



**HP-UX/Tru64 UNIX
System
Administration**

August 2003



**technical
white paper**

Performance Monitoring

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overview

This white paper describes the conceptual similarities and differences between the tools and the types of performance monitoring available on Tru64 UNIX and HP-UX. The audience for this paper is system administrators who manage Tru64 UNIX Version 5.1A or higher operating systems and who are considering migration to HP-UX 11i v2 from Tru64 UNIX.

Performance monitoring lets you display usage information for system resources, applications, and user activity. You can use that information to configure your system for optimal efficiency and performance.

Through performance monitoring you might decide to reconfigure the layout of a volume or disk to improve performance or learn that an NFS mounted file system is degrading performance because it is consuming too many resources or too much time.

Both operating systems have tools that focus on two primary areas for monitoring performance. One area is physical, concerned with managing hardware such as disks and controllers. The other area is logical, concerned with managing software and its operations. This white paper discusses both physical and logical areas.

Some symptoms of performance problems are obvious. For example, applications might complete slowly or messages might appear on the console; these problems indicate that the system is out of resources. Other problems or performance deficiencies are not obvious and can be detected only by monitoring system performance.

The commands for reporting quick performance statistics are similar between the HP-UX and Tru64 UNIX operating systems; however, the utilities for detailed examination of system performance are different, because they were developed independently over a period of time.

note It is important to understand how your application uses system resources, because not all configurations are appropriate for all types of workloads on Tru64 UNIX and HP-UX. For specific information, see the Tru64 UNIX and HP-UX system hardware documentation.

displaying hardware system components

Before monitoring your system performance, you must understand your system's hardware configuration. Table 1 lists the hardware configuration tools for Tru64 UNIX and HP-UX.

Table 1: hardware configuration tools

Tru64 UNIX	HP-UX
<code>hwmgr view hierarchy</code>	<code>ioscan</code>
<code>vmstat -P</code>	<code>vmstat</code>

On Tru64 UNIX, the principal command to manage hardware is the `hwmgr` command, which enables you to display information about and manage hardware components and the software subsystems that maintain information about the components. Other interfaces, such as the SysMan tasks, provide a limited subset of the features provided by the `hwmgr` command. To view the hierarchy of hardware within your system, use the `view hierarchy` command.

The following example shows `hwmgr view hierarchy` command output on a Tru64 UNIX system:

```
# hwmgr view hierarchy
HWID: Hardware component hierarchy
-----

1: platform AlphaServer 800 5/500
2:  cpu CPU0
4:  bus pci0
5:    scsi_adapter isp0
6:    scsi_bus scsi0
18:      disk bus-0-targ-0-lun-0 dsk0
19:      disk bus-0-targ-4-lun-0 cdrom0
20:    graphics_controller trio0
8:    bus eisa0
9:      serial_port tty00
10:     serial_port tty01
11:     parallel_port lp0
12:     keyboard PCXAL
13:     pointer PCXAS
14:     fdi_controller fdi0
15:       disk fdi0-unit-0 floppy0
16:     network tu0
17:     network tul
output truncated
```

On HP-UX, the principal command to manage hardware is the `ioscan` command. The `ioscan` command scans system hardware, usable I/O system devices, or kernel I/O system data structures as appropriate and lists the results. The `ioscan` command is the single most versatile tool in HP-UX for displaying your system configuration. The `-fnCdisk` option displays device special file names associated with a peripheral. The `-C disk` option shows the device files available for the `disk` class, as well as the location and type of disk device.

