle through the function keys

The SOSLOGX Report Format Selection Menu

The Report Format Selection Menu contains a list of system performance data reports that can be compiled by SOSLOGX.

To display the Report Format Selection Menu, type a lowercase **s** from any SOSLOGX screen.

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: --/--/--  --:--
                          Report Format Selection Menu

 1 CPU Summary Chart                    9 NFS Client Summary
 2 Global Summary                      10 Workload Summary
 3 Memory Summary Chart                11 Workload Detail (INTERACT)
 4 Memory Summary                      12 Response Time Chart
 5 Disk Summary                        13 FS Space Summary
 6 Disk Summary Chart                  14 DNLC Summary
 7 Network Summary                     15 System Configuration
 8 Net IF Summary

Press return to go to main screen.
Enter report format option:
```

Figure 31.2 *SOSLOGX Report Format Selection Menu screen*

To view one of the reports listed in the Report Format Selection Menu, type the report's corresponding command key at the command prompt. Each screen is described briefly in Table 31.6. The reports are described in detail in "SOSLOGX Reports" on page 213.

NOTE All command keys are case-sensitive.

Table 31.6 *SOSLOGX Report Format Selection Menu command keys*

Key	Report Format	Description
1	CPU Summary Chart	Reports the general state of one or more CPUs. For more information, see "SOSLOGX CPU Summary Chart" on page 213.
2	Global Summary	Contains a basic, overall picture of your system's performance. For more information, see "SOSLOGX Global Summary" on page 214.

Key	Report Format	Description
3	Memory Summary Chart	Displays memory performance data in graphical format. For more information, see “SOSLOGX Memory Summary Chart” on page 215.
4	Memory Summary	Provides a detailed look at memory performance data in tabular format. For more information, “SOSLOGX Memory Summary” on page 216.
5	Disk Summary	Contains a table of performance data for all disks on the system. For more information, see “SOSLOGX Disk Summary” on page 217.
6	Disk Summary Chart	Displays a summary of disk activities in graphical format. For more information, see “SOSLOGX Disk Summary Chart” on page 218.
7	Network Summary	Displays network performance information, including protocol data and network interface information. For more information, see “SOSLOGX Network Summary” on page 219.
8	Net If Summary	Contains information about the network interface. For more information, see “SOSLOGX Net If (Network Interface) Summary” on page 220.
9	NFS Client Summary	Provides information about the Network File System (NFS). For more information, see “SOSLOGX NFS Client Summary” on page 221.
10	Workload Summary	Provides general workload information. For more information, see “SOSLOGX Workload Summary” on page 222.
11	Workload Detail (INTERACT)	Provides detailed information about the INTERACT workload. For more information, see “SOSLOGX Workload Detail” on page 223.

Key	Report Format	Description
12	Response Time Chart	Displays system response times in graphical format. For more information, see "SOSLOGX Response Time Chart" on page 224.
13	FS Space Summary	Contains general information about the block and fragment size, space usage, and inode usage for each file system. For more information, see "SOSLOGX FS Space Summary" on page 225.
14	DNLC Summary	Reports statistics regarding file name lookups satisfied in the dynamic name lookup cache (DNLC). For more information, see "SOSLOGX DNLC Summary" on page 226.
15	System Configuration	Shows the current system configuration parameters. For more information, see "SOSLOGX System Configuration" on page 227.

The SOSLOGX Main Option Menu

The SOSLOGX MAIN OPTION MENU screen contains a set (and several subsets) of options that enable the user to configure the SOSLOGX program.

To access the SOSLOGX MAIN OPTION MENU, type **o** from any SOSLOGX screen.

```
SOSLOGX MAIN OPTION MENU

   1) Current log file location (/var/opt/lps/log/)
   2) Company name ()
   3) Use function keys to select reports (N)
   4) Maximum lines per report page (60)
   5) Display process information (N)
   6) Display extended process line (N)
   7) Data break configuration menu (SUBMENU)
   8) Log information exclusions (SUBMENU)
   9) Export file configuration menu (SUBMENU)
  10) Performance Gallery configuration (SUBMENU)









Which Option: _
```

Figure 31.3 *SOSLOGX MAIN OPTION MENU*

Main Options

To enable an option:

1. Type the option command key from the SOSLOGX MAIN OPTION MENU and press the Enter key.
2. Enter a new parameter at the secondary command prompt. Press Enter.
3. Press Enter again to exit the SOSLOGX MAIN OPTION MENU.
4. At the Should these options be saved permanently? prompt:
   - Press the Enter key to return to the SOSLOGX program without saving the options permanently.
   - Type **Y** (Yes) to save the changes permanently and then press the Enter key.

Information about each option is described to assist you.

NOTE All command keys are case-sensitive.

Current log file location

The current location of the SL log file is shown in parentheses. To load a different log file:

1 From the SOSLOGX MAIN OPTION MENU, type the command key for the Current file location option. Press the Enter key.

2 At the secondary prompt, type the location of the new SL file. Press the Enter key.

Company name

By default, the company name is not included in the SOSLOGX reports. To add the name of your company or another brief headline for your SOSLOGX reports:

1 From the SOSLOGX MAIN OPTION MENU, type the command key for the Company name option. Press the Enter key.

2 At the secondary prompt, type a company name, system name, or another headline (up to 43 alpha-numeric characters). Press the Enter key.

The headline is inserted into the banner line of the SOSLOGX report.

Use function keys to select reports

The function keys, when available, are displayed in the bottom portion of the soslogx screens. By default, they are not used to select soslogx reports. To enable/disable the function keys to select reports:

1 From the SOSLOGX MAIN OPTION MENU, type the command key for the Use function keys to select reports option. Press the Enter key.

2 At the secondary prompt, type **Y** (Yes) to enable the option, or **N** (No) to disable the option. Press Enter.

Maximum lines per report page

By default, soslogx reports contain up to 60 lines of information per page. To increase or decrease the maximum threshold:

1 From the SOSLOGX MAIN OPTION MENU, type the command key for the Maximum lines per report page option. Press the Enter key.

2 At the secondary prompt, type a new maximum threshold. Press Enter.

Display process information

To include/exclude PROCESS STATISTICS in the Global Summary report:

1 From the SOSLOGX MAIN OPTION MENU, type the command key for the Display process information option. Press the Enter key.

2 At the secondary prompt, type **Y** (Yes) to enable the option, or **N** (No) to disable the option. Press Enter.

Display extended process line

To include/exclude PROCESS STATISTICS in the Global Summary report:

1 From the SOSLOGX MAIN OPTION MENU, type the command key for the Display process information option. Press the Enter key.

2 At the secondary prompt, type **Y** (Yes) to enable the option, or **N** (No) to disable the option. Press Enter.

Data break configuration (SUBMENU)

The Data break configuration submenu lists options that average the data into larger units of time, so the system performance is shown for a day, a week, or a month.

To view the Data break configuration submenu, type the command key for the data break configuration option. Press the Enter key.

