MARC K7.3.2 Release Notes

The current release of MARC K7.3.2 broadly encompasses the following objectives:

- Inclusion of Parallel processing capability in MARC K7.2 to have one integrated analysis product. The parallel processing can be done on a single machine parallel or on a cluster of networked workstations.
- Solution accuracy and robustness.
- Quality Improvements: Over 110 bugs in MARC K7.2 and previous versions have been fixed in this release.

The release note addresses the following items:

Note for SGI Machines:

When running a single machine parallel version with the MPI 3.2 version, the job may not run if the `marck73` or run directory path name is very long. Normally, path names up to 80 characters are allowed in MARC, but there seems to be a problem with the MPI 3.2 version.

Notes for HP Machines:

1. The HP-UX 10.20 executables have been built for both PA-RISC 1.1 and PA-RISC 2.0 architecture. The architecture can be checked by running a command on the executable in the `marck73/bin` directory as: `file marck73`. Please note that the executable will give a message of incompatibility with hardware if the PA-RISC 2.0 executable is used on a PA-RISC 1.1 architecture. The reverse, however (i.e., PA-RISC 1.1 on PA-RISC 2.0), will work but at a slower speed. The platform can be identified with the use of the command: `/usr/bin/getconf SC_CPU_VERSION`. If it returns a number greater than or equal to 532, it is a PA_RISC 2.0 system.

2. For large models requiring memory sizes of over 650 MB, an addition of the option, -W1, -N, is required in the two load statements in the file `marck73/tools/include` for the two released versions.

   1) HP-UX 11.0

   ```
   LOAD="${MPI_ROOT}/bin/mpif90 +ppu +DA2.ON +DS2.0a +03 +Oparallel
   -W1, -N -W1,+FPD -W1,-aarchive_shared -W1, +vnocompatwarnings
   -W1, -a,shared_archive -o "
   ```

   2) HP-UX 10.20

   ```
   LOAD="${MPI_ROOT}/bin/mpif77 +ppu +DA2.ON +DS2.0a +03 +Oparallel
   -W1, -N -W1,+FPD -W1,-aarchive_shared -W1, +vnocompatwarnings
   -W1, -a,shared_archive -o "
   ```

   This will be for single processor, single machine parallel as well as the network versions.

Part Number RL-3973.07

MARC K7.3.2 can run in both single CPU and multiple CPU mode. All features of MARC are supported in single CPU mode. Most, but not all, features of MARC are supported in multiple CPU (parallel) mode. For details, refer to Section VI. MARC K7.3.2 Capabilities Supported in Parallel

The single processor version of MARC K7.3.2 is available on 15 platforms. The single machine parallel version of MARC K7.3.2 is available on 12 platforms (9 UNIX, 2 NT, and 1 CRAY), and the network parallel version is available on 7 platforms. The network version must be used on compatible machines only. (Please refer to *MARC K7.3.2 Network Version for UNIX — Installation Instruction and User Notes*, Part I for definition of compatible machines.)

For the network versions, the directory `marck73/notes` *contains a PDF file with installation and user notes specifically for network installation and use. The single machine parallel version can run on either shared memory machines or distributed memory machines such as the IBM-SP. For the UNIX platforms, the MPI libraries for single machine parallel version are the hardware vendor-provided libraries. For the NT platform, the public domain version (WIN MPICH provided on the CD) is used. For the network UNIX parallel version, the MPI library is the public domain version of MPICH (provided on the CD); for the network NT version, the MPI library (PATENT MPI) is provided by Genias Software and is shipped on the CD.*

Please read the *MARC K7.3.2 Network Installation Instruction and User Notes* for easy installation and usage of the network parallel versions.

I. What is New in MARC K7.3.2 Beyond MARC K7.3.1

Security for Parallel Versions:

Besides the feature name, `marck71` (for Single Processor Versions), two new security features have been introduced: `marcp` (for Single Machine Parallel Version) and `marcn` (for Network Version).

