SPEC CPU®2017 Integer Rate Result

IBM Corporation

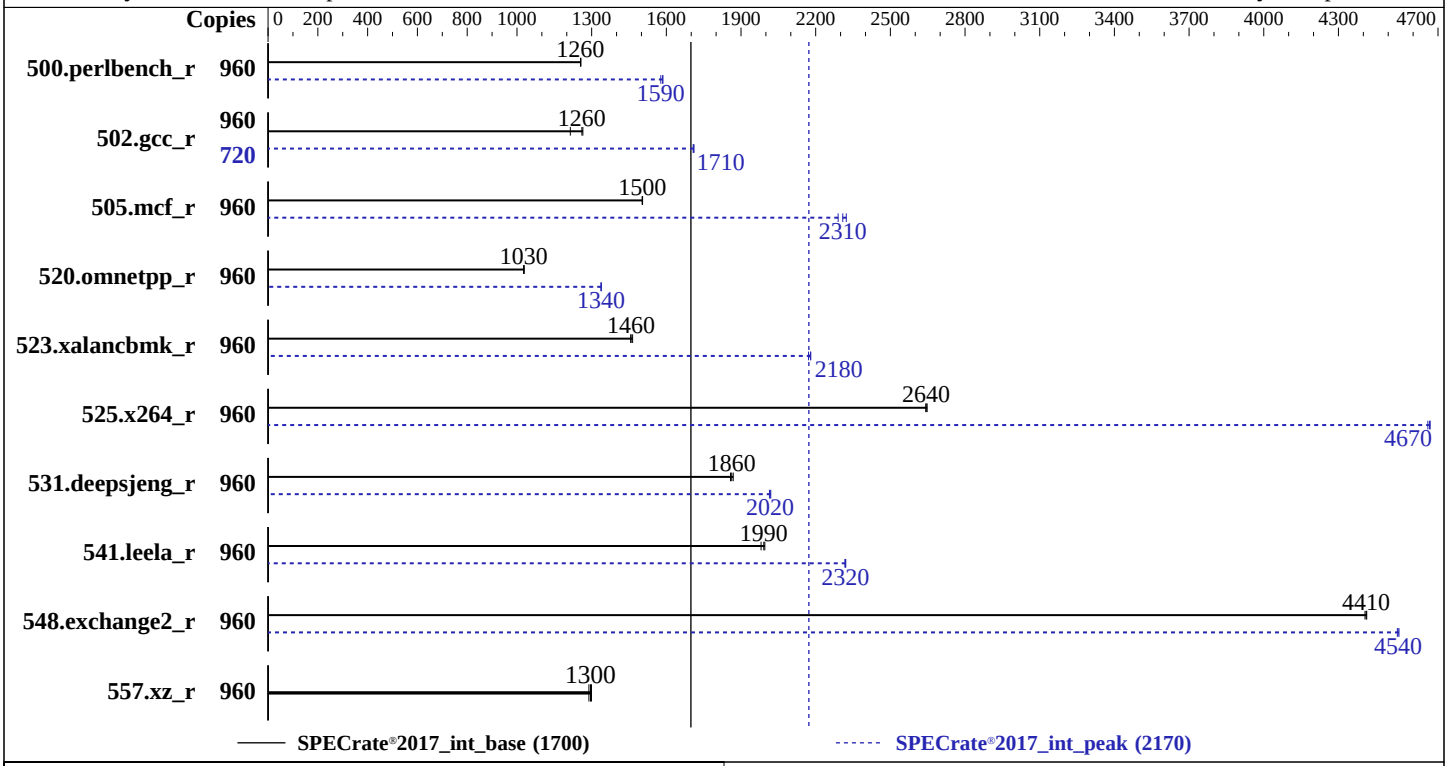
IBM Power E1080 (3.55 - 4 GHz, 120 core, AIX)

SPECrate®2017_int_base = 1700

SPECrate®2017_int_peak = 2170

CPU2017 License: 11
Test Sponsor: IBM Corporation
Tested by: IBM Corporation

Test Date: Aug-2021
Hardware Availability: Sep-2021
Software Availability: Sep-2021



Hardware

CPU Name:	Power10
Max MHz:	4000
Nominal:	3550
Enabled:	120 cores, 8 chips, 8 threads/core
Orderable:	4, 8 Chips
Cache L1:	96 KB I + 64 KB D on chip per core
L2:	2 MB I+D on chip per core
L3:	120 MB I+D on chip per chip shared NUCA / 15 cores
Other:	None
Memory:	8 TB (128 x 64 GB 1Rx4 PC4-3200V-R)
Storage:	1 x 512 GB NVMe SSD
Other:	None