```
SOSLOGX MAIN OPTION MENU
  Data break configuration menu

   1) Force data break at end of logfile (N)
   2) Force data break at end of day (Y)









Which Option:
```

Figure 31.4 *SOSLOGX Data break configuration submenu*

The Data break configuration options are listed and described in the next table.

Table 31.7 *SOSLOGX Data break configuration options*

Option	Default	Description
Force data break at end of logfile	N	By default, the boundary between data files is transparent, or "invisible", to the user. To force a break between data files on the report screen, enter **Y** (Yes).
Force data break at end of day	Y	By default, there is a break after the last data record for each day. To remove this break, enter **N** (No).

Log information exclusions (SUBMENU)

The Log information exclusions submenu contains options that can be set to exclude specific day and time ranges from the data display. The excluded data will not actually be removed from the SL file, but it will not appear in the soslogx reports.

The Log information exclusions options enable the user to exclude performance data collected during days or periods of low and or unusual activity that could skew analysis of the system's general performance.

NOTE Do not exclude log information when preparing data for export to the Performance Gallery Gold application. Ensure the default settings are enabled.

To view the Log information exclusions submenu, type the command key for the Log information exclusions option from the SOSLOGX MAIN OPTION MENU (see Figure 31.5).

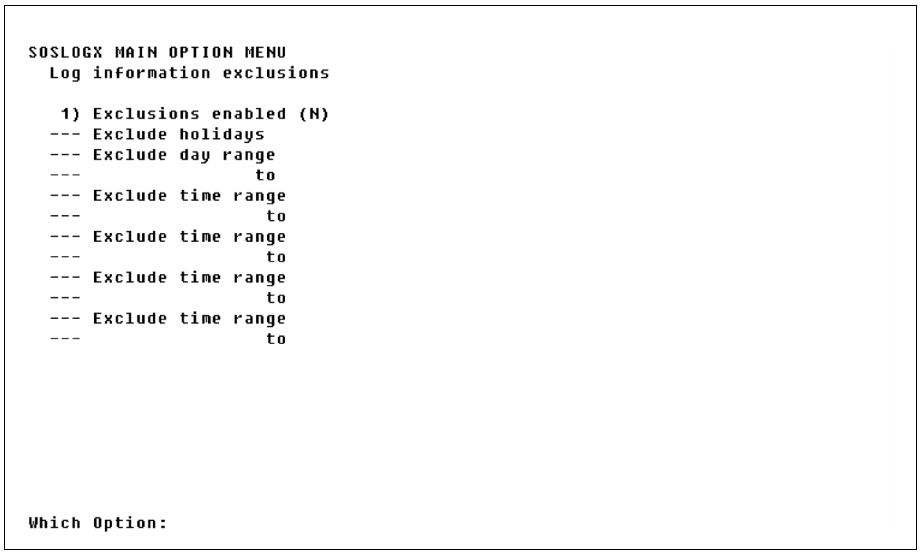


Figure 31.5 *SOSLOGX Log information exclusions submenu*

The Log information exclusions options are listed and described in the next table.

Table 31.8 *SOSLOGX Log information exclusion options*

Option	Default	Description
Exclusions enabled	N	By default, exclusions are disabled. To set and enable one or more exclusions, type Y (Yes) and press Enter—the subsequent options will be activated.
Exclude holidays	N	To exclude holidays (as defined in the holidays.dat file), type Y (Yes) and press Enter. For information about the holiday.dat file, see “SOS holidays File” on page 69.

Option	Default	Description
Exclude day range	0=None	To exclude a range of days, type the corresponding number of the first day in the range of days. For example: 0=None (exclude no days) 1=Sunday 2=Monday 3=Tuesday 4=Wednesday 5=Thursday 6=Friday 7=Saturday
to	0=None	Type the corresponding number of the last day in the excluded day range.
Exclude time range	00:00	To exclude a specific range of time, type the start of this range in hours and minutes (hh:mm).
to	00:00	Type the end of the excluded time range (hh:mm).

Additional time ranges can be excluded. The progression of options allows up to four different time ranges to be excluded from each day or day range. For example, to report data for normal business hours only (Monday through Friday, 8:00 AM to 5:00 PM, no holidays), you would exclude data from weekends, holidays, the early morning hours, and the night-time hours.

Export file configuration menu (SUBMENU)

The options in the Export file configuration submenu will format the file that receives the logged data to be exported to a third-party application for analysis. The purpose of these options is to make the file format compatible with the import functions of popular spreadsheet, database, and graphics applications.

NOTE Do not employ these options when preparing data for export to the Performance Gallery Gold application. Ensure the default settings are enabled.

To view the Export file configuration submenu, type the command key for the Export file configuration menu option from the SOSLOGX MAIN OPTION MENU.

```
SOSLOGX MAIN OPTION MENU
  Export file configuration menu

   1) Generate item label heading line (Y)
   2) Enclose item labels in quotes (Y)
   3) Include log date in data line (N)
  --- Date format option
  --- Enclose date in quotes
   6) Include log time in data line (Y)
   7) Time format option (1-24 hr)
   8) Enclose time in quotes (Y)
   9) Separate items with commas (Y)









Which Option:
```

Figure 31.6 *SOSLOGX Export file configuration submenu*

The Export file configuration options are listed and described in the next table.

Table 31.9 *SOSLOGX Export file configuration options*

Option	Default	Description
Generate item label heading line	Y	The item label heading line is provided by default. To eliminate the heading line, choose **N** (No).
Enclose item labels in quotes	Y	The data item labels are enclosed in quotation marks (" "). To eliminate the quotation marks, choose **N** (No).
Include log date in data line	N	To include the log date in the data line, enter **Y** (Yes). The two subsequent options will be activated.

Option	Default	Description
Date format option	1-mm/dd/yy	To change the format of the log date, enter the corresponding number: 1=mm/dd/yy 2=mmddyy 3=dd mmm yy 4=dd.mm.yy
Enclose date in quotes	Y	The log date will be enclosed in quotation marks, by default. To remove the quotation marks, enter **N** (No).
Include log time in data line	Y	The log time will be included in the data line. To eliminate this information from the data line, enter **N** (No).
Time format option	1=24 hr	The time format options are: 1=24 hour 2=AM/PM
Enclose time in quotes	Y	The log time will be enclosed in quotation marks, by default. To remove the quotation marks, enter **N** (No).
Separate items with commas	Y	By default, the data items in the export file are comma-delimited. To send the data without commas, enter **N** (No).

Performance Gallery configuration (SUBMENU)

To view the Performance Gallery configuration submenu, type the command key for the Performance Gallery configuration option from the SOSLOGX MAIN OPTION MENU.

```
SOSLOGX MAIN OPTION MENU
  Performance Gallery configuration

   1) Export Data configuration (SUBMENU)
   2) Export Thresholds configuration (SUBMENU)









Which Option: _
```

Figure 31.7 *SOSLOGX Performance Gallery configuration submenu*

From the Performance Gallery configuration submenu, you can access the following configuration menus:

- Export Data configuration submenu (see “Export Data configuration Submenu” on page 210).
- Export Thresholds configuration submenu (see “Export Thresholds configuration Submenu” on page 212).

Export Data configuration Submenu

To display the Export Data configuration submenu, type the corresponding command key from the SOSLOGX Performance Gallery configuration submenu.

