



# HPC2002 Result

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**Hewlett-Packard Company**  
hp server rx2600 cluster (1500MHz Itanium2)

**SPECenvM2002 = 545**

SPEC license #: HPG2116 | Tested by: Hewlett-Packard Company | Test site: Richardson, Texas | Test date: Feb-2004 | HW Avail: May-2004 | SW Avail: May-2004

Benchmark	Reference Time	Runtime	Ratio
361.wrf_m	86400	158	545

Hardware		Software	
CPU:	Intel Itanium 2	Parallel:	MPI
CPU MHz:	1500	Processes-Threads:	76
FPU:	Integrated	MPI Processes:	76
CPU(s) enabled:	76	OpenMP Threads:	N/A
CPU(s) orderable:	1 to 2 per node, up to 64 nodes	Operating System:	HPUX11i-TCOE B.11.23
Primary Cache:	L1 Inst/Data: 16 KB, associativity = 4	Compiler:	HP C/ANSI C Compiler B.11.23
Secondary Cache:	L2 Unified: 256 KB, associativity = 8		HP aC++ Compiler B.11.23
L3 Cache:	L3 Unified: 6144 KB, associativity = 24		HP Fortran 90 Compiler B.11.23
Other Cache:	None		HP LIBF90 PHSS_29620
Memory:	12GB per node (12 x 1 GB DDR 266 DIMMS)		HP F90 Compiler PHSS_29663
Disk Subsystem:	36GB 10k RPM SCSI system disk per node		HP aC++ Compiler PHSS_29655
Other Hardware:	See Notes section below.		HP C Compiler PHSS_29656
		File System:	u2comp/be/plugin library PHSS_29657
		System State:	HP MPI 02.00.01.00 B6060B
		Other Software:	vxfs (system), vxfs through NFS (benchmark files)
			Multi-user
			NetCDF 3.5.0, HP MPI v2.00.01

## Notes/Tuning Information

CPU(s) enabled: 76 (two per node, 38 nodes)

### Other Hardware:

#### Computation Network:

- AB286A PCI-X 2-port Infiniband HCA for HPC
- AB346A 5m copper cable PCI-X Infiniband
- AB353A 7m copper cable PCI-X Infiniband
- AB291A PCI-X 12-port InfiniBand Copper Switch
- Topspin 96-port IB copper switch 99-00020-01 TS170
- 98-00045-01 12-port leaf boards (8)
- 98-00047-01 power supply
- 98-00044-01 controller module

GigaBit on-board adapter for Administration and NFS  
 PCI GigaBit card for NFS traffic (GigE-TX adapter A6825A )

### NFS file server:

- rp5470 (PA-RISC) NFS File Server
- 4 PA8700 CPUs 750 MHz. 16 GB of memory
- 4 internal disks 73 GB Ultra2 SCSI
- 20 external disks 18 GB U160 SCSI striped with LVM across 4 SCSI controllers
- 15 external disks 73 GB FibreChannel mirrored with LVM across 2 FC controllers which contain the NFS filesystems accessed by the benchmark. These NFS filesystems are optimized for security rather than performance.

### File Server Network:

- HP ProCurve 9308 64-port copper Gigabit Ethernet Switch
- Built-in Gigabit Ethernet Adapters (one per node)



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## Notes/Tuning Information (Continued)

Peak Flags: MPI

```
mpif90 +DD64 +noppu +Ofast +Oinfo +U77
mpicc -Ae +DD64 +Ofast -DNOUNDERSCORE -DSPEC_HPG_MPI2
OPTIMIZE =
ENV_SPEC_HPG_PARALLEL=MPI
CPPFLAGS = -I. -C -P
EXTRA_LIBS= -minshared -L${NETCDF}/lib/hpux64 -lnetcdf
NETCDF = /home/clpack/netcdf-3.5.0
FPORABILITY= -I${NETCDF}/include
```

Alternate Source used for Peak:

```
361.wrf_m: module_big_step_utilities_em.F90
Improve data locality via loop interchange.
Available as SPEC HPC2002 Source: env2002-src_hp-20040303.tar.gz
```

Kernel Paramters (/stand/system):

```
maxdsiz      0x7b03a000
maxdsiz_64bit 0x4000000000
maxssiz      0x10000000
maxssiz_64bit 0x40000000
maxtsiz      1073741824
maxtsiz_64bit 4294967296
vps_pagesize 4
vps_ceiling  64
dbc_min_pct  3
dbc_max_pct  3
```

Peak User Environment:

```
use_submit_for_speed=1
submit = /home/f90pack/clust_mpirun $command
```

clust\_mpirun:

```
mpirun -ITAPI -f appfile
```

appfile:

```
-h rx17 -np 2 -e MPI_FLAGS=y -e MPI_WORKDIR=$cwd $command
...
-h rx54 -np 2 -e MPI_FLAGS=y -e MPI_WORKDIR=$cwd $command
```

LSF used to initiate batch job submissions.

Appfile is generated from within the LSF run.

Netcdf source obtained from

```
http://www.unidata.ucar.edu/packages/netcdf/
```

Netcdf built for HPUX 64 bit mode with:

```
#!/bin/csh
setenv CC '/opt/ansic/bin/cc +DD64'
setenv CPPFLAGS "-D_HPUX_SOURCE -D_FILE_OFFSET_BITS=64 -Dextname"
setenv FC '/opt/fortran90/bin/f90 +DD64'
setenv FFLAGS -w
setenv FLIBS -lU77
setenv CXX '/opt/aCC/bin/aCC +DD64'
./configure
```