Software

OS:	AIX 7.2 TL5 SP3
Compiler:	C/C++: Version 17.1.0 of IBM Open XL C/C++ for AIX; Fortran: Version 17.1.0 of IBM Open XL Fortran for AIX;
Parallel:	No
Firmware:	Version NH1010_041 released Sep-2021
File System:	JFS2
System State:	Run level 2 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other:	tcmalloc: tcmalloc memory allocator library v2.7.1
Power Management:	Maximum Performance mode

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	960	1216	1260	**1217**	**1260**	1218	1260	960	964	1590	**964**	**1590**	969	1580
502.gcc_r	960	1075	1260	1119	1210	**1078**	**1260**	720	597	1710	596	1710	**596**	**1710**
505.mcf_r	960	1031	1500	**1031**	**1500**	1032	1500	960	**672**	**2310**	677	2290	668	2320
520.omnetpp_r	960	1224	1030	1227	1030	**1225**	**1030**	960	942	1340	**941**	**1340**	941	1340
523.xalancbmk_r	960	692	1460	696	1460	**695**	**1460**	960	465	2180	467	2170	**465**	**2180**
525.x264_r	960	635	2650	**636**	**2640**	636	2640	960	361	4660	**360**	**4670**	360	4670
531.deepsjeng_r	960	589	1870	**591**	**1860**	592	1860	960	546	2010	545	2020	**545**	**2020**
541.leela_r	960	797	2000	803	1980	**798**	**1990**	960	686	2320	**685**	**2320**	685	2320
548.exchange2_r	960	570	4410	571	4410	**570**	**4410**	960	554	4540	**554**	**4540**	554	4540
557.xz_r	960	798	1300	**800**	**1300**	804	1290	960	798	1300	**800**	**1300**	804	1290

SPECrate®2017_int_base = 1700

SPECrate®2017_int_peak = 2170

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

```
The config file option 'submit' was used
to assign benchmark copies to specific processors using
the "bindprocessor" command (see flags file for details).
```

Operating System Notes

```
AIX V7.2 TL5 SP3 running on Power10 in Power9 compatibility mode.
Following ulimits set to unlimited.
'ulimit -f unlimited' set file size to unlimited.
'ulimit -s unlimited' set stack size to unlimited.
'ulimit -c unlimited' set core file size to unlimited.
'ulimit -d unlimited' set data segment size to unlimited.
'ulimit -m unlimited' set max memory size to unlimited.

72000 16M large pages defined with vmo command.
'AIX_STDBUFSZ=524288' configures the I/O buffer size for the read and write system calls.
'mount -o remount,noatime /dev/hd1' for filesystems with a high rate of file access, performance
can be improved by disabling the update of the access time stamp.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LIBPATH = "/home/cpu2017/v1.1.8/tcmalloc"
MALLOCMULTIHEAP = "1"
MEMORY_AFFINITY = "MCM"
XLFRTEOPTS = "intrinthds=1"
```

(Continued on next page)

Environment Variables Notes (Continued)

```
Environment variables set by runcpu during the 500.perlbench_r peak run:
MALLOCOPTIONS = "pool:0x20000000,buckets,no_mallinfo"

Environment variables set by runcpu during the 502.gcc_r peak run:
MALLOCTYPE = "watson2"

Environment variables set by runcpu during the 505.mcf_r peak run:
MALLOCTYPE = "watson2"

Environment variables set by runcpu during the 520.omnetpp_r peak run:
MALLOCOPTIONS = "pool:0x20000000"

Environment variables set by runcpu during the 523.xalancbmk_r peak run:
MALLOCOPTIONS = "pool:0x20000000"
MALLOCTYPE = "Yorktown"

Environment variables set by runcpu during the 525.x264_r peak run:
MALLOCTYPE = "watson2"

Environment variables set by runcpu during the 531.deepsjeng_r peak run:
MALLOCTYPE = "watson2"

Environment variables set by runcpu during the 541.leela_r peak run:
MALLOCTYPE = "watson2"

Environment variables set by runcpu during the 548.exchange2_r peak run:
MALLOCTYPE = "watson2"
```

General Notes

```
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.

tcmalloc, a general purpose malloc implementation
built with the AIX V7.2 and IBM XL C/C++ compiler 16.1.0 for AIX
used for all benchmarks in base
sources available from https://github.com/gilamn5tr/gperftools/archive/refs/heads/aix-enablement-upstream.zip
```

