CIS2380 Tutorial Week 2

This week we shall be looking at some Unix Commands which illustrate the concepts of the next few weeks.
The ps Command The first command is ps. Here is part of the response to the manual entry for ps - which you can also obtain using xman (the windows version)
parryscommmw23: man ps

NAME
ps - report process status

%% parameter list
SYNOPSIS
ps ps [ -aAcdefjllLPy ] [ -g grplist ] [ -n namelist ]
[ -o format ] ... [ -p proclist ] [ -s sidlist ] [ -t term ]
[ -u uidlist ] [ -U uidlist ] [ -G gidlist ]

DESCRIPTION
The ps command prints information about active processes. Without options, ps prints information about processes that have the same effective user ID and the same controlling terminal as the invoker. The output contains only the process ID, terminal identifier, cumulative execution time, and the command name. Otherwise, the information that is displayed is controlled by the options.

Some options accept lists as arguments. Items in a list can be either separated by commas or else enclosed in quotes and separated by commas or spaces. Values for proclist and grplist must be numeric.

OPTIONS
The following options are supported:

- a List information about all processes most frequently requested: all those except process group leaders and processes not associated with a terminal.

- A List information for all processes. Identical to -e, below.
-c  Print information in a format that reflects scheduler properties as described in priocntl(1).
The -c option affects the output of the -f and -l options, as described below.

-d  List information about all processes except session leaders.

-e  List information about every process now running.

-f  Generate a full listing. (See below for significance of columns in a full listing.)

-g grplist
   List only process data whose group leader's ID number(s) appears in grplist. (A group leader is a
   process whose process ID number is identical to its process group ID number.)

-j  Print session ID and process group ID.

-l  Generate a long listing. (See below.)

-L  Print information about each light weight process (1wp) in each selected process. (See below.)

-u  List information for processes whose real user ID numbers or login names are given in uidlist. In the
   listing, the numerical user ID will be printed unless you give the -f option, which prints the
   login name.

Many of the options shown are used to select processes to list. If any are specified, the default list will be ignored
and ps will select the processes represented by the inclusive OR of all the selection-criteria options.

DISPLAY FORMATS
   Under the -f option, ps tries to determine the command name and arguments given when the process was created by examin-
ing the user block. Failing this, the command name is printed, as it would have appeared without the -f option, in square brackets.

The column headings and the meaning of the columns in a ps listing are given below; the letters f and l indicate the option full or long, respectively) that causes the corresponding heading to appear; all means that the heading always appears. Note: These two options determine only what information is provided for a process; they do not determine which processes will be listed.

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S (1) The state of the process:

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>Process is running on a processor.</td>
</tr>
<tr>
<td>S</td>
<td>Sleeping: process is waiting for an event to complete.</td>
</tr>
<tr>
<td>R</td>
<td>Runnable: process is on run queue.</td>
</tr>
<tr>
<td>Z</td>
<td>Zombie state: process terminated and parent not waiting.</td>
</tr>
<tr>
<td>T</td>
<td>Process is stopped, either by a job control signal or because it is being traced.</td>
</tr>
</tbody>
</table>

PID (all)  
The process ID of the process (this datum is necessary in order to kill a process).

PPID (f,l)  
The process ID of the parent process.

PRI (1) The priority of the process. Without the -c option, higher numbers mean lower priority. With the -c option, higher numbers mean higher priority.
ADDR (1) The memory address of the process.

SZ (1) The total size of the process in virtual memory, including all mapped files and devices, in pages. See pagesize(1).

WCHAN (1)
The address of an event for which the process is sleeping (if blank, the process is running).

STIME (f)
The starting time of the process, given in hours, minutes, and seconds. (A process begun more than twenty-four hours before the ps inquiry is executed is given in months and days.)

TTY (all)
The controlling terminal for the process (the message, ?, is printed when there is no controlling terminal).

TIME (all)
The cumulative execution time for the process.

CMD (all)
The command name (the full command name and its arguments, up to a limit of 80 characters, are printed under the -f option).

The following two additional columns are printed when the -j option is specified:

PGID The process ID of the process group leader.

SID The process ID of the session leader.

The following two additional columns are printed when the -L option is specified:

LWP The lwp ID of the lwp being reported.

NLWP The number of lwps in the process (if -f is also
specified).