The following example shows the `ioscan` command default output on an HP-UX system:

```
# ioscan

H/W Path      Class      Description
=====
      bc
8            bc      I/O Adapter
8/0          ext_bus   GSC add-on Fast/Wide SCSI Interface
8/0.7        target
8/0.7.0      ctl      Initiator
8/4          ext_bus   GSC add-on Fast/Wide SCSI Interface
8/4.3        target
8/4.3.0      ctl      Initiator
8/8          ba      GSCToPCI Bridge
8/8/1/0      fc      HP Tachyon TL/TS Fibre Channel
            Mass Storage Adapter
8/8/1/0.33   fcp      FCP Domain
8/8/1/0.33.0.255.1 ext_bus   FCP Device Interface
8/8/1/0.33.0.255.1.3 target
8/8/1/0.33.0.255.1.3.0 disk      DEC    HSG80CCL
8/8/1/0.33.1.255.1 ext_bus   FCP Device Interface
8/8/1/0.33.1.255.1.3 target
8/8/1/0.33.1.255.1.3.0 disk      DEC    HSG80CCL
8/8/1/0.33.2.255.1 ext_bus   FCP Device Interface
8/8/1/0.33.3.255.1 ext_bus   FCP Device Interface
.
.
10           bc      I/O Adapter
10/0         ext_bus   GSC built-in Fast/Wide SCSI Interface
10/0.3       target
10/0.3.0     disk      SEAGATE ST15150W
10/0.4       target
10/0.4.0     disk      SEAGATE ST15150W
10/0.5       target
10/0.5.0     disk      SEAGATE ST15150W
10/0.6       target
10/0.6.0     disk      SEAGATE ST15150W
10/0.7       target
10/0.7.0     ctl      Initiator
10/4         bc      Bus Converter
10/4/0       tty     MUX
10/8         ba      GSCToPCI Bridge
10/8/1/0     lan     HSC 10/100Base-TX K-Class
10/8/2/0     lan     HSC 10/100Base-TX K-Class
10/12        ba      Core I/O Adapter
10/12/0     ext_bus   Built-in Parallel Interface
10/12/5     ext_bus   Built-in SCSI
10/12/5.0   target
10/12/5.0.0 tape     HP     C1533A
10/12/5.2   target
10/12/5.2.0 disk     TOSHIBA CD-ROM XM-5401TA
10/12/5.7   target
10/12/5.7.0 ctl     Initiator
10/12/6     lan     Built-in LAN
10/12/7     ps2    Built-in Keyboard/Mouse
10/16       bc      Bus Converter
32          processor Processor
.
.
46          processor Processor
49          memory   Memory
```

Note: The `hwmgr` command and the `ioscan` command do not display the amount of physical memory on your system. For information on how to display physical memory statistics on Tru64 UNIX and on HP-UX, see [Monitoring Virtual Memory Activity](#).

For more information about the `hwmgr` command, see the [Tru64 UNIX Hardware Management](#) manual or the `hwmgr(8)` reference page. For more information about `ioscan`, see the [Configuring HP-UX for Peripherals](#) manual or see the `ioscan(1m)` reference page.

types of performance monitoring

There are two types of performance monitoring. The first and simplest type gives a snapshot of the system as it appears at a particular moment. Both operating systems offer commands and utilities that provide statistics for a particular component of the operating system; for example, input/output (I/O) or virtual memory.

The second type monitors performance over a long time. This type of performance monitoring is particularly useful for developing changes to the configuration, because it gives a good picture of actual system use.

graphical interfaces

Performance monitoring can also be done using a graphical user interface (GUI). Table 2 lists the graphical interfaces for Tru64 UNIX and HP-UX.

Table 2: graphical Interfaces

Tru64 UNIX	HP-UX
SysMan	SAM

HP recommends that you use the graphical user interface on Tru64 UNIX and HP-UX.

- On Tru64 UNIX, the `SysMan` application is loaded by default when the Common Desktop Environment (CDE) software is loaded on your system. The `SysMan` applications are available in the Application Manager, which you can access from the CDE Front Panel.
- On HP-UX, refer to the [Software Distributor Administration Guide](#) for information on how to add the System Administration Manager (SAM) to your configuration.

`SysMan` and `SAM` reduce the complexity of most administration tasks. They minimize or eliminate the need for detailed knowledge of many administration commands. These graphical interfaces provide information about a system's physical and logical objects. You can display and track events that lead to a problem.

For more information on how to use `SAM`, see [Managing Systems and Workgroups: A Guide for HP-UX System Administrators](#) or see the `SAM(1m)` reference page. For more information on how to use `SysMan`, see the [System Administration](#) manual.

performance monitoring commands and interfaces

Table 3 lists the types of performance monitoring functions and the commands you can use to display the relevant performance information on Tru64 UNIX and HP-UX.