Increased Performance:

1. The NT DF 6.0 version has been rebuilt with new options and increases the speed by about 10-25% on at least the select problems that we tested.
2. In most UNIX versions, one would notice a significant speed increase for the default solver (the direct profile solver) due to increased optimization.
3. Besides the speed-up for the direct profile solver, substantial performance enhancements have been made in the Single Processor, Single Machine Parallel and Network versions for the HP machines. This applies to both the HP UX-10.20 as well as HP UX-11.0 platforms.

Increased Coverage:

1. Additional versions are available for:
   a. Single Processor: HP (UX 10.20/PA 1.1), SGI (R4000/Irix 5.3), IBM (RS6000/AIX 4.3.1)
   b. Single Machine Parallel: IBM-SP (RS6000/AIX 4.3.2)
   c. Network of workstations: UNIX and NT (please refer to Section IX. for the list)
2. Additional ports (MARC K7.3.2 versions can be used for various Processor/OS combinations as described below. The notes apply to Single Processor, Single Machine Parallel as well as Network versions unless otherwise stated):
   a. SGI - R8000, Irix 6.2: This version will work on R8000/R10000 processors running Irix 6.2, 6.4 and 6.5 (it uses the `-mips4` and `-64` option). Also this version is suitable for machines with either 6.2 or 7.2 compilers. This version has been tested on machines with R8000/Irix 6.2 and R10000/Irix 6.5 machines.
   b. SGI – R5000, Irix 6.3: This version will work on R4000/R5000 processors running Irix 6.3 and 6.5 (it uses the `-mips3` and `-n32` option). This version has been tested on R5000/Irix 6.3 and R4400/Irix 6.5 machines.
   c. SGI – R4000, Irix 5.3: This version will work on machines with R4000/R5000 processors running Irix 5.3, 6.2, 6.3 and 6.5 (it uses the `-mips2` and `-o32` option). This version has been tested on R4000/Irix 5.3, R4400/Irix 6.5 and R5000/Irix 6.3 machines.
   d. SUN – Ultra II, Solaris 2.5: This version will work on Ultra processors running Solaris 2.5, 2.6 and 2.7 (notice that for Solaris 2.7, only the Single processor and Network versions can be used. The Single Machine Parallel version cannot be used on the system with Solaris 2.7 as the current SUN HPC 2.0 MPI libraries are not supported on Solaris 2.7). Also, additional shared objects have been included in the `lib_shared` directory (please refer to Section II., Item 4.b. for additional information). This version has been tested on Solaris 2.5, 2.6 and 2.7 operating systems.
   e. IBM – AIX 4.1.5: These versions (RS 6000 workstations as well as the SP machines) are good for machines running AIX 4.1.5 and AIX 4.2 (there are separate versions for the AIX 4.3 OS). This version has been tested on AIX 4.1.5.

f. HP-UX 10.20 and SPP-UX 5.2: These versions come in two flavors (PA-RISC 1.1 and 2.0). The PA-RISC 1.1 version will run on the PA-RISC 2.0 machine but the speed will be slower (PA-RISC 2.0 version will not work on PA-RISC 1.1 machines).

g. For single processor DEC OSF 4.0, the version has been built as static

h. All the UNIX Single Machine Parallel versions (which utilize the *hardware vendor provided MPI libraries)* have their equivalent Network versions (which utilize the *public domain MPI libraries*).

The SGI-Irix 5.3, IBM-AIX 3.2/4.1.5/4.2, DEC 3.2, SUN 2.3/2.4 and HP 9.0.5/10.01 are not Y2K compliant. The hardware vendors have strongly advised us to drop these platforms for the next release of MARC. While MARC 9.1 and its security will be Y2K compliant, the hardware will not be (even with the patches the Y2K compliance is not guaranteed).

