

14.5 DATA STORAGE IN SCRATCH FILES

Two types of temporary scratch files are opened during execution of the subprogram POTEN. One group are opened formally using the FORTRAN scratch file convention, with filenames which are assigned by the compiler. The second group are opened with the temporary filenames SCRATCHA, SCRATCHB, ..., SCRATCHO. All of these files are deleted prior to the end of the run, but if execution is interrupted by the user (or by power interruption to the system) some or all of these scratch files may remain on the hard disk. In the latter case the user is advised to delete these files manually.

If the storage requirements of a run exceed the available disk space a system error will be encountered; in this event the user should either increase the available disk space or reduce the number of panels or solutions. The parameter SCRATCH_PATH can be used in the configuration files to distribute storage between two disks, as explained in [Section 4.7](#).

14.6 MULTIPLE PROCESSORS (NCPU>1)

WAMIT Version 7 is compiled with the Intel Fortran Compiler, using special directives to enable parallel processing on systems with multiple processors. Depending on the inputs and hardware, the total run time can be reduced substantially by using this capability. [Figure 14.2](#) shows two examples, using modified inputs of the test runs 06a (ISSC TLP) and 15 (Semi-sub) which are described in [Appendix A](#), and using the low-order and higher-order options respectively. In order to provide examples for relatively large computations, the input parameters for these two runs have been modified as explained in the caption.

Users should first verify the number of logical processors (also known as logical CPUs) and the size of available RAM on the system.¹ NCPU, that assigns the number of threads for parallel processing, should be determined based on these resources. Note that increasing NCPU beyond the number of logical processors no longer improves performance. Instead it may incur slight overhead due to time sharing of the logical processors among threads.

If the system has multiple logical processors, open the file `config.wam` with a text editor. The default settings in this file are as follows:

```
NCPU=1
RAMGBMAX=0.5
```

Change NCPU to the appropriate number for the system, and increase RAMGBMAX to the maximum value which can be used for scratch memory, following the guidelines in [Section 14.4](#). Note that the RAM required for multiple processing is proportional to NCPU. The actual RAM required during a run is displayed in the output file `wamitlog.txt`. If RAMGBMAX is not sufficiently large for the value of NCPU specified, the program stops

¹This information can be obtained by selecting 'Start', 'Task manager', 'Performance', and then 'CPU' and 'Memory', on Windows systems, and using the 'lscpu' and 'free -h' commands, on Linux systems.

with an error message displayed. In that case the user should reduce NCPU, or modify the other input parameters to increase RAMGBMAX or reduce the required RAM.

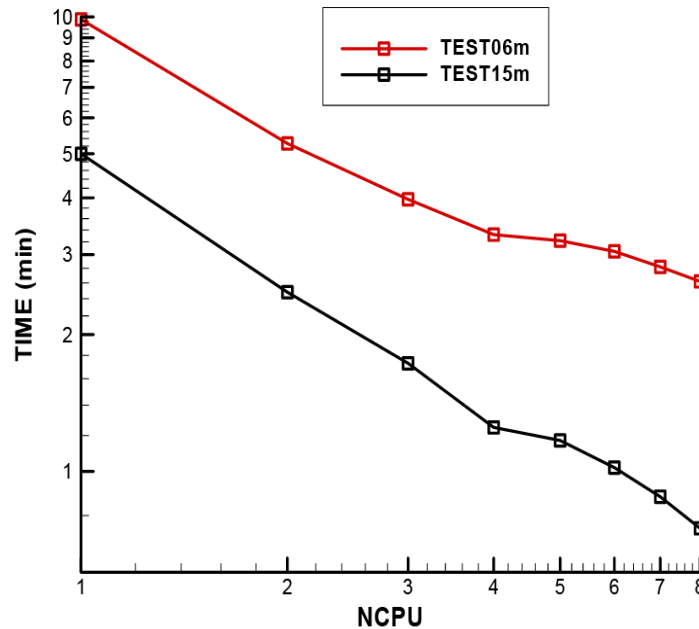


Figure 14.2: Run times for modified versions of test06a (ISSC TLP) and test15 (Semi-Sub) for values of NCPU between 1 and 8. The TEST06m inputs are the same as for TEST06a in Appendix A.6 except that the number of panels NPAN=4048 and the number of wave periods NPER=32. The test15m inputs are the same as in Appendix A.15 except that NPER=32. These computations were run on a PC with i5-1240P CPU and 64 Gb of RAM, under the Windows 11 Pro operating system.

The principal advantage of multiple processing is in the computing time for loops over the wave period. During the run, when the time and number of iterations are output for each wave period on the monitor, these are displayed in groups of NCPU lines more-or-less simultaneously, with values of the wave period which usually are not in a logical sequence. (The original sequence is restored in the header of the .out output file, where it will be noted that the clock time for each wave period is not sequential.) Test14a is a useful example of this process, and of the advantage of using multiple processors for runs with a large number of wave periods (See [Appendix A.14](#)).

When NCPU>1, the value of NCPU used is shown in the `wamitlog.txt` output file. If the total number of wave periods NPER is less than the value of NCPU in the configuration files, NCPU is reduced for the loops over the wave period and the reduced value is displayed in the `wamitlog.txt` file. Maximum efficiency of the computing time is achieved when NPER is an integer multiple of NCPU.

When NCPU>1 the ‘BREAK’ option to interrupt the run is disabled and cannot be used (See [Section 4.12](#)).