Table 3: commands and interfaces for monitoring system performance

function	Tru64 UNIX	HP-UX
Monitoring system performance	<code>collect</code>	<code>glace</code> (GlancePlus/UX)
Monitoring disks and terminals	<code>iostat</code>	<code>iostat -t</code>
Monitoring interprocess communication	<code>ipcs</code>	<code>ipcs</code>
Monitoring network activity	<code>netstat</code>	<code>netstat</code>
Monitoring processors	<code>psrinfo -v</code> and <code>pinfo</code>	Start SAM → select Performance Monitors → select System Properties
Monitoring processes	<code>top</code> , <code>time</code> , and <code>ps</code>	<code>top</code> , <code>time</code> , <code>timex</code> and <code>ps</code>
Monitoring system activity	<code>dxsysinfo</code> , and <code>sys_check</code>	<code>sar</code> and <code>sysdef</code>
Monitoring virtual memory activity	<code>vmstat</code>	<code>vmstat</code>
Monitoring kernel tunable parameters	<code>sysconfig</code>	<code>kmtune</code>

system performance monitoring tools

An operating system may perform slowly for a variety of reasons; it is important to determine the source of the performance problem. Before monitoring specific areas of your system, such as memory, disks, or processes, you might be able to diagnose the problem by using your system performance monitoring tools. Table 4 lists the system performance monitoring tools for Tru64 UNIX and HP-UX.

Table 4: system performance monitoring tools

Tru64 UNIX	HP-UX
collect	glance (GlancePlus/UX)

On Tru64 UNIX, the `collect` command records or shows specific operating system data over an extended period of time. The `collect` command creates minimal system overhead and is highly reliable.

The following example shows the `collect` command output only from the file system subsystem on Tru64 UNIX:

```
# /usr/sbin/collect -sf
# FileSystem Statistics
# FS      Filesystem      Capacity   Free
0        root_domain#root  128        30
1        usr_domain#usr    700        147
3        usr_domain#var    700        147
```

Table 5 shows how to use `collect` command options to show Tru64 UNIX subsystem data.

Table 5: collect command options for showing Tru64 UNIX subsystem data

subsystem	option
Process data	-p
Memory data	-m
Disk data	-d
Logical Storage Manager (LSM) data	-l
Network data	-n
CPU data	-c
File system data	-f
Select subsystems in data collection	-s

You can invoke the `collect` command from the `collgui` graphical user interface or from the command line. If you are using the graphical user interface, run the `cfilt` command to filter `collect` command data used by `collgui` interface and user scripts. For more information, see the `collect(8)` reference page.

On HP-UX, GlancePlus/UX is an optional Hewlett-Packard product that shows system activities and bottlenecks. GlancePlus/UX allows you to tune your system for more efficient operations. It provides useful performance data in real time in your choice of character or graphical mode. For example, it will provide a process list, a CPU report, a memory report, and disk report. It also allows you to take a more detailed look at many areas of your system to determine which areas might be constrained.

The following example shows no specific subsystem (default) statistics in HP-UX output using the `glance` command (GlancePlus/UX) .

```
# glance
B3692A GlancePlus C.03.20.00 12:02:16 unknown 9000/800 Current Avg High
-----
CPU Util S | 1% 1% 2%
Disk Util | 0% 6% 18%
Mem Util S SUB B | 16% 16% 16%
Swap Util U URR | 11% 11% 11%
-----
PROCESS LIST Users= 1
User CPU Util Cum Disk Thd
Process Name PID PPID Pri Name ( 600% max) CPU IO Rate RSS Cnt
-----
glance 1164 3913 156 root 6.7/ 6.6 0.7 0.0/ 2.0 3.3mb 1
ProcList CPU Rpt Mem Rpt Disk Rpt NextKeys SlctProc Help Exit
```