II. Installation Remarks

1. If not installing as `root` (or administrator), it is important that the installation of MARC K7.3.2 product from the CD ROM be done with the same USERID as the one used before. This is necessary to insure that the correct links to marck73 script are created, especially if the installation is being done in the same physical location.

   Failure to use the same USERID may create a permissions problem leading to incorrect setup of links. Currently, the install script is designed to overwrite the existing install subdirectory.

2. Please note that to run the UNIX single machine parallel version, the MPI libraries must be installed. To check the version of the supported MPI libraries, please refer to section VII. Also, see the install file in the notes directory for commands to check the MPI version for various platforms.

3. If you get an error message of `f77 not found` when running a job with a user subroutine and you know there is a Fortran compiler on the machine, its path needs to be provided. A typical example would be the SUN platform where the f77 compiler may live in the `/opt/SUNWspro/bin` directory. This path must be added if you get the `f77` error message.

4. On a rare occasion, a job can fail to run on certain platforms with a message; for example, on DEC machines `libUfor.so not found` or on SUN machines `libsunmath.so.1 not found`. These files with extensions of `.so` are shared objects and the error message suggests that either the run time libraries are missing from the system or installed in a nonstandard place. This problem can be fixed with one of the following procedures:

   a. Try re-linking the version first by executing the `make_marc` script in the `marck73/tools` directory and run the job with and without user subroutines.

   b. If the problem persists, check if the `.so` file exists in the `marck73/lib/lib_shared` directory. If it does exist, include the following two lines in the `run_marc` script under `marck73/tools` directory:

      ```
      LD_LIBRARY_PATH = $DIR/../lib/lib_shared

      export LD_LIBRARY_PATH
      ```

      If the first line already exists and points to some other directory, replace it with the new line. Run the job with and without user subroutines once again.

   c. If the `.so` files do not exist in the `marck73/lib/lib_shared` directory or if the `lib_shared` directory does not exist, contact your system administrator to off load the necessary run time libraries from the system CD.

III. Input and Documentation Notes

1. SPLIT BODIES:
   a. Description - New history definition option for Rezoning. This must be used after the REZONE option.
   b. Purpose - To insure correct interpolation of rezoned quantities for deformable-to-deformable contact.
   c. Limitation - Available for 4-node quadrilateral elements only.
2. AUTO THERM now works correctly in analysis with contact. The AUTO THERM functionality should not be used in combination with contact prior to the MARC K7.3.2 version.
3. In the input for a shared or network parallel job, all nodes and elements must be numbered sequentially.
4. MARC K7.3.2 has full dynamic memory allocation in both single as well as multi-processor jobs:
   a. The current maximum memory size in MARC K7.3.2 is close to 1GB. Besides the MAXSIZE parameter, another parameter, MAXNUM, in the include file in the `tools` directory (introduced in MARC K7.2) represents the current maximum of the number of entities (nodes or elements) in the model and should be about one-fifth of the NORMAL parameter. For more details on the program sizing, consult Chapter 5 Making Changes to the MARC Programs in the *MARC K7.3.2 Installation Instructions for UNIX Systems* and Chapter 6 Making Changes to the MARC Programs in the *MARC K7.3.2 Installations Instructions for Windows-NT.*
   b. The initial amount of memory requested by the job from the operating system is equal to the value of NORMAL in the `tools/include` (`tools\include.bat` on NT) file. MARC automatically adds more memory as needed.
   c. When the amount of memory used becomes larger than the value of MAXSIZE as specified in the include file or when the operating system refuses to give more memory, MARC automatically goes out-of-core or stops if it cannot. For multi-processor jobs, the amount of memory used by each processor is limited by MAXSIZE.
   d. The user can specify a value of 0 under the sizing option, in which case the initial memory allocation will be equal to NORMAL. If the value specified under the sizing option is more than NORMAL, MARC will use that value as an initial allocation.

