Accelerating Femap with NX Nastran runtime performance

Femap with NX Nastran will expose the strengths and weaknesses of any computer like few other applications. However, it is unlikely that the default FwNX installation configuration is optimal for typical computing that most people buy today. The two easy items for improving runtime is to switch parallel processing on, and to force spare RAM to be used as if a disk. Depending on model style and size (and computer), these changes can improve runtimes by 2-4 times, or more. SMP Parallel processing is standard capability in NX Nastran, whether with Femap or as standalone.

Go to <Femap Install Directory>\nastran\conf.
Open the nast<v>.rcf text file (eg. using Notepad). "v" is an NX Nastran major version number.

In the file, add these entries:
PARALLEL= <n> $ where <n> is the total number of cores/cpus in the computer.
Example: PARALLEL=8

MEMORY=<x>MB $
Where <x> is 75% of the computer's installed RAM, in MB.
Example: MEMORY=6000MB

SMEMORY=<x-2000>MB $ where <x> is 75% of the computer's installed RAM, in MB. Example: SMEMORY=4000MB.

Important Notes:

1. The number of cpu's / cores can be found via the number of graph boxes in the CPU Usage History section of the Performance tab in Windows Task Manager.

2. 75% is a rough estimate of the maximum sensible amount. If the computer has numerous other applications open (or doesn't have much RAM) such that 75% is not free to start the analysis, then the analysis will terminate.

3. The suggested 2000MB difference between MEMORY and SMEMORY is (more than)
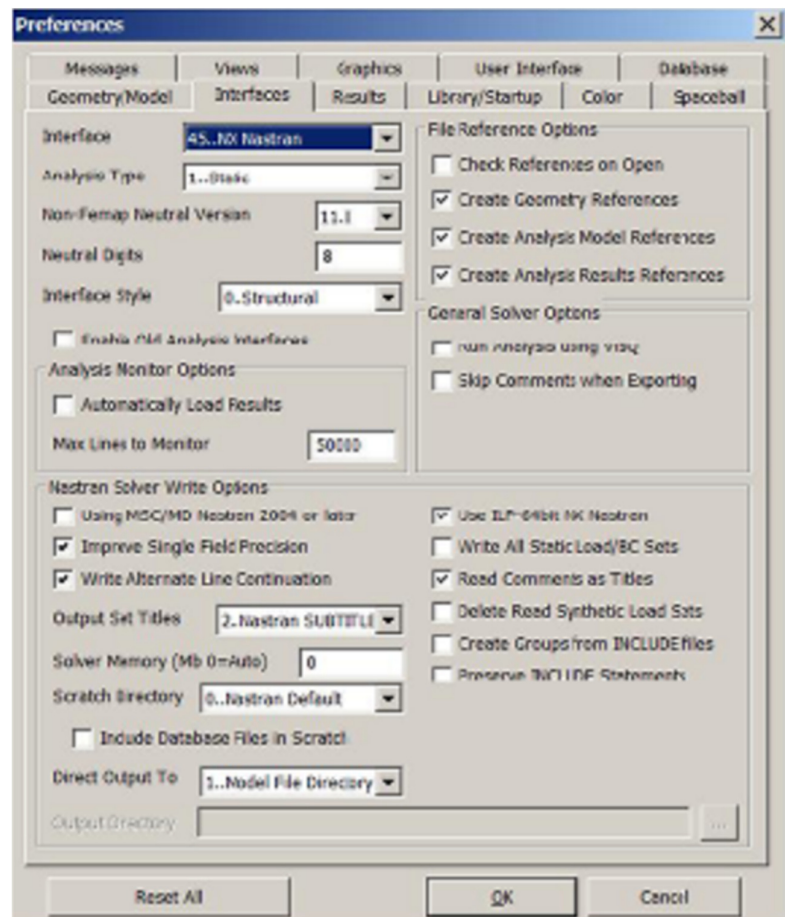
enough for an enormous range of FEA analyses. The difference must be enough to cover the largest memory usage that would have occurred had the analysis run with no SMEMORY set. For example, 2000MB is enough for a 1.5m node solid contact model of moderate matrix density, but probably isn't enough for a 1.0m node solid cube. Note that SMEMORY is superior to Windows own RAM caching methods. A large enough SMEMORY can easily reduce the amount of I/O written/read to disk by a factor of 10's, 100's or 1000's. SMEMORY RAM is also faster than any SSD. RAM has ALWAYS been the most expensive system item per GB, so NX Nastran is optimised to minimise its use. However, if the computer has "RAM to spare", then MEMORY and SMEMORY puts the excess to good use.

4. If MEMORY is set to a bigger number than 8000MB, then NX Nastran MUST use the ILP 64 bit solver. In Femap, this is checked on via File | Preferences -> Interfaces tab (Under Nastran Solver Write Options). These settings make the biggest difference for linear contact problems where there are multiple iterations of the contact condition during solution. They are also useful for fairly non-linear problems of moderate size. Even though not all NX Nastran processes are parallelised, the numerous non-linear iterations normally include a large amount of disk I/O, which can operate entirely within RAM if the SMEMORY is large enough.