The following example shows the `glance` command output only from the file system subsystem on HP-UX:

```
# glance -i
B3692A GlancePlus C.03.58.00 15:10:15 kathrynh 90
00/800 Current Avg High
-----
CPU Util | 0% 1% 1%
Disk Util FF | 4% 3% 7%
Mem Util S SUUB B | 17% 17% 17%
Swap Util U UR R | 10% 10% 10%
-----
IO BY FILE SYSTEM Users= 1
Idx File System Device Type Logl IO Phys IO
-----
1 / /dev/vg00/lvol3 vxfs 0.1/ 0.4 1.5/ 0.5
2 /stand /dev/vg00/lvol11 hfs 0.0/ 0.0 0.0/ 0.0
3 /var /dev/vg00/lvol18 vxfs 0.0/ 0.7 0.3/ 0.9
4 /usr /dev/vg00/lvol17 vxfs 0.0/ 0.0 1.1/ 0.4
5 /tmp /dev/vg00/lvol14 vxfs 0.0/ 0.0 0.0/ 0.0
6 /opt /dev/vg00/lvol16 vxfs 0.0/ 0.1 0.0/ 0.2
7 /home /dev/vg00/lvol15 vxfs 0.0/ 0.0 0.0/ 0.0
8 lvm swap device /dev/vg00/lvol12 hfs 0.0/ 0.0 0.0/ 0.0

Top disk user: PID 39, vxfsd 2.3 IOs/sec S - Select a Disk
Page 1 of 1
ProcList CPU Rpt Mem Rpt Disk Rpt NextKeys SlctProc Help Exit
```

For more information, see the `glance` command reference pages on HP-UX.

monitoring disks and terminals

For the best performance, disk I/O should be evenly distributed across disks. On Tru64 UNIX and HP-UX, the `iostat` command shows disk usage.

The output of the `iostat` command on HP-UX is similar to the output on Tru64 UNIX. The `iostat` command on HP-UX and Tru64 UNIX shows the following information:

- number of characters read from terminals (`tin`)
- number of characters written to terminals (`tout`)
- percentage of time system (active processors) has spent in user mode (`us`)
- percentage of time system (active processors) has spent in user mode running low-priority (`nice`) processes (`ni`)
- percentage of time system has spent in system mode (`sy`)
- percentage of time system (active processors) has spent idling (`id`)

The following example shows `iostat` command output on Tru64 UNIX:

```
# iostat 1
tty      floppy4      cdrom4      cpu
tin tout    bps    tps    bps    tps  us ni sy id
1    164     0     0     0     0   2  4 15 80
0     52     0     0     0     0   0  0  0 11 89
0     52     0     0     0     0   0  0  0  8 92
0     52     0     0     0     0   0  0  0  9 91
0     52     0     0     0     0   0  0  0  9 91
```

On Tru64 UNIX, you can specify a drive parameter with the `iostat` command to show specific drives. Tru64 UNIX reports only on the first two disks drives by default.

On HP-UX, you can specify the `iostat` command with the `-t` option to show I/O statistics for disks and also terminal and processor statistics.

The following example shows `iostat` command output on HP-UX:

```
# iostat -t

          tty          cpu
          tin tout          us ni  sy  id
          0  26          0  0  0  100

device    bps    sps    msps
c0t2d0    0     0.0    1.0
c0t0d0    0     0.0    1.0
c2t0d0    0     0.0    1.0
```

On HP-UX, the statistics are grouped into two sections: terminal statistics and processor statistics. The disk data information (processor statistics) is arranged in a four-column format, the device name (`device`), the kilobytes transferred per second (`bps`), the number of seeks per second (`sps`), and the milliseconds per average seek (`msps`).

Also on HP-UX, you can start the `iostat` command using `SAM`. After starting `SAM`, select Performance Monitors and then select Disks & Terminal Activity. `SAM` will open a terminal window and execute the `iostat -t` command instantly.

For more information, see the `iostat` command reference pages on Tru64 and HP-UX.

monitoring interprocess communication

On Tru64 UNIX and HP-UX, the `ipcs` command shows data for currently active message queues, shared memory segments, and semaphores.

The output of the `ipcs` command on HP-UX is similar to the output on Tru64 UNIX. The `iostat` command on HP-UX and Tru64 UNIX show the following information:

- Facility type (T)
- Identifier for the facility entry (ID)
- Facility entry (KEY)
- Facility access modes and flags (MODE)

The following example shows `ipcs` command output on Tru64 UNIX:

```
# ipcs
Message Queues:
T      ID      KEY      MODE      OWNER      GROUP
q      0 0x419501a0 --rw----- root      system
Shared Memory:
T      ID      KEY      MODE      OWNER      GROUP
m      0 0x4d190007 --rw-rw-r-- lanman    system
m      1      0x1664 --rw----- root      system
Semaphores:
T      ID      KEY      MODE      OWNER      GROUP
s      0 0x419501a0 --ra----- root      system
s      1 0x415a6cc8 --ra----- root      system
s      2      0x1664 --ra----- root      system
```