Under the -L option, one line is printed for each lwp in the process and the time-reporting fields STIME and TIME show the values for the lwp, not the process. A traditional single-threaded process contains only one lwp.

A process that has exited and has a parent, but has not yet been waited for by the parent, is marked <defunct>.

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NAME
vmstat - report virtual memory statistics

SYNOPSIS
vmstat [ -cipsS ] [ disks ] [ interval [ count ] ]

DESCRIPTION
vmstat reports virtual memory statistics regarding process, virtual memory, disk, trap, and CPU activity.

On MP systems, vmstat averages the number of CPUs into the output. For per-process statistics, see mpstat(1).

vmstat only supports statistics for certain devices. For more general system statistics, use sar(1), iostat(1M), or sar(1M).

Without options, vmstat displays a one-line summary of the virtual memory activity since the system was booted.

During execution of this kernel status command, the "state" of the kernel can change. An example would be CPUs going online or offline. vmstat will report this as <<State change>>.

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OPTIONS
The following options are supported:

-c Report cache flushing statistics. By default, report the total number of each kind of cache flushed since boot time. The types are: user, context, region, segment, page, and partial-page.

-i Report the number of interrupts per device.

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-p Report paging activity in details. This option will display the following, respectively:

epi Executable page-ins.
epo  Executable page-outs.
epf  Executable page-frees.
api  Anonymous page-ins.
apo  Anonymous page-outs.
apf  Anonymous page-frees.
fpi  File system page-ins.
fpf  File system page-frees.
fpf  File system page-frees.

-s  Display the total number of various system events since boot.

-S  Report on swapping rather than paging activity. This option will change two fields in vmstat’s ‘‘paging’’ display: rather than the ‘‘re’’ and ‘‘mf’’ fields, vmstat will report ‘‘si’’ (swap-ins) and ‘‘so’’ (swap-outs).

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Example 1: Using vmstat

The following command displays a summary of what the system is doing every five seconds.

eexample% vmstat 5

procs  memory  page  disk  faults  cpu
r  b  w  swap  free  re  mf  pi  p  fr  de  sr  s0  s1  s2  s3  in  sy  cs  us  sy  id
0 0 0 11456 4120 1 41 19 1 3 0 2 0 4 0 0 48 112 130 4 14 82
0 0 1 10132 4280 0 44 0 0 0 0 0 23 0 0 211 230 144 3 35 62
0 0 1 10132 4616 0 20 0 0 0 0 0 19 0 0 150 172 146 3 33 64
0 0 1 10132 5292 0 9 0 0 0 0 0 21 0 0 165 105 130 1 21 78
1 1 1 10132 5496 0 5 0 0 0 0 0 23 0 0 183 92 134 1 20 79
1 0 1 10132 5564 0 25 0 0 0 0 0 18 0 0 131 231 116 4 34 62
1 0 1 10124 5412 0 37 0 0 0 0 0 22 0 0 166 179 118 1 33 67
1 0 1 10124 5236 0 24 0 0 0 0 0 14 0 0 109 243 113 4 56 39

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example%

The fields of vmstat 's display are

procs Report the number of processes in each of the three following states:

r in run queue
b blocked for resources I/O, paging, and so forth
w runnable but swapped

memory Report on usage of virtual and real memory.

swap amount of swap space currently available (Kbytes)
free size of the free list (Kbytes)

page Report information about page faults and paging activity. The information on each of the following activities is given in units per second.

re page reclams - but see the -S option for how this field is modified.
mf minor faults - but see the -S option for how this field is modified.
pi kilobytes paged in
po  kilobytes paged out
fr  kilobytes freed
de  anticipated short-term memory shortfall (Kbytes)
sr  pages scanned by clock algorithm
disk  Report the number of disk operations per second. There are slots for up to four disks, labeled with a single letter and number. The letter indicates the type of disk (s = SCSI, i = IPI, and so forth); the number is the logical unit number.
faults  Report the trap/interrupt rates (per second).

in  (non clock) device interrupts
sy  system calls
cs  CPU context switches
cpu  Give a breakdown of percentage usage of CPU time. On MP systems, this is an average across all processors.

us  user time
sy  system time
id  idle time

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This command gives information about virtual memory - see week 1 notes. We shall be returning to this subject later in greater detail. Experiment with this command as for the ps command
The perfmeter command
You can try the also - this displays system performance values in multiple dials or strip charts