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## Tuning The Server

Some useful UNIX commands can be used to monitor server CPU and memory usage. Some of the commands vary depending upon the flavor of UNIX OS, we use. We will discuss some of the useful Unix commands with their parameters and options associated with them.

### ▶▶ **top**

The UNIX top command provides information on CPU and memory utilization. The statistics are refreshed every few seconds to provide near real-time data. Statistics for CPU, memory, and swap space for the top command are given below.

- **CPU States as Displayed by top**

<u>Column</u>	<u>Description</u>
User	Percentage of CPU utilized by user.
System	Percentage of CPU utilized by the server.
Idle	Percentage of CPU idle time.

- **Memory as Displayed by top**

<u>Column</u>	<u>Description</u>
Av	Available memory.
Used	Used memory.
Free	Free memory.

- **Swap as Displayed by top**

<u>Column</u>	<u>Description</u>
Av	Available swap space.
Used	Used swap space.
Free	Free swap space.

When we execute top command, the CPU, memory, and swap statistics are displayed, followed by a list of active system processes.

### ▶▶ **sar**

System Activity Reporter (sar) has many different parameters that can be used. CPU utilization can be shown with the -u switch, for example, and memory swapping can be

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shown with the -w switch. The sar command requires two arguments, the first being the time interval between samples, and the second being the number of samples to take. The relevant columns and descriptions of the data of sar are listed below by executing sar -u to capture CPU utilization.

- **Columns and Descriptions for the sar -u Command**

<u>Column</u>	<u>Description</u>
%user	Percentage of system utilized by users.
%system	Percentage of system utilized by the OS.
%iowait	Percentage waiting on I/O.
%idle	Percentage of server that is idle.

Lets take an example, if we want to display CPU utilization with five samples in 10 second intervals. Then We will run sar -u as follows:

```
$ sar -u 10 5
```

The relevant columns and descriptions of the data displayed by executing sar -r to capture memory utilization.

- **Statistics Displayed by the sar -r Command**

<u>Column</u>	<u>Description</u>
kbmemfree	Free memory in KB.
kbmemused	Memory used in KB.
%memused	Percentage of memory used.
kbswpfree	Free swap space in KB.
kbswpused	Used swap space in KB.
%swpused	Percentage of used swap space.

Lets take an example, if we want to display server data for six samples with 5-second intervals between each sample, we need to run sar -r as follows:

```
$ sar -r 5 6
```

▶▶ **vmstat**

We have one more command that can be used to display UNIX performance statistics is vmstat. Common statistics displayed by vmstat arranged in categories are listed below.

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- **Categories for the vmstat Command**

<b><u>Category</u></b>	<b><u>Description</u></b>
procs	Information about processes.
memory	Information about virtual and real memory.
wwap	Information about page faults and paging activity.
io	Information about I/O.
system	Information about system interrupts and switches.
cpu	Information about percentage of CPU time.

Lets take an example of vmstat, if we want to display five summaries at 3-second intervals, the first summary being the summary since boot up. Then we will run vmstat as shown below:

```
$ vmstat 3 5
```

Additional details for key vmstat columns in the different categories are listed below.

- **Key vmstat Statistics**

<b><u>Column</u></b>	<b><u>Description</u></b>
r	Run queue.
free	Amount of idle memory (KB).
si	Amount of memory swapped in from disk (KB/s).
so	Amount of memory swapped to disk (KB/s).
bi	Blocks sent to a device.
bo	Blocks received from a device.
us	User time.
sy	System time.
id	Idle time.

▶ **Using ps**

The UNIX ps command is used to display active processes. This command can be sorted by any of the columns that are displayed by it.

Lets take an example, if we want to sort by the sixth column, the CPU column, then we need to run the ps command as follows.

```
Ps -ef | sort +6 | tail
```