The following example shows `ipcs` command output on HP-UX:

```
# ipcs
IPC status from /dev/kmem as of Thu Jul 3 11:33:17 2003
T      ID      KEY      MODE      OWNER      GROUP
Message Queues:
q      0 0x3c1c0101 -Rrw--w--w- root      root
q      1 0x3e1c0101 --rw-r--r-- root      root
Shared Memory:
m      0 0x411c00fb --rw-rw-rw- root      root
m      1 0x4e0c0002 --rw-rw-rw- root      root
m      2 0x41200d17 --rw-rw-rw- root      root
m      49155 0x00000000 D-rw----- root      root
m      32772 0x00000000 D-rw----- www       www
Semaphores:
s      0 0x411c00fb --ra-ra-ra- root      root
s      1 0x4e0c0002 --ra-ra-ra- root      root
s      2 0x41200d17 --ra-ra-ra- root      root
s      3 0x00446f6e --ra-r--r-- root      root
```

On HP-UX, the `-C corefile` command allows you to specify a file, which is a core file or a directory created by `savecrash` or `savecore`, instead of `/dev/kmem`. The default output of the command as implemented in HP-UX corresponds to the `ipcs -a` command on Tru64 UNIX.

On HP-UX, you can also start the `ipcs` command using `SAM`. After starting `SAM`, select Performance Monitors, and then select Inter-Process Communication Facility. `SAM` will open a terminal window and execute the `ipcs` command instantly. For more information, see the `ipcs` command reference pages on Tru64 and HP-UX.

monitoring network activity

On Tru64 UNIX and HP-UX, the `netstat` command shows statistics for network interfaces and protocols, as well as the contents of various network-related data structures. You can also use the `showmount` command on both systems to show all the clients that have a remotely mounted file system from a given host. Table 6 compares the `netstat` command options on Tru64 UNIX and HP-UX.

Table 6: comparison of netstat command options on Tru64 UNIX and HP-UX

option	Tru64 UNIX	HP-UX
-A	Shows either the address of any protocol control blocks associated with sockets or the addresses of routing table entries with bitmasks.	Not applicable
-a	Shows the state of sockets related to the Internet protocol.	Shows the state of all sockets, including passive sockets used by server processes.
-b	Shows the content of Mobile IPv6 binding cache.	Not applicable
-g	Shows statistics since the system was last booted.	Shows multicast information for network interfaces.
-H	Shows the Address Resolution Protocol (ARP) table.	Not applicable
-I	Shows the current access filter for the specified network interface.	The <code>-g</code> and <code>-i</code> options show information about the specified interface only.
-i	Shows the state of configured network interfaces.	Shows the state of the configured network interfaces.
-M	Shows Internet Protocol multicast routing information.	Shows the multicast routing tables.
-m	Shows information about memory allocated to the data structures associated with network operations.	Not applicable
-R	Shows the host's routing tables on each Resource Affinity Domain (RAD), if the system is NUMA capable.	Not applicable
-r	Shows the host's routing tables.	Shows the routing tables. When the <code>-v</code> option is used with the <code>-r</code> option, it displays the network masks in the route entries.
-s	Shows statistics for each protocol.	Shows statistics for all protocols.
-t	Shows timer information.	Not applicable
-u	Shows information about domain sockets (UNIX domain).	Not applicable

Table 5: comparison of netstat command options on Tru64 UNIX and HP-UX (cont.)

option	Tru64 UNIX	HP-UX
-v	Shows more verbose output.	Shows additional routing information.
-x	Shows the status of Internet Protocol Security (IPsec) Security Associations (SAs).	Not applicable
-X	Shows the status of the Internet Key Exchange (IKE) Protocol SAs.	Not applicable
-z	Shows the current network interface statistics or protocol statistics, then sets them to 0.	Not applicable

On Tru64 UNIX and HP-UX, most information provided by `netstat` is used to diagnose network hardware or software failures. The `netstat -i` command displays the following information:

- Excessive amounts of input errors (`Ierrs`)
- Output errors (`Oerrs`)
- Collisions (`Coll`)