Platform Notes

```
 Sysinfo program /home/cpu2017/v1.1.8/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on compden1.aus.stglabs.ibm.com Fri Aug 13 10:26:37 2021

 SUT (System Under Test) info as seen by some common utilities.
 For more information on this section, see
    https://www.spec.org/cpu2017/Docs/config.html#sysinfo

 WARNING regarding the output of 'prtconf':
    (1) The tester may need to adjust the sysinfo-supplied 'hw_nominal_mhz'.
    (2) The 'Number of Processors' reported by prtconf is the number of cores available to
    the partition.
 From prtconf:
    Host Name: compden1.aus.stglabs.ibm.com
    System Model: IBM,9080-HEX
    Processor Clock Speed: 3650 MHz
    Number Of Processors: 120
    Memory Size: 8180736 MB
    BIOS Version: NH1010_041

 WARNING regarding the output of 'lscfg':  this utility reports resources for the system,
 not the current partition.  Therefore, for a partition that has a subset of the full
 system resources:
    (1) The tester may need to adjust the sysinfo-supplied 'hw_ncores'.
    (2) The tester may need to adjust the sysinfo-supplied 'hw_nchips'.
    (3) Be aware that 'hw_memory' is set from 'prtconf', and is correct for the partition,
    but "Memory DIMM info from lscfg" reports the number of DIMMs in the entire server.
 Processors, from lscfg -vplsysplanar0

    ^^^Note: sum of ways = 0, differs from prtconf 'Number Of Processors'
 Memory DIMM info from lscfg:
     128x 01GY910

 Operating System: AIX 7.2.0.0   7200-05-03-2135

 disk: df -k /home/cpu2017/v1.1.8
    Filesystem    1024-blocks      Free %Used    Iused %Iused Mounted on
    /dev/hd1        525336576 457662164   13%   125636     1% /home

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C       | 500.perlbench_r(peak) 502.gcc_r(peak)
```

(Continued on next page)

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
IBM Open XL C/C++ for AIX 17.1.0 (5725-C72, 5765-J18), clang version 13.0.0
Target: powerpc-ibm-aix7.2.0.0
Thread model: posix
InstalledDir: /opt/IBM/openxlC/17.1.0/bin
------------------------------------------------------------------------------

==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
        | 525.x264_r(base, peak) 557.xz_r(base, peak)
------------------------------------------------------------------------------
IBM Open XL C/C++ for AIX 17.1.0 (5725-C72, 5765-J18), clang version 13.0.0
Target: powerpc64-ibm-aix7.2.0.0
Thread model: posix
InstalledDir: /opt/IBM/openxlC/17.1.0/bin
------------------------------------------------------------------------------

==============================================================================
C       | 500.perlbench_r(peak) 502.gcc_r(peak)
------------------------------------------------------------------------------
IBM Open XL C/C++ for AIX 17.1.0 (5725-C72, 5765-J18), clang version 13.0.0
Target: powerpc-ibm-aix7.2.0.0
Thread model: posix
InstalledDir: /opt/IBM/openxlC/17.1.0/bin
------------------------------------------------------------------------------

==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
        | 525.x264_r(base, peak) 557.xz_r(base, peak)
------------------------------------------------------------------------------
IBM Open XL C/C++ for AIX 17.1.0 (5725-C72, 5765-J18), clang version 13.0.0
Target: powerpc64-ibm-aix7.2.0.0
Thread model: posix
InstalledDir: /opt/IBM/openxlC/17.1.0/bin
------------------------------------------------------------------------------

==============================================================================
C++     | 520.omnetpp_r(peak) 523.xalancbmk_r(peak)
------------------------------------------------------------------------------
IBM Open XL C/C++ for AIX 17.1.0 (5725-C72, 5765-J18), clang version 13.0.0
Target: powerpc-ibm-aix7.2.0.0
Thread model: posix
InstalledDir: /opt/IBM/openxlC/17.1.0/bin
------------------------------------------------------------------------------

==============================================================================
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base,
```

(Continued on next page)

Compiler Version Notes (Continued)

```
        | peak) 541.leela_r(base, peak)
------------------------------------------------------------------------------
IBM Open XL C/C++ for AIX 17.1.0 (5725-C72, 5765-J18), clang version 13.0.0
Target: powerpc64-ibm-aix7.2.0.0
Thread model: posix
InstalledDir: /opt/IBM/openxlC/17.1.0/bin
------------------------------------------------------------------------------