```
SOSLOGX MAIN OPTION MENU
  Performance Gallery configuration
    Export Data configuration

   1) CPU Data (Y)
   2) Buffer Cache Data (Y)
   3) DNLC Cache Data (Y)
   4) Inode Cache Data (Y)
   5) VM Data (Y)
   6) Misc Data (Y)
   7) Disk Data (Y)
   8) Network Protocol Data (Y)
   9) Network Interface Data (Y)
  10) NFS Data (N)
  11) NFS Global Data (Y)
  12) RPC Data (Y)
  13) Workload Data (Y)
  14) Process Data (N)
  15) Swap Data (N)
  16) File System Space Data (N)


Which Option: _
```

Figure 31.8 *SOSLOGX Export Data configuration submenu*

The Export Data configuration options are listed and described in the next table.

Table 31.10 *SOSLOGX Export Data configuration options*

Option	Default	Description
CPU Data	Y	By default, any CPU data in the collection will be exported. To eliminate CPU data from the export file, enter **N** (No).
Buffer Cache Data	Y	By default, buffer cache data will be exported. To eliminate this data from the export file, enter **N** (No).
DNLC Cache Data	Y	By default, DNLC (dynamic name lookup cache) will be exported. To eliminate this data from the export file, enter **N** (No).
Inode Cache Data	Y	By default, inode cache data will be exported. To eliminate this data from the export file, enter **N** (No).

Option	Default	Description
VM Data	Y	By default, VM (virtual memory) data will be exported. To eliminate this data from the export file, enter **N** (No).
Misc Data	Y	By default, miscellaneous data will be exported. To eliminate this data from the export file, enter **N** (No).
Disk Data	Y	By default, disk data will be exported. To eliminate this data from the export file, enter **N** (No).
Network Protocol Data	Y	By default, network protocol data will be exported. To eliminate this data from the export file, enter **N** (No).
Network Interface Data	Y	By default, network interface data will be exported. To eliminate this data from the export file, enter **N** (No).
NFS Data	Y	By default, NFS (network file system) will be exported. To eliminate this data from the export file, enter **N** (No).
NFS Global Data	Y	By default, global (system-wide) NFS data will be exported. To eliminate this data from the export file, enter **N** (No).
RPC Data	Y	By default, RPC (remote procedure call) data will be exported. To eliminate this data from the export file, enter **N** (No).
Workload Data	Y	By default, workload data will be exported. To eliminate this data from the export file, enter **N** (No).
Process Data	N	By default, process data will be exported. To eliminate this data from the export file, enter **N** (No).
Swap Data	N	By default, swap data will be exported. To eliminate this data from the export file, enter **N** (No).
File Systems Space Data	N	By default, file systems space data will be exported. To eliminate this data from the export file, enter **N** (No).

Export Thresholds configuration Submenu

To display the Export Thresholds configuration submenu, type the corresponding command key from the SOSLOGX Performance Gallery configuration submenu.

```
SOSLOGX MAIN OPTION MENU
  Performance Gallery configuration
    Export Thresholds configuration

   1) Max Number of Discs Exported (100)
   2) Max Number of Network ifs Exported (10)
   3) Max Number of NFS Systems Exported (50)
   4) Max Number of Workloads Exported (50)
   5) Max Number of Processes Exported (20)
   6) Max Number of Swaps Exported (20)
   7) Max Number of File System Space Exported (100)
   8) Performance Gallery File Size Limit (10000)









Which Option:
```

Figure 31.9 *SOSLOGX Export Thresholds configuration submenu*

The Export Thresholds configuration options are listed in Table 31.11. Their meanings are self-explanatory.

Table 31.11 *SOSLOGX Export Thresholds configuration options*

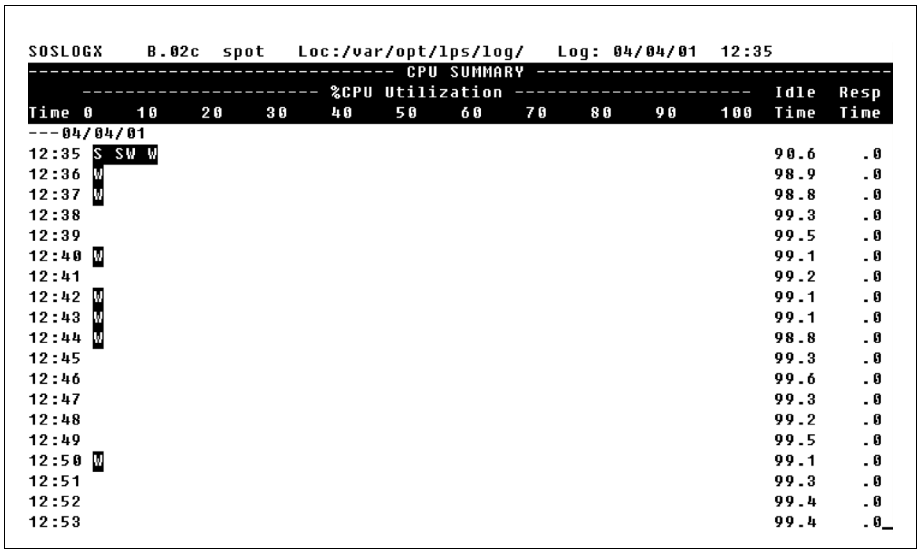
Option	Default Setting
Max number of Discs Exported	100
Max number of Network Ifs (interfaces) Exported	10
Max Number of NFS Systems Exported	50
Max Number of Workloads Exported	50
Max Number of Processes Exported	20
Max Number of Swaps Exported	20
Max Number of File System Space Exported	100

32

SOSLOGX REPORTS

SOSLOGX CPU Summary Chart

The CPU Summary Chart in SOSLOGX displays general CPU statistics in graphical format, similar to the CPU SUMMARY in SOS.