The following example shows `netstat -i` command output on Tru64 UNIX:

```
# netstat -i
Name Mtu Network Address Ipkts Ierrs Opkts Oerrs Coll
tu0 1500 Link 00:00:aa:11:0a:c1 0 0 43427 43427 0
tu0 1500 DLI none 0 0 43427 43427 0
tu1 1500 Link bb:00:03:01:6c:4d 963447 138 902543 1118 80006
tu1 1500 DLI none 963447 138 902543 1118 80006
tu1 1500 o-net plume 963447 138 902543 1118 80006
```

The following example shows the `netstat -i` command on HP-UX:

```
# netstat -i
Name Mtu Network Address Ipkts Ierrs Opkts Oerrs Coll
lan0 1500 16.140.2.0 doc001.zk3.dec.com 84459 0 7897 0 0
lo0 4136 loopback localhost 0 0 0 0 0
```

For more information, see the [Network Administration: Connections Guide](#), the [System Configuration and Tuning](#) manual on Tru64 UNIX, and/or see the `netstat(1)` reference pages on HP-UX and Tru64 UNIX.

monitoring processors

Monitoring processors on Tru64 UNIX and HP-UX is different. On Tru64 UNIX, the `psrinfo` and `pinfo` commands are used to show information about processors including the current state of the processor, how long it has been on line, its processor speed in megahertz, and whether or not it has an internal floating point processor. The `-v` option is used with the `psrinfo` command to show how many processors are resident and how long they have been running.

The following example shows `psrinfo` command output on Tru64 UNIX:

```
# psrinfo
processor 0 online      since 09/15/1994 17:24:30
processor 1 offline    since 09/16/1994 09:18:22
```

On HP-UX, SAM is used to show processor information. After starting SAM, select Performance Monitors, and then select System Properties. SAM will open a terminal window and show the processor information.

For more information, see the `psrinfo` and `pinfo` command reference pages on Tru64 UNIX.

monitoring processes

On HP-UX and Tru64 UNIX, the `top` command shows processes. The `top` command is not part of the Tru64 UNIX operating system, but it is distributed as freeware on the Tru64 UNIX Associated Products CD-ROM (APCD). The `top` command lists the processes with the highest CPU percentages.

The following example shows `top` command output on HP-UX:

```
# top
System: persied                               Thu Jul 10 17:37:50 2003
Load averages: 0.00, 0.00, 0.00
186 processes: 176 sleeping, 10 running
Cpu states:
CPU  LOAD   USER   NICE    SYS   IDLE  BLOCK  SWAIT   INTR   SSYS
 0   0.00  0.0%  0.0%   0.2% 99.8%  0.0%  0.0%  0.0%  0.0%
 1   0.00  0.0%  0.0%   0.0%100.0%  0.0%  0.0%  0.0%  0.0%
 2   0.00  0.0%  0.0%   0.2% 99.8%  0.0%  0.0%  0.0%  0.0%
 3   0.01  0.0%  0.0%   0.2% 99.8%  0.0%  0.0%  0.0%  0.0%
---  ---
avg  0.00  0.0%  0.0%   0.2% 99.8%  0.0%  0.0%  0.0%  0.0%

Memory: 241500K (31120K) real, 5174960K (570016K) virtual, 118276K free Page# 1
CPU TTY      PID USERNAME PRI NI  SIZE  RES STATE  TIME %WCPU %CPU COMMAND
 3  ?         42 root      152 20  4080K 3264K run    7:13  0.35  0.35 vxfsd
 2 pts/12 12337 prentiss 178 20 15868K  880K run    0:00  0.38  0.25 top
 3 pts/10 12338 detest    154 20 13580K  744K sleep  0:00  0.50  0.18 view
 0  ?         624 root      152 20 26180K 7352K run    7:06  0.18  0.18 automoun
 0 pts/10 12231 root      154 20 15708K  576K sleep  0:00  0.12  0.12 rlogind
 1  ?          29 root      152 20  480K  384K run    1:46  0.12  0.12 schedcpu
 0  ?         334 root      152 20 14364K  548K run    0:08  0.08  0.08 syncer
```

On HP-UX, you can specify the delay between screen updates, a specific count of displays, your choice of user names or user identifiers, and a specific number of processes to be displayed with the `top` command.

Both Tru64 UNIX and HP-UX, provide the `time` and `ps` commands. The `time` command gives a quick indication of system performance by timing a given command and showing the real, system, and user time required for the command to produce an error message. The `ps` command lists the processes currently running on the system.

