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## ANSYS – Application Execution Guidelines for vSMP Foundation Aggregated Virtual Machine

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### Overview

ANSYS jobs can be run either in “standard mode” – which is usually suitable for single or low CPU-count jobs (up to 4 cores, using threads), or in “parallel mode” (typically referred to as PPFA or distributed-ANSYS), which is suitable for higher-CPU-count jobs. In standard mode ANSYS creates a thread for each CPU requested, while in parallel mode, ANSYS creates a process for each CPU requested. The threads in standard ANSYS “communicate” using a proprietary memory-sharing scheme. The processes in PPFA communicate using MPI messages, which are implemented as shared-memory copies/moves.

In general, PPFA’s parallelism is more efficient than that of standard ANSYS, especially at the high CPU counts, and therefore usually will complete the same task faster given higher CPU count. To select parallel ANSYS, add the following arguments to the ANSYS command line: “-pp -dis -np <#cpus>”.

### Running ANSYS with HP-MPI

#### *Environment variables – HP-MPI*

If you are running ANSYS with HPMPI, you should set the following environment variables prior to running ANSYS to yield the optimal performance:

```
export MPI_BIND_MAP=0,1,2,3,4,5,6,7 (For example)
```

```
export MPIRUN_OPTIONS="-cpu_bind=map_cpu,v"
```

```
export HPMP_FRAGSIZE=131072
```

```
export MPI_SHMEMCNTL=16,2400000,4000000
```

MPI\_BIND\_MAP specifies a list of CPUs to which MPI ranks will be bound. You should replace the list above with a list of integers, zero to #cpus-1.

For more information on HP-MPI CPU affinity settings, refer to the HP-MPI user's guide available from "<http://docs.hp.com/en/B6060-96022/B6060-96022.pdf>".

## ***Process memory limitations***

If you see a message similar to:

```
mid: Cannot create shared memory segment of 225255424 bytes
```

when you run ANSYS, then you should execute a command similar to:

```
sudo sh -c "echo 9999999999 > /proc/sys/kernel/shmmax"
```

to extend the amount of shared memory allowed per process.

## **Running StarCD with Ram-Drive**

ANSYS may perform better if you copy your input files to a directory in a RAMFS mount, and 'cd' there before running ANSYS. This is especially useful for large-scale jobs.

In order to run with Ram-Drive, perform the following

```
sudo mkdir -p /ramfs
sudo mount -t ramfs ramfs /ramfs -o noatime
sudo chmod 777 /ramfs
mkdir /ramfs/Ansys 11
cp * /ramfs
cd /ramfs/
<execute ansys11 run script>
```

After the run terminates, you will need to copy the output files back to a disk-backed file system; **files in RAMFS do not survive system reboots.**

## ***Sample script for running ANSYS with HP-MPI and Ram Drive***

```
export MPI_BIND_MAP=0,1,2,3,4,5,6,7 (For example)
export MPIRUN_OPTIONS="-cpu_bind=map_cpu,v"
export HPMP_FRAGSIZE=131072
export MPI_SHMEMCNTL=16,24000000,4000000
```

```
sudo mkdir -p /ramfs
sudo mount -t ramfs ramfs /ramfs -o noatime
sudo chmod 777 /ramfs
mkdir /ramfs/Ansys 11
cp * /ramfs
cd /ramfs/
arg_list=" -pp -dis -mpi hpmpi -p ane3fl -np 16 -db 1024 -dofs 500 -b -preopt 0 "
ansys110 $arg_list -aspect 1 -stype dsp -eltype 95 <input>.inp
```