```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---------------------------------- CPU SUMMARY ----------------------------------
     ---------------------- %CPU Utilization ----------------------  Idle  Resp
Time 0    10    20    30    40    50    60    70    80    90    100  Time  Time
---04/04/01
12:35 S SW W                                                        90.6    .0
12:36 W                                                             98.9    .0
12:37 W                                                             98.8    .0
12:38                                                               99.3    .0
12:39                                                               99.5    .0
12:40 W                                                             99.1    .0
12:41                                                               99.2    .0
12:42 W                                                             99.1    .0
12:43 W                                                             99.1    .0
12:44 W                                                             98.8    .0
12:45                                                               99.3    .0
12:46                                                               99.6    .0
12:47                                                               99.3    .0
12:48                                                               99.2    .0
12:49                                                               99.5    .0
12:50 W                                                             99.1    .0
12:51                                                               99.3    .0
12:52                                                               99.4    .0
12:53                                                               99.4    .0
```

Figure 32.1 *SOSLOGX CPU Summary Chart report*

For information about the SOSLOGX CPU Summary Chart data, please refer to “SOS CPU Summary” on page 101.

SOSLOGX Global Summary

The Global Summary in SOSLOGX displays system-wide performance data, similar to the Global Summary in SOS:

- CPU utilization statistics
- CPU miscellaneous statistics
- Memory and virtual memory statistics
- Miscellaneous statistics
- Disk statistics
- Process statistics
- Workload statistics

An example SOSLOGX Global Summary screen is shown in Figure 32.2. For information about global data, refer to "SOS Global Summary" on page 77.

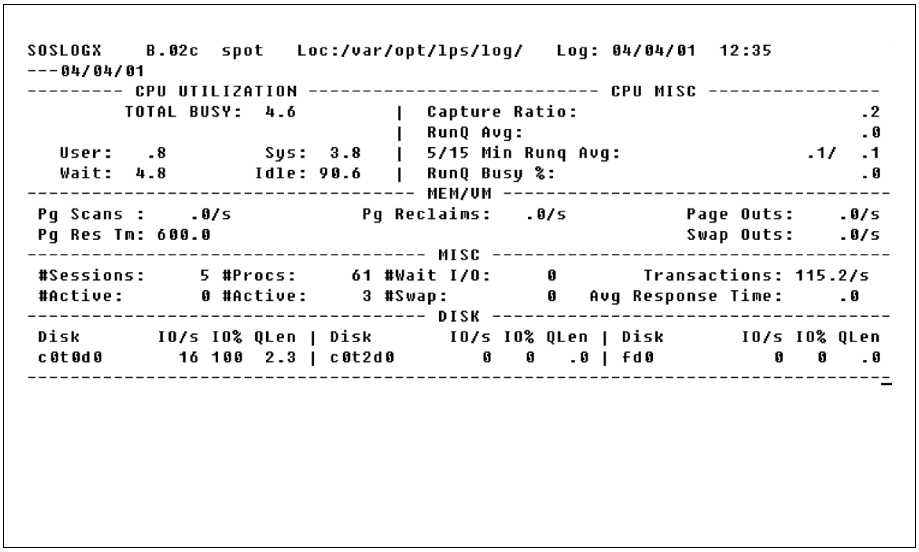


Figure 32.2 *SOSLOGX Global Summary report*

SOSLOGX Memory Summary Chart

The Memory Summary Chart in SOSLOGX displays memory performance statistics in a graphical format.

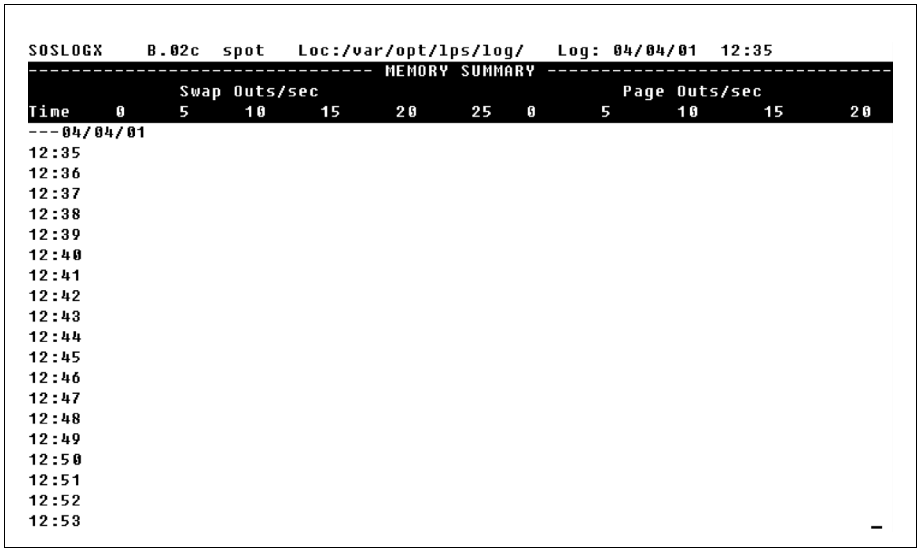


Figure 32.3 *SOSLOGX Memory Summary Chart report*

For information about the data in the SOSLOGX Memory Summary Chart, refer to “SOS Memory Summary” on page 107.

SOSLOGX Memory Summary

The Memory Summary in SOSLOGX displays a detailed look at memory and virtual memory performance, similar to the Memory Summary in SOS.

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
---------- MEM/VM ALLOCATION ---------------------- PROC MEM STATUS ------------
          Size       Used       Free    |                Run     Sleep     Total
   Mem  262144     244944      17200    |    Loaded        1        60        61
   VM   328816      87984     240832    |    Swapped       0         0         0
------------------------------------ PAGING ------------------------------------
            In(/s)    Out(/s)    In(byte/s)   Out(byte/s)         #In        #Out
  Pages         .0         .0             0             0          0           0
  Swaps         .0         .0             0             0          0           0
  Minor Pg Faults: 19.3/s                                Major Page Faults:   .0/s
-------------------------------- PAGE SCANNER --------------------------------
  Page Recs:   .0/s            Page Scans:   .0/s            Ave Page Res:600.0
--------------------------- MEMORY MANAGEMENT CONFIG ---------------------------
 lotsfree:   493              throttlefree:   123              page size:  8192
  desfree:   246           priority paging:     0               fastscan:  8192
  minfree:   123                   maxpgio:    40               slowscan:   100
------------------------------ FSFLUSH CONFIGURATION ------------------------------
 ufs_LW: 262144                    autoup:    30                   doiflush: 1
 ufs_HW: 393216                 t_fsflushr:     5                dopageflush: 1
-------------------------------------------------------------------------------
```

Figure 32.4 *SOSLOGX Memory Summary report*

For information about the data in the SOSLOGX Memory Summary Chart, refer to "SOS Memory Summary" on page 107.

SOSLOGX Disk Summary

The Disk Summary in SOSLOGX provides a summary of performance data for all disks on the system.