On HP-UX, the `timex` command shows the total system activity or process accounting data for the command being timed.

For more information, see the `top`, `ps`, and `time` command reference pages on Tru64 UNIX and HP-UX. See the `timex` command reference page on HP-UX.

monitoring system activity

On Tru64 UNIX and HP-UX, there are multiple ways to monitor system activity. Table 7 lists the utilities that are used to monitor system activity.

Table 7: tools for monitoring system activity

Tru64 UNIX	HP-UX
sar	sar
dxsysinfo and sys_check	sysdef

On HP-UX, the System Activity Reporter (`sar`) is a standard utility. This utility is available only on earlier versions of Tru64 UNIX with the SVE extension to the operating system. There are two `sar` commands: the system activity reporter (`sar`) and the system activity report package (`sa1`, `sa2`, `sadc`). The first form of the `sar` command samples cumulative activity counters in the operating system. The second form of the `sar` command extracts sample data from a previously recorded file.

The following example shows the `sar` command output for five seconds of CPU activity on HP-UX:

```
# sar 1 5
HP-UX doc001 B.11.23 U ia64 07/18/03
15:35:48 %usr %sys %wio %idle
15:35:49 0 0 0 100
15:35:50 1 0 0 99
15:35:51 0 0 0 100
15:35:52 0 0 0 100
15:35:53 0 0 0 100
Average 0 0 0 100
```

Some `sar` command options are different on Tru64 UNIX and HP-UX. Table 8 compares the `sar` command options on Tru64 UNIX and HP-UX.

Table 8: comparison of sar command options on Tru64 UNIX and HP-UX

option	Tru64 UNIX	HP-UX
-A	Reports all data.	Reports all data.
-g and -p	Reports paging activities (similar to the HP-UX <code>-w</code> option).	Not applicable
-k	Reports kernel memory allocation activities.	Not applicable
-M	Not applicable	Reports the per-processor data on a multiprocessor system (similar to the Tru64 UNIX <code>-P</code> option).
-P	Reports the activity for a specified processor (similar to the HP-UX <code>-M</code> option).	Not applicable
-r	Reports unused memory pages and disk blocks.	Not applicable
-w	Not applicable	Reports system swapping and switching activity (similar to the Tru64 UNIX <code>-g</code> and <code>-p</code> options).

`dxsysinfo` On Tru64 UNIX, you can monitor a system and its file systems and devices using the `dxsysinfo` utility for a graphical representation of current system activity. This graphical user interface, which runs only on Tru64 UNIX, provides general information about the operating system and version, the amount of RAM, the number of CPUs, CPU activity, free memory, available swap space, file system utilization, and disk and tape device names.

For more information about `dxsysinfo` see the `dxsysinfo(8)` reference page.

`sys_check` On Tru64 UNIX, you can use the `sys_check` utility to create an HTML file that describes the system configuration and can be used to diagnose problems. The `sys_check` utility performs an analysis of operating system parameters and kernel attributes that tune the performance of your system. The utility checks memory and CPU resources, provides performance data and lock statistics for SMP systems and for kernel profiles, and outputs any warnings and tuning guidelines.

For more information, see the `sys_check(8)` reference page.

`sysdef` On HP-UX, the `sysdef` command analyzes the running system and reports on its tunable configuration parameters. Note that `sysdef` will not be supported in future releases of HP-UX. So users are advised to use the `kmtune` utility, which provides additional information on kernel tunable parameters. [See Monitoring Kernel Tunable Parameters](#) for information.

For more information, see the `sysdef(1M)` reference page.

monitoring virtual memory activity

On Tru64 UNIX and HP-UX, monitoring virtual memory activity is similar. You can get a snapshot of the virtual memory activity with the `vmstat` command.

On both operating systems, the `vmstat` command shows process information (`procs`), virtual memory information (`memory`), paging information (`pages`), trap/interrupt information (`faults/intr`), and CPU usage information (`cpu`).

The following example shows `vmstat` command output on Tru64 UNIX and HP-UX:

Tru64 UNIX:

```
# vmstat
Virtual Memory Statistics: (pagesize = 8192)
procs      memory          pages                intr          cpu
r  w  u  act  free wire fault cow zero react pin pout in  sy  cs  us  sy id
5 356 58   82K  203  44K 120M  30M  39M   4M  23M 254K 986  4K  5K  25 38 37
```

HP-UX:

```
# vmstat
procs      memory          page          faults          cpu
r  b  w  avm   free re  at  pi  po  fr  de  sr  in  sy  cs  us  sy id
1  0  0 149645 48712 4   1  0  0  0   0  0 1055 560  50  0  0 100
```

On Tru64 UNIX and HP-UX, the process information is the same, but it is displayed differently. For example, on HP-UX, the process information is displayed using `r`, `b`, and `w` and, on Tru64 UNIX, the information is displayed using `r`, `w` and `u`. The `r` represents the number of processes in the run queue. The `w` and the `b` represent the processes waiting or blocked for resources. And the `w` and `u` represent the number of threads that are waiting uninterrupted.

Also on HP-UX, you can invoke the `vmstat` command using `SAM`. After starting `SAM`, select Performance Monitors, and then select Virtual Memory Activity. `SAM` will open a terminal window and execute the `vmstat` command instantly.

For more information, see the appropriate `vmstat` reference pages.

monitoring kernel tunable parameters

Both operating systems provide tools to analyze the parameters and kernel attributes that tune the performance of your system. Table 9 lists kernel configuration tools on Tru64 UNIX and HP-UX.

Table 9: kernel configuration tools

Tru64 UNIX	HP-UX
<code>sysconfig</code>	<code>kmtune</code>
<code>dxkerneltuner</code>	Not applicable

On Tru64 UNIX, the `sysconfig` utility is used to query or modify the kernel subsystem configuration. You use this utility to ask for information about (query) subsystems in the kernel, add subsystems to your running kernel, reconfigure subsystems already in the kernel, and remove subsystems from the kernel.

The Kernel Tuner (`dxkerneltuner`) graphical user interface is used to show permanent, current (run-time), minimum, and maximum values of attributes. Access the GUI through the Common Desktop Environment (CDE) Application Manager window; select the `System_Admin` icon, and then select the `MonitoringTuning` icon. You can then choose the subsystem whose attributes you want to display on Tru64 UNIX.

On HP-UX, the `kmtune` command is similar to the `sysconfig` utility on Tru64 UNIX. It is also used to query, set, or reset system parameters. The `kmtune` utility displays the value of all system parameters when used without any options or with the `-S` or `-l` option.

For more information, see the appropriate kernel configuration reference pages.

third-party performance monitoring tools

There are many third-party performance monitoring tools. Hewlett-Packard suggests the following third-party performance monitoring tools for Tru64 UNIX and HP-UX:

- BMC Patrol Express
- Uptime Software
- SarCheck

BMC Patrol Express provides QoS monitoring, notification, and reporting across customers' servers, networks and application infrastructures. For more information, see the BMC Patrol Express Web site at: <http://www.bmc.com>.

Uptime Software provides monitoring, reporting, troubleshooting, root-cause analysis, problem solving, long term trending, server consolidation, and capacity planning. For more information, see the Uptime Software Web site at: <http://www.uptimesoftware.com/>.

SarCheck is a UNIX performance analysis and tuning tool for most HP-UX systems that produces recommendations and explanations, with supporting graphs and tables. For more information, see the SarCheck Web site at: <http://www.sarcheck.com/schp.htm>.

for more information

To learn more about Tru64 UNIX and HP-UX performance monitoring, see the following documentation:

Tru64 UNIX

- Tru64 UNIX documentation: <http://h30097.www3.hp.com/docs/>
- [System Configuration and Tuning](#)
- [System Administration](#)
- [Cluster Administration Guide](#)
- [Network Administration: Connections Guide](#)
- [Tru64 UNIX to HP-UX 11i Porting Guide](#)
- [Tru64 UNIX Hardware Management](#)
- *Tru64 UNIX/HP-UX System Administration Interoperability (Coming Soon)*

HP-UX

- HP-UX documentation: <http://docs.cup.hp.com/>
- [HP-UX Workload Managers User's Guide](#)
- [Using the Event Monitoring Service](#)
- [HP-UX Floating-Point Guide](#)
- [Software Distributor Administration Guide](#)
- [Managing Systems and Workgroups: A Guide for HP-UX System Administrators](#)
- [Configuring HP-UX for Peripherals](#)