==============================================================================
C++     | 520.omnetpp_r(peak) 523.xalancbmk_r(peak)
------------------------------------------------------------------------------
IBM Open XL C/C++ for AIX 17.1.0 (5725-C72, 5765-J18), clang version 13.0.0
Target: powerpc-ibm-aix7.2.0.0
Thread model: posix
InstalledDir: /opt/IBM/openxlC/17.1.0/bin
------------------------------------------------------------------------------

==============================================================================
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base,
        | peak) 541.leela_r(base, peak)
------------------------------------------------------------------------------
IBM Open XL C/C++ for AIX 17.1.0 (5725-C72, 5765-J18), clang version 13.0.0
Target: powerpc64-ibm-aix7.2.0.0
Thread model: posix
InstalledDir: /opt/IBM/openxlC/17.1.0/bin
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base, peak)
------------------------------------------------------------------------------
IBM Open XL Fortran for AIX 17.1.0 (5725-C74, 5765-J19)
Version: 17.01.0000.0000
Driver Level: 200728-1954 (252) ID: 915518f5b
Fortran Front End and Run Time Level: 200728-1954 (252) ID: 1be655d9d
Fortran Transformer Level: 200730-1513 (267) ID: d7d107fc9
LLVM IR Builder ID: e62648dbf4b9
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
/opt/IBM/openxlC/17.1.0/bin/ibm-clang

C++ benchmarks:
/opt/IBM/openxlC/17.1.0/bin/ibm-clang++_r

(Continued on next page)

Base Compiler Invocation (Continued)

Fortran benchmarks:
/opt/IBM/openxlf/17.1.0/bin/xlf95_r

Base Portability Flags

500.perlbench_r: -DSPEC_AIX -DSPEC_LP64
502.gcc_r: -DSPEC_AIX -DSPEC_NEED_ASPRINTF -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_AIX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_AIX -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -Wl,-bbigtoc -Wl,-blpdata
-Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bplugin_opt:--data-layout-opt=1
-Wl,-bplugin_opt:-fold-complex-pointer-compare=false -mcpu=pwr9
-mabi=vec-extabi -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -flto -mllvm -data-layout-opt=1 -O3
-fcommon -mllvm -fold-complex-pointer-compare=false
-L/opt/IBM/xlmass/10.1.0/lib -lmass -L/opt/IBM/openxlf/17.1.0/lib
-lxlopt

C++ benchmarks:
-m64 -Wl,-bbigtoc -Wl,-blpdata
-Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bplugin_opt:-fold-complex-pointer-compare=false -mcpu=pwr9
-mabi=vec-extabi -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -flto -O3 -L/opt/IBM/xlmass/10.1.0/lib
-lmass -L/opt/IBM/openxlf/17.1.0/lib -lxlopt

Fortran benchmarks:
-q64 -bbigtoc -blpdata
-Wl,-bplugin_opt:-fold-complex-pointer-compare=false -O3 -qarch=pwr9
-qvecnvol -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -qlto -L/opt/IBM/xlmass/10.1.0/lib -lmass

(Continued on next page)

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-L/opt/IBM/openxlf/17.1.0/lib -lxlopt

Peak Compiler Invocation

C benchmarks:
/opt/IBM/openxlC/17.1.0/bin/ibm-clang

C++ benchmarks:
/opt/IBM/openxlC/17.1.0/bin/ibm-clang++_r

Fortran benchmarks:
/opt/IBM/openxlf/17.1.0/bin/xlf95_r

Peak Portability Flags

500.perlbench_r: -DSPEC_AIX
502.gcc_r: -DSPEC_AIX -DSPEC_NEED_ASPRINTF
505.mcf_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_AIX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_AIX -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -m32 -Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bmaxdata:0xD0000000/dsa
-Wl,-bplugin_opt:--ppc-set-dscr=1
-Wl,-bplugin_opt:-inline-hot-callsites-aggressively
-Wl,-blpdata -Wl,-bbigtoc -O3 -mcpu=pwr9
-mabi=vec-extabi -flto -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -fprofile-generate
-fprofile-use=default.profdata -fno-strict-aliasing
-L/opt/IBM/xlmass/10.1.0/lib -lmass
-L/opt/IBM/openxlf/17.1.0/lib -lxlopt

(Continued on next page)

Peak Optimization Flags (Continued)

502.gcc_r: -m32 -Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bmaxdata:0x50000000
-Wl,-bplugin_opt:-fold-complex-pointer-compare=false
-Wl,-blpdata -Wl,-bbigtoc -O3 -mcpu=pwr9
-mabi=vec-extabi -flto -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -fprofile-generate
-fprofile-use=default.profdata
-mllvm -fold-complex-pointer-compare=false
-L/opt/IBM/xlmass/10.1.0/lib -lmass
-L/opt/IBM/openxlf/17.1.0/lib -lxlopt