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
--- 12:35 ----------------------- DISK SUMMARY ----------------------------------
                              Wait       Service       Rates (/s)    Avg Size(b)
Dev       IO%    Qlen  Util%  Time(ms)   Time(ms)    Read  Write    Read   Write
-------------------------------------------------------------------------------
c0t0d0   100     2.3     .0      9.8       12.5        .0   15.7       0    7560
c0t2d0     0      .0     .0       .0         .0        .0     .0       0       0
fd0        0      .0     .0       .0         .0        .0     .0       0       0
-------------------------------------------------------------------------------
TOTALS   100      .6     .0      9.8       12.5        .0   15.7       0    7560
--- 12:36 ----------------------- DISK SUMMARY ----------------------------------
                              Wait       Service       Rates (/s)    Avg Size(b)
Dev       IO%    Qlen  Util%  Time(ms)   Time(ms)    Read  Write    Read   Write
-------------------------------------------------------------------------------
c0t0d0   100      .1     .0      5.7       12.9        .1    1.0    1024    7252
c0t2d0     0      .0     .0       .0         .0        .0     .0       0       0
fd0        0      .0     .0       .0         .0        .0     .0       0       0
-------------------------------------------------------------------------------
TOTALS   100      .0     .0      5.7       12.9        .1    1.0    1024    7252
```

Figure 32.5 *SOSLOGX Disk Summary report*

For information about the data presented in the SOSLOGX Disk Summary, refer to “SOS Disk I/O Summary” on page 111.

SOSLOGX Disk Summary Chart

The Disk Summary Chart in SOSLOGX displays disk performance data in graphical format.

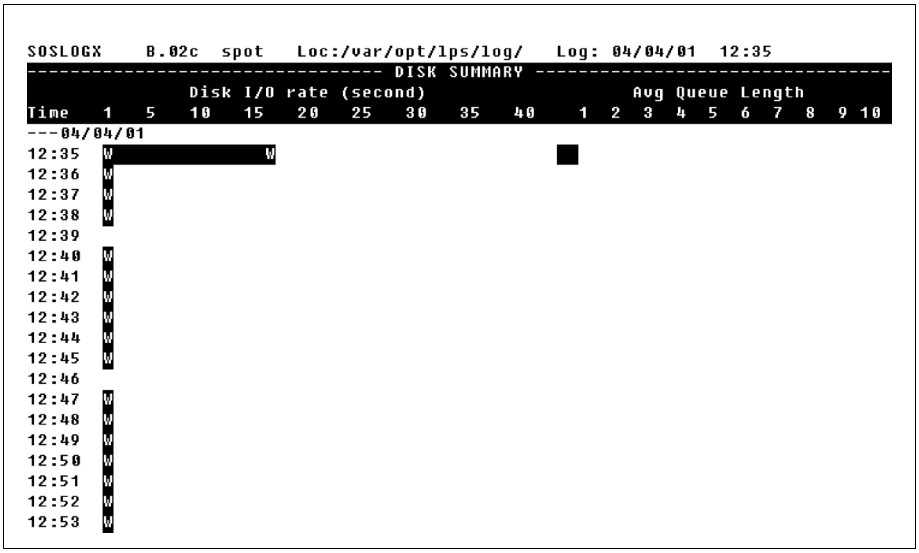
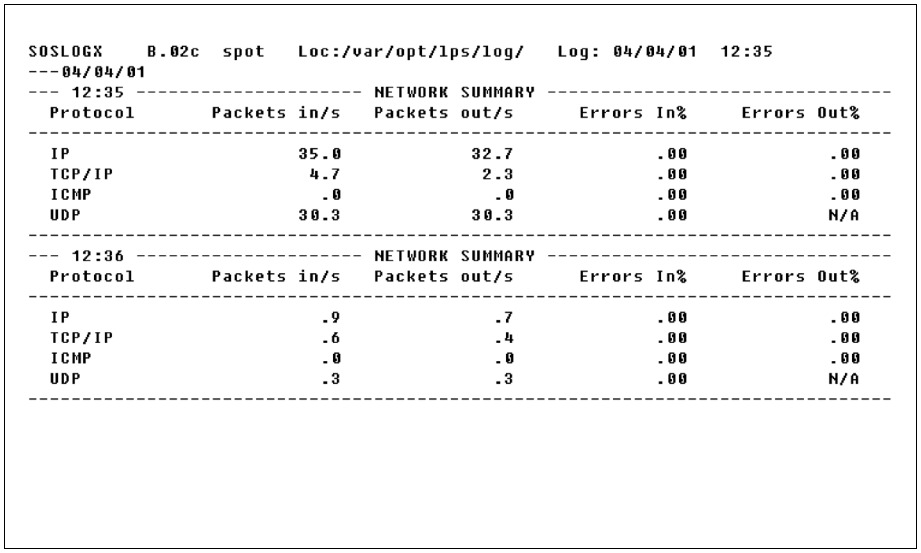


Figure 32.6 *SOSLOGX Disk Summary Chart report*

For information about the data presented in the SOSLOGX Disk Summary, refer to "SOS Disk I/O Summary" on page 111.

SOSLOGX Network Summary

The Network Summary in SOSLOGX displays network performance information.



```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
--- 12:35 --------------------- NETWORK SUMMARY ---------------------------------
  Protocol       Packets in/s   Packets out/s      Errors In%     Errors Out%
-------------------------------------------------------------------------------
  IP                     35.0            32.7             .00             .00
  TCP/IP                  4.7             2.3             .00             .00
  ICMP                     .0              .0             .00             .00
  UDP                    30.3            30.3             .00             N/A
-------------------------------------------------------------------------------
--- 12:36 --------------------- NETWORK SUMMARY ---------------------------------
  Protocol       Packets in/s   Packets out/s      Errors In%     Errors Out%
-------------------------------------------------------------------------------
  IP                       .9              .7             .00             .00
  TCP/IP                   .6              .4             .00             .00
  ICMP                     .0              .0             .00             .00
  UDP                      .3              .3             .00             N/A
-------------------------------------------------------------------------------
```

Figure 32.7 *SOSLOGX Network Summary report*

For information about the data displayed in the SOSLOGX Network Summary, please refer to “SOS Network Summary” on page 121.

SOSLOGX Net If (Network Interface) Summary

The Net If Summary in SOSLOGX displays performance information as it pertains to the network interface.

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
--- 12:35 ---------------- NETWORK INTERFACE SUMMARY ----------------------------
 Interf   Packets In/s  Packets Out/s  Defer%   Coll%  Err In%  Err Out%  Nocan
 ------------------------------------------------------------------------------
 lo0              .0             .0       .00     .00      .00       .00     .0
 hme0            35.7           32.7       .00     .00      .00       .00     .0
------------------------------------------------------------------------------
 TOTALS          35.7           32.7       .00     .00      .00       .00     .0
--- 12:36 ---------------- NETWORK INTERFACE SUMMARY ----------------------------
 Interf   Packets In/s  Packets Out/s  Defer%   Coll%  Err In%  Err Out%  Nocan
 ------------------------------------------------------------------------------
 lo0              .1             .1       .00     .00      .00       .00     .0
 hme0            1.1             .7       .00     .00      .00       .00     .0
------------------------------------------------------------------------------
 TOTALS           1.2             .8       .00     .00      .00       .00     .0
--- 12:37 ---------------- NETWORK INTERFACE SUMMARY ----------------------------
 Interf   Packets In/s  Packets Out/s  Defer%   Coll%  Err In%  Err Out%  Nocan
 ------------------------------------------------------------------------------
 lo0              .0             .0       .00     .00      .00       .00     .0
 hme0             .6             .2       .00     .00      .00       .00     .0
------------------------------------------------------------------------------
 TOTALS           .6             .2       .00     .00      .00       .00     .0
```

Figure 32.8 *SOSLOGX Net If Summary report*

For information about the data displayed in the SOSLOGX Network Summary, please refer to "NETWORK INTERFACES" on page 122.

SOSLOGX NFS Client Summary

The NFS Client Summary in SOSLOGX displays bad NFS call information associated with the NFS client.

Bad NFS Calls

The Bad NFS Calls data item represents:

- The number of bad NFS calls accumulated during the current interval.
- The percentage of NFS calls that are bad NFS calls.