IV. Defects Fixed in this Release

Adaptive Meshing and Rezoning:

1. ATTACH NODE gave incorrect results with adaptive meshing.
2. Incorrect interpolation of variables during rezoning in a deformable-to-deformable contact analysis. This defect can be fixed with the use of the new history definition option SPLIT BODIES. Refer to Section III. Input and Documentation Notes, Item 1.
3. New distributed load types for 4-node quadrilateral elements were not supported in adaptive meshing.
4. TRANSFORMATION in a job with adaptive meshing or rezoning may have lead to core overwrite during post file generation leading to core dump or wrong results.
5. Platform specific restart problem with ADAPTIVE and nonconsecutive element/node numbering.

Contact:

1. Deformable-to-deformable contact generated incorrect results with use of nonsymmetric solver.
2. Poor or no convergence was found in some two-dimensional contact problems with NURBS.
3. Core dump during normal calculations for collapsed patches in three-dimensional Contact.
4. Core dump or core overwrite if more than 200 non-homogeneous coordinates of NURBS existed in the input file.
5. Incorrect handling of boundary conditions during RELEASE option leads to core overwrite in frictional contact situations.
6. Due to inconsistencies in projection algorithm when using the glue option in the CONTACT TABLE option could lead to spurious displacements and stresses in three-dimensional contact.
7. Possible problems in two-dimensional contact problems if a node slid beyond the end of a NURBS.
8. Possible core dump or NaN messages if collapsed brick elements or 4-node tetrahedral elements were used in three-dimensional deformable-to-deformable contact.
9. Load controlled body gave incorrect results if multiple flexible bodies were present.
10. Possibility for a node to separate from the body instead of sliding to the next segment in two-dimensional contact analysis with NURBS description of rigid bodies.
11. Interference closure distance in CONTACT TABLE option gave incorrect results in three-dimensional deformable-to-deformable contact.
12. Possible convergence problems in some three-dimensional contact problems with NURBS.
13. Possible problems were encountered in a three-dimensional contact analysis if a node touched an analytical body and a non-analytical body. This bug only occurred if the analytical body consisted of multiple NURBS and a node slide from one NURBS surface to another.
14. Possible inconsistencies in three-dimensional contact analysis with stick-slip friction and ADAPTIVE option.
15. Possible problems in contact detection if a large number of NURBS surfaces are used to describe the contact body in a three-dimensional contact analysis.

16. Wrong results if the SERVO LINK option was used in combination with contact tyings in deformable-to-deformable, deformable-to-load control rigid or deformable-to-rigid body with heat transfer, contact analysis.

17. Possible core dump or wrong results in increment 1 if load controlled rigid bodies were used and initial contact had to be established during increment zero.

18. Possible exit 33 if Mentat was used to submit a job containing load controlled rigid bodies.

19. Displacements of first retained node of rigid body tying and displacements of nodes of load controlled rigid bodies were not recognized as displacements during convergence testing or given correct code on the post file for Mentat.

20. Load controlled rigid bodies gave correct results only if in every increment a nonzero point load is applied. Hence, a constant load could not be applied in Mentat.

21. If contact tolerances were given in the CONTACT TABLE option and one of them was much larger than the default contact tolerance specified in the input under CONTACT or calculated by the program, penetrations could occur.

22. Possible error in a three-dimensional contact analysis where a node contacted two or three rigid bodies and the first touched body used an analytical description.

23. Possibility of EXCLUDE option to be ignored if used as a history definition option. In Mentat – if not used as initial load. Also, there may have been problems if the excluded information was changed during the loadcase.

24. Three-dimensional contact with friction gave incorrect results with out-of-core solver.

Dynamics:

1. Incorrect calculation of stable time step calculation for central difference algorithms (DYNAMIC, 4) lead to wrong results.

2. Wrong results for transient dynamics with rigid body contact.

3. Transient dynamic analysis using model superposition (DYNAMIC, 1) did not work and gave exit 3301 if LARGE DISP option is used to calculate eigenmodes of prestressed structure.