505.mcf_r: -m64 -Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bplugin_opt:--data-layout-opt=3 -Wl,-blpdata
-Wl,-bbigtoc -O3 -mcpu=pwr9 -mabi=vec-extabi -flto
-mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -fprofile-generate
-fprofile-use=default.profdata -mllvm -data-layout-opt=3
-L/opt/IBM/xlmass/10.1.0/lib -lmass
-L/opt/IBM/openxlf/17.1.0/lib -lxlopt

525.x264_r: -m64 -Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-blpdata -Wl,-bbigtoc
-Wl,-bplugin_opt:-enable-aggressive-vectorization -O3
-mcpu=pwr9 -mabi=vec-extabi -flto
-mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -fprofile-generate
-fprofile-use=default.profdata -fcommon -frestrict-args
-mllvm -enable-aggressive-vectorization
-mllvm -ppc-enable-redxnintr -L/opt/IBM/xlmass/10.1.0/lib
-lmass -L/opt/IBM/openxlf/17.1.0/lib -lxlopt

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: -m32 -Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bmaxdata:0x30000000 -Wl,-bplugin_opt:--ppc-set-dscr=1
-Wl,-blpdata -Wl,-bbigtoc -O3 -mcpu=pwr9
-mabi=vec-extabi -flto -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -fprofile-generate
-fprofile-use=default.profdata
-Wl,-bplugin_opt:-dynamic-cast-opt=on
-L/opt/IBM/xlmass/10.1.0/lib -lmass
-L/opt/IBM/openxlf/17.1.0/lib -lxlopt

(Continued on next page)

Peak Optimization Flags (Continued)

523.xalancbmk_r: -m32 -Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bmaxdata:0x30000000
-Wl,-bplugin_opt:-inline-hot-callsites-aggressively
-Wl,-bplugin_opt:-enable-partial-inlining -Wl,-blpdata
-Wl,-bbigtoc -mllvm -enable-partial-inlining
-mllvm -enable-vec-find=true -O3 -mcpu=pwr9
-mabi=vec-extabi -flto -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -fprofile-generate
-fprofile-use=default.profdata -L/opt/IBM/xlmass/10.1.0/lib
-lmass -L/opt/IBM/openxlf/17.1.0/lib -lxlopt

531.deepsjeng_r: -m64 -Wl,-bplugin_opt:--ppc-set-dscr=1
-Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bplugin_opt:-inline-hot-callsites-aggressively
-Wl,-blpdata -Wl,-bbigtoc -O3 -mcpu=pwr9
-mabi=vec-extabi -flto -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -fprofile-generate
-fprofile-use=default.profdata -L/opt/IBM/xlmass/10.1.0/lib
-lmass -L/opt/IBM/openxlf/17.1.0/lib -lxlopt

541.leela_r: -m64 -Wl,-bplugin_opt:--enable-ppc-gen-scalar-mass
-Wl,-bplugin_opt:-inline-hot-callsites-aggressively
-Wl,-blpdata -Wl,-bbigtoc
-mllvm -aggressive-late-full-unroll
-mllvm -array-compress=true
-mllvm -enable-lvi-memoryssa=true -O3 -mcpu=pwr9
-mabi=vec-extabi -flto -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -fprofile-generate
-fprofile-use=default.profdata -L/opt/IBM/xlmass/10.1.0/lib
-lmass -L/opt/IBM/openxlf/17.1.0/lib -lxlopt

Fortran benchmarks:
-q64 -Wl,-bplugin_opt:--ppc-set-dscr=1 -blpdata -bbigtoc -qlto -O3
-qarch=pwr9 -qvecnvol -mllvm -enable-ppc-gen-scalar-mass
-mllvm -vector-library=MASSV -qprofile-generate
-qprofile-use=default.profdata -L/opt/IBM/xlmass/10.1.0/lib -lmass
-L/opt/IBM/openxlf/17.1.0/lib -lxlopt

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/IBM_AIX_7.2_S-RevB.html
http://www.spec.org/cpu2017/flags/IBM_Open_XL_AIX_flags-RevB.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/IBM_AIX_7.2_S-RevB.xml
http://www.spec.org/cpu2017/flags/IBM_Open_XL_AIX_flags-RevB.xml

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.8 on 2021-08-13 11:26:35-0400.
Report generated on 2021-09-01 14:13:05 by CPU2017 PDF formatter v6442.
Originally published on 2021-09-01.