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
---  12:35 ---------------------- NFS CLIENT SUMMARY -----------------------------
                                 Bad NFS Calls *****
--------------------------------- NFS V2 PERCENT ---------------------------------
NULL       .0 GTATTR 100.0 STATTR     .0 ROOT       .0 LOOKUP     .0 RDLINK     .0
READ       .0 WCACHE     .0 WRITE      .0 CREATE     .0 REMOVE     .0 RENAME     .0
LINK       .0 SLINK      .0 MKDIR      .0 RMDIR      .0 RDDIR      .0 STATFS     .0
--------------------------------- NFS V3 PERCENT ---------------------------------
NULL       .0 GTATTR     .0 STATTR     .0 LOOKUP     .0 ACCESS     .0 RDLINK     .0
READ       .0 WRITE      .0 CREATE     .0 MKDIR      .0 SLINK      .0 MKNOD      .0
REMOVE     .0 RMDIR      .0 RENAME     .0 LINK       .0 RDDIR      .0 RDDIRP     .0
FSSTAT     .0 FSINFO     .0 PCONF      .0 COMMIT     .0
------------------------------------- RPC -----------------------------------------
 Calls     .3   Bad Calls     .0   Retrans     .0   Timeouts     .0   Badxids     .0
--------------------------------- NFS SERVERS ------------------------------------
                          No Resp  Rd Rate  Wr Rate   Wt Time  Srv Time  Avg QLen
--------------------------------------------------------------------------------
```

Figure 32.9 *SOSLOGX NFS Client Summary report*

For information about SOSLOGX NFS Client data, refer to “NFS Client Summary Screen Display Items” on page 126.

SOSLOGX Workload Summary

The Workload Summary in SOSLOGX displays workload statistics.

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
--- 12:35 -------------------- WORKLOAD SUMMARY ----------------        18 -----
No Group Name    %CPU       %User CPU    %Disk I/O   Mem (kb)      CPU (kb)
 1:INTERACT        .0            .0           .0       21784            0
 2:BATCH           .0            .0           .0        2616            0
 3:DAEMON         4.3           3.1        100.0      136824          170
 4:DEFAULT         .0            .0           .0           0            0
 5:
--- 12:36 -------------------- WORKLOAD SUMMARY ----------------        24 -----
No Group Name    %CPU       %User CPU    %Disk I/O   Mem (kb)      CPU (kb)
 1:INTERACT        .0          23.1           .0       21784            0
 2:BATCH           .0            .0           .0        2616            0
 3:DAEMON          .3           2.2        100.0      136856          180
 4:DEFAULT         .0            .0           .0           0            0
 5:
--- 12:37 -------------------- WORKLOAD SUMMARY ----------------        36 -----
No Group Name    %CPU       %User CPU    %Disk I/O   Mem (kb)      CPU (kb)
 1:INTERACT        .0          23.1           .0       20560            0
 2:BATCH           .0          50.0           .0        2616            0
 3:DAEMON          .6           2.4        100.0      135608          350
 4:DEFAULT         .0            .0           .0           0            0
 5:
```

Figure 32.10 *SOSLOGX Workload Summary report*

For information about the SOSLOGX Workload Summary statistics, refer to "WORKLOAD SUMMARY Data Items" on page 90.

SOSLOGX Workload Detail

The Workload Detail in SOSLOGX displays detailed information about a specific workload.

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
--------------------------------- WORKLOAD DETAIL ---------------------------------
 Workload: INTERACT                                        Proc Count:     11.0
------------------------------------ MEMORY ------------------------------------
   CPU %:        .0       |    RSS: 21784  | Trans :      0 |    Phyio in:      0
  CPU ms:         0       |    VSS: 29056  | Resp T:     .0 |   Phyio out:      0
       :                  |       :        |       :        |  Phyio in/s:     .0
  User %:        .0       |  Min/s:     .0 |       :        | Phyio out/s:     .0
   Sys %:        .0       |  Maj/s:     .0 |       :        |          IO%:     .0
  Trap %:        .0       |  Swp/s:     .0 |       :        |            :
---------------------------------- WAIT STATES ----------------------------------
   JOB:   0                          CPU:   0                         OTHR: 100
   PRI:   0       TFLT:   0       DFLT:   0       KFLT:   0       ULCK:   0
--------------------------------------------------------------------------------
```

Figure 32.11 *SOSLOGX Workload Detail report*

For information about the data presented in the SOSLOGX Workload Detail report, refer to “SOS Workload Detail” on page 173.

SOSLOGX Response Time Chart

The Response Time Chart in SOSLOGX displays the number of transactions per second and the average response time (seconds) recorded.

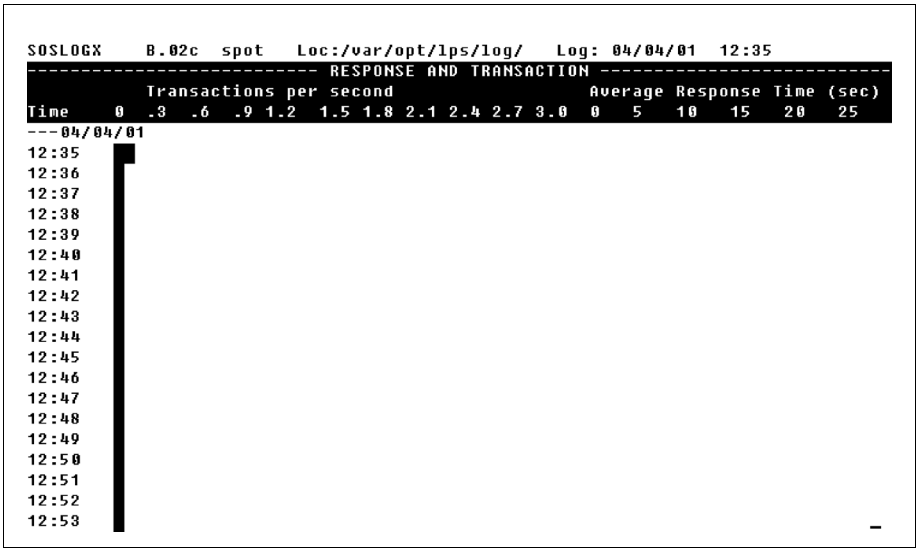


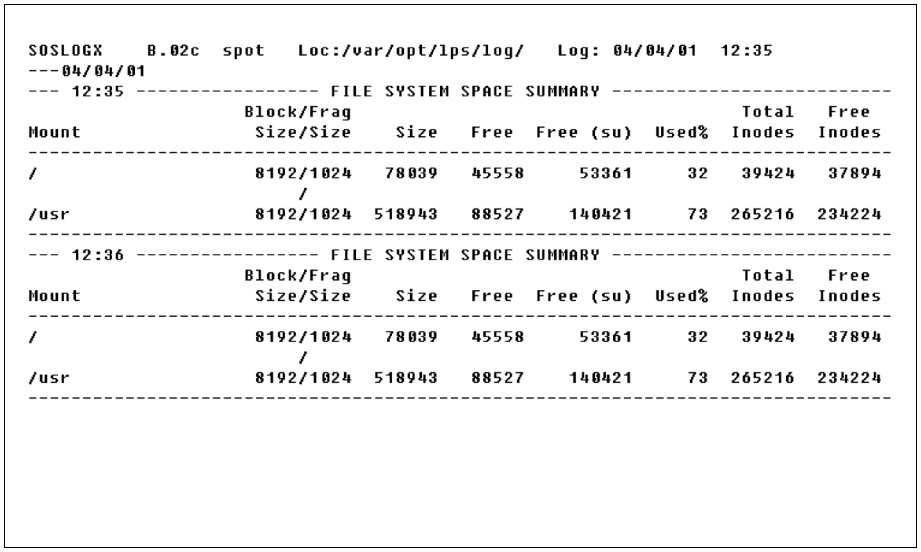
Figure 32.12 *SOSLOGX Response Time Chart report*

For descriptions of these data items, please refer to:

- "Transactions" on page 96
- "Avg Response Time" on page 96

SOSLOGX FS Space Summary

The FS Space Summary in SOSLOGX displays file system space information for each file system.



```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
--- 12:35 ----------------- FILE SYSTEM SPACE SUMMARY --------------------------
                   Block/Frag                                          Total   Free
Mount               Size/Size    Size   Free  Free (su)  Used%  Inodes  Inodes
-------------------------------------------------------------------------------
/                   8192/1024   78039   45558     53361     32   39424   37894
                       /
/usr                8192/1024  518943   88527    140421     73  265216  234224
-------------------------------------------------------------------------------
--- 12:36 ----------------- FILE SYSTEM SPACE SUMMARY --------------------------
                   Block/Frag                                          Total   Free
Mount               Size/Size    Size   Free  Free (su)  Used%  Inodes  Inodes
-------------------------------------------------------------------------------
/                   8192/1024   78039   45558     53361     32   39424   37894
                       /
/usr                8192/1024  518943   88527    140421     73  265216  234224
-------------------------------------------------------------------------------
```

Figure 32.13 *SOSLOGX FS Space Summary report*

For information about the data contained in the SOSLOGX FS Space Summary report, refer to “SOS File System Space Summary” on page 119.

SOSLOGX DNLC Summary

The DNLC Summary in SOSLOGX displays information about the DNLC (dynamic name lookup cache).

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
--- 12:35 ---------------------- DNLC SUMMARY ----------------------------------
  ncsize 17088                lookup rate *****                     hit %  99.4
-------------------------------------------------------------------------------
--- 12:36 ---------------------- DNLC SUMMARY ----------------------------------
  ncsize 17088                lookup rate  37.9                     hit %  98.7
-------------------------------------------------------------------------------
--- 12:37 ---------------------- DNLC SUMMARY ----------------------------------
  ncsize 17088                lookup rate  31.7                     hit %  99.6
-------------------------------------------------------------------------------
--- 12:38 ---------------------- DNLC SUMMARY ----------------------------------
  ncsize 17088                lookup rate  30.4                     hit %  99.6
-------------------------------------------------------------------------------
--- 12:39 ---------------------- DNLC SUMMARY ----------------------------------
  ncsize 17088                lookup rate  30.5                     hit %  99.7
-------------------------------------------------------------------------------
--- 12:40 ---------------------- DNLC SUMMARY ----------------------------------
  ncsize 17088                lookup rate  32.0                     hit %  99.6
-------------------------------------------------------------------------------
--- 12:41 ---------------------- DNLC SUMMARY ----------------------------------
  ncsize 17088                lookup rate  32.6                     hit %  99.6
-------------------------------------------------------------------------------
```

Figure 32.14 *SOSLOGX DNLC Summary report*

The data items in the SOSLOGX DNLC Summary are described in "DNLC CACHE SUMMARY" on page 147.

SOSLOGX System Configuration

The System Configuration report in SOSLOGX displays various configurable kernel parameters.

```
SOSLOGX    B.02c  spot   Loc:/var/opt/lps/log/   Log: 04/04/01  12:35
---04/04/01
--- 12:35 ------------------ SYSTEM CONFIGURATION -------------------------------
 system name: spot        os version: 5.6                    cpu type: sun4u
  serial num:  -2136990345 boot time: 18:04 08 MAR 2001     run level: 3
--------------------------- MEMORY MANAGEMENT CONFIG --------------------------
 lotsfree:   493              throttlefree:   123              page size:  8192
  desfree:   246           priority paging:     0               fastscan:  8192
  minfree:   123                   maxpgio:    40               slowscan:   100
------------------------------ FSFLUSH CONFIGURATION ----------------------------
 ufs_LW: 262144                     autoup:    30                   doiflush: 1
 ufs_HW: 393216                 t_fsflushr:     5                dopageflush: 1
---------------------------- CACHE/BUF CONFIGURATION --------------------------
 ufs_ninode: 17088       |         nbuf:    700        |               :
     ncsize: 17088       |       bufhwm:   5048        |               :
------------------------------ PROCESS CONFIGURATION ----------------------------
 rlim_fd_cur:   64    rlim_fd_max: 1024     maxuprc:  3941     max_nproc:  3946
------------------------------- IPC CONFIGURATION -------------------------------
     MESSAGES      msgmap:    0 |   SEMAPHORES     semvmx: 32767 |   SHARED MEM
 msgmax:     0     msgmni:    0 | semmap:   10     semaem: 16384 | shmmax: ****
 msgmnb:     0     msgseg:    0 | semmni:   10     semmnu:    30 | shmmni:  100
  msgsz:     0     msgtql:    0 | semmns:   60     semume:    10 | shmseg:    6
-------------------------------------------------------------------------------_
```

Figure 32.15 *SOSLOGX System Configuration report*

For information about the data items presented in the SOSLOGX System Configuration report, refer to “SOS System Configuration Summary” on page 149.

A

SOS/SOLARIS Pulse Points

Pulse points are the indicators of performance displayed in the SOS Pulse Points screen. For information about pulse point performance indicators, see “SOS Pulse Points Summary” on page 155.

The following SOLARIS pulse points are provided by John Herberg of Lund Performance Solutions and Craig Solomon of Lund Consulting Services. The performance ranges are generic for all SOLARIS systems—customizing them for your system is recommended. Please refer to the configuration instructions in “SOS ppoints File” on page 70.

Table A.1 *SOS/SOLARIS Pulse Points*

Performance Indicator	Performance Ranges		
	Normal	Problematic	Unacceptable
Processor Performance			
CPU Busy % The percentage of time the CPU spent executing the following activities instead of being in a pause or idle state: • Processing user and system process code. • Managing main memory. • Scheduling and dispatching processes (interrupts). • Processing context switches and overhead (external device activity).	less than 60	60 to 85	greater than 85
CPU High Pri Busy % The percentage of time the CPU spent executing high-priority system and user processes, interrupts, and overhead.	less than 60	60 to 85	greater than 85

Performance Indicator	Performance Ranges		
	Normal	Problematic	Unacceptable
Real Time Processing % The percentage of time the CPU spent serving online, interactive sessions ("real time" user processes). These processes run at a fixed high-priority status.	less than 5	5 to 10	greater than 10
Run Queue Average The average number of executable processes that waited for the CPU during a collection interval.	less than 5	5 to 10	greater than 10
System Processing % The percentage of time the CPU spent executing system calls or operating in kernel mode.	less than 10	10 to 20	greater than 20
Memory Performance			
Memory Used % The average percentage of main memory used during the collection interval.	less than 80	80 to 90	greater than 90
Page Outs/second The number of instances per second that a page out occurred during the collection interval. A page out is performed to move the least-needed pages from memory by writing them to swap space or to the file system. A page out occurs when physical memory becomes scarce.	less than 5	5 to 10	greater than 10

Performance Indicator	Performance Ranges		
	Normal	Problematic	Unacceptable
Deactivations/second The number of processes swapped out of memory to disk in order to satisfy extreme memory shortages.	less than 2	2 to 5	greater than 5
Disk Performance			
Disk Queue Length The average number of processes in the request queue for a particular disk drive.	less than 1	1 to 3	greater than 3
Read Hit % The percentage of time that requests for information were satisfied in main memory. A Read Hit percentage less than 90 could indicate a data locality problem or a shortage of memory.	greater than 90	90-80	less than 80
Disk I/O Rate The number of disk I/O (reads and writes to disk) per second.	less than 40	40 to 60	greater than 60

B

SOS/SOLARIS WAIT STATES

Overview

SOLARIS wait states information is displayed in the following SOS screens:

- In the PROCESS STATISTICS portion of the Global Summary screen.
- In the extended process line of the Global Summary screen.
- In the WAIT STATES portion of the Process Detail screen.
- In the WAIT STATES portion of the Workload Detail screen.

Wait State Descriptions

Each of the wait states monitored by SOS is described in the next table.

Table 2.1 *Wait states*

Wait State	Description
CPU	The percentage of a process' time that it was in the CPU state, executing on the CPU.
JOB	The percentage of a process' time that it was in the JOB state, waiting for job control or tracing signals.
OTHR	The percentage of a process' time that it was in the OTHR state, waiting on all other resources and events.
PRI	The percentage of a process' time that it was in the PRI state, waiting for the CPU.
TFLT	The percentage of a process' time that it was in the TFLT state, waiting on text page faults.
DFLT	The percentage of a process' time that it was in the DFLT state, waiting on data page faults.

Wait State	Description
KFLT	The percentage of a process' time that it was in the KFLT state, waiting on kernel page faults.
ULCK	The percentage of a process' time that it was in the ULCK state, waiting on user locks.

GLOSSARY OF TERMS

CPU Terms

The CPU terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

capture ratio

A ratio of time a CPU spent in user mode to system/kernel mode. The capture ratio value is calculated:

$$Capture\ Ratio = (User + Real + Nice + NNice) / (Sys + Intr + C\ SW + Trap + Vflt)$$

A capture ratio value equal to one or greater indicates the system is spending more than half its time on useful system work. A value of less than one means the system is spending more than half its time on overhead.

context switch

A context switch occurs when a process relinquishes a CPU.

context switch time

The amount of time a CPU spends managing context switches.

high priority time (high pri time)

The amount of time a CPU spends executing high priority processes. A high priority process is any process (excluding batch processes) that does not have a positive nice value. Generally, high priority processes are all interactive and system processes.

idle time

The amount of time a CPU has nothing to do.

interrupt

Interrupt s occur when a high priority event must have control of a CPU. The current running process is forced to temporarily suspend execution while the interrupt is processed. The most well known interrupt is a disk I/O completion interrupt.

interrupt CPU time

The amount of time a CPU spends processing interrupts.

negative nice time (nnice time)

The amount of time a CPU spends in user mode for a process that has a nice level of 0-19. Refer to the **nice** man page for more information.

nice time

The amount of time a CPU spends in user mode for a process that has a nice level of 21-40. Refer to the **nice** man page for more information.

real time

The amount of time a CPU spends in in user mode for "real time" priority processes.

system time

The amount of time a CPU spends in kernel mode that does not fall under interrupt, trap, and memory times.

trap

Similar to an interrupt. The difference is that the process currently running on a CPU causes the trap. Interrupts are not caused by the process that is interrupted.

trap time

The amount of time a CPU spends processing traps.

user time

The amount of time a CPU spends in user mode (excluding nice, negative nice, and real times).

Memory Terms

The memory terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

activation

An activation occurs when a process is reactivated from a deactivation. See “deactivation” on page 237.

buffer cache

A pool of buffers in memory with the purpose of maintaining data in memory to avoid disk access.

buffer cache headers

The headers associated with each set of data within the buffer cache.

buffer cache hit

A buffer cache hit occurs when data is found in the buffer cache as opposed to disk. Read hit percentages lower than 90 can indicate the need for a larger buffer cache. Write hit percentage lower than 65 also indicates the potential need to increase the buffer cache size.

deactivation

A deactivation occurs when a process is removed from the list of runable processes because of memory or CPU contention. It will not be scheduled until it is CPU and/or memory contention subsides. Deactivations indicate CPU and/or memory bottlenecks.

desfree

The lower bound for paging. When free memory drops below desfree, paging begins.

dynamic buffer cache (DBC)

The buffer cache is configured in a manner that allows the kernel to dynamically change the buffer cache size. The buffer cache grows as a result of page faults. It shrinks as the vhand process finds unused pages.

fixed size buffer cache

The "fixed size buffer cache" means the size is fixed and will not change without a reconfiguration and recompilation of the kernel.

lotsfree

The upper bound for paging. Once paging has begun, it will continue until free memory is larger than lotsfree.

major page fault

Page faults that require disk access.

minfree

The threshold at which the system considers itself "out of memory." At this point, the system will start deactivating processes.

minor page fault

Page faults that are satisfied in memory; for example, via page reclaims.

page fault

Page faults occur when a page is not found in the buffer cache; the pages are satisfied in memory and disk.

page in

A page in is a page fault that requires disk access.

page out

A page out occurs when the amount of memory required is greater than the amount available. Data within the page is written to disk and the page is made available for use. Excessive page outs indicates a memory bottleneck.

page reclaim

A page reclaim occurs when a requested page exists on the free list. A page reclaim results in a page fault being satisfied in memory.

page scan

A page scan occurs when the vhand process searches through used pages for candidates to page out. Excessive page scanning can be an indicator of a memory bottleneck.

unlockable memory

The amount of memory that cannot be locked. Physical memory that may be locked is called "lockable memory." Locked memory holds frequently-accessed programs or data structures, such as the operating system code. Lockable memory is never more than 3/4 of the available memory. Allowing too much locked memory could lead to a system deadlock. Unlockable memory is used for swapping pages, but lockable memory cannot be used for swapping pages.

VM I/O

A physical disk I/O that is a result of virtual memory management.

Disk Terms

The disk terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

logical I/O

An I/O that is satisfied in memory or disk.

physical I/O

An I/O that requires disk access. Physical I/Os include User, Sys, VM, and RAW.

raw I/O

A disk I/O that bypasses the buffer cache.

service time

The amount of time an I/O request takes to be serviced once it begins to be processed by the disk (removed from the disk queue), excluding wait time.

system I/O

A disk I/O that is the result of system overhead in managing files (i.e., super-block reads/writes).

user I/O

A disk I/O that is a result of user file reads/writes.

virtual memory I/O

A disk I/O that is a result of virtual memory management.

wait time

The amount of time an I/O request waits in the disk queue before being serviced. Excessive wait times indicate a disk bottleneck.

Network Terms

The network terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

badxid

A duplicate transmission. Every outgoing NFS request is assigned a unique sequential identifier. Requests are retransmitted if the server does not respond within a time-out period. When the server eventually responds, it is possible to respond to the same request multiple times. This is counted as a badxid. badxids are an indication that the server is not responding quickly enough.

collision

A network collision occurs when the system sends a packet at the same time as another system. When collisions occur, the system dispatching them waits a random amount of time to retransmit the packet. Excessive collision percentages indicate a network bottleneck.

Process Terms

The process terms defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

priority

The CPU scheduling priority of the process. High priority numbers indicate low priority status, and vice versa.

think time

The amount of time a process is waiting for user input.

timeslice

The maximum amount of time one process is allowed to run before the scheduler searches for other higher priority processes. The process may give up the CPU sooner if it enters kernel mode.

transactions

A character read or write, or a process death.

wait state

Identifies a resource that a process is waiting (blocked) on.

Wait State Codes

The wait state codes defined in this glossary are specific to the performance data provided by SOS Performance Advisor.

CPU

Executing on the CPU.

JOB

Waiting for job control or tracing signals.

OTHR

Waiting on all other resources and events.

PRI

Waiting for the CPU.

TFLT

Waiting on text page faults.

DFLT

Waiting on data page faults.

KFLT

Waiting on kernel page faults.

ULCK

Waiting on user locks.

INDEX OF DATA ITEMS

M

Memory

N

Network

Network File System

P

T

Terminal

U

User

W

Wait States

Workloads

INDEX

Symbols

A

B

C

D

E

F

G

H

I

P

R

S

T

U

V

W