4. Core overwrite followed by core dump if in post dynamic analysis (DYNAMIC, 5), direct sparse or non-default solvers are turned on.

Elements:

1. Exit 1001 was produced if more than 10,000 nodes were in a model with generalized plane strain elements.

2. Segment connectivity for 3D truss elements in contact was incorrect.

3. Truss heat transfer elements did not give correct results in heat transfer analysis.

4. Inadequate documentation for stress stiffening effect of internal pressure loads for element type 31.

5. Incorrect results for distributed loads for element 31.

6. Incorrect distribution of volumetric fluxes for element types 85 and 86 if quadratic temperature distribution through the thickness was used.

7. Element type 9 or 36 in a coupled analysis gave wrong results for transient heat transfer response when PROCESSOR parameter was used.

8. Due to inconsistent integration point numbering, element 139 gave wrong results.

9. REBAR option in combination with nonconsecutive element numbering gave marc exit 13.

10. Actuator element type 9 used zero current length instead of original length, if actuator length was not changing during the first loadcase.

11. Possible convergence problems with element types 76-79 when used in an updated Lagrange analysis.

12. Wrong equivalent nodal load calculations for element types 1, 15, 16, 17, 45, 89, and 90 if nonuniform load type was used (FORCEM option) in combination with FOLLOW FOR and AUTO INCREMENT options.

13. Incorrect answers were obtained if elements 40 or 42 (or elements 11, 28 in a coupled analysis) were used with a PROCESSOR parameter and a value not equal to 0 or 1 is inadvertently specified in the first field of the GEOMETRY option.

Heat Transfer:

1. Radiation in shell elements gave incorrect results.

2. Negative coefficient of thermal expansion could not be input for materials.

3. FLUXES in the parameter section was not being read correctly.

4. Documentation was incorrect for orthotropic materials with radiation.

5. If the infinite temperature with radiation was a round number not equal to zero then the results for the analysis were wrong.

6. Wrong displacements found for a rigid body modeled with heat transfer elements if both nonzero translational and rotational displacements were specified.

Materials:

1. Core overwrite occurred if PRINT NODE model definition option was used with CREEP option.

2. Documentation inconsistency for TEMPERATURE EFFECTS option in case of Mooney material.

3. Incorrect use of plane stress elements with ELASTICITY, 2 was not trapped.

4. Thermal strains were incorrect for isotropic elasticity with LARGE DISP option.

5. Possible core overwrite with use of TEMPERATURE EFFECTS option on NT machine.

6. Mixing normal and hourglass elements using PLASTICITY, 5 or ELASTICITY, 2 gave NaN.

7. Results for PLASTICITY, 2 and PLASTICITY, 4 options were incorrect prior to this MARC K7.3.2 release.

8. Possible core dump when Herrmann elements were inadvertently used with ELASTICITY, 2.

9. Incorrect results if TRANSFORMATION option is used in combination with ELASTICITY, 2 OR PLASTICITY, 5.

Pre- and Postprocessing, Input/Output:

1. Rigid body forces on post file were incorrect.

2. VMASS print option printed only three digits for volume and mass.

3. Post file generated by a restart run used to core dump on certain platforms.

4. Incorrect values on post file if TRANSFORMATION option was used (analysis was correct).

5. In dynamic analyses, modal mass value in the post file was incorrect.

6. Results of certain fluid problems using mixed formulation could not be post processed.
7. Post files generated on NT by MARC K6.3 could not be post processed.
8. Incorrect post file and output for a restarted analysis in which ADAPTIVE meshing and nonconsecutive node/element numbering was used. The analysis would have been correct.
9. Model mass and reaction forces were wrong on the post file if MODAL SHAPE was used in combination with RECOVER option. Analysis would have been correct.
10. Nodal displacements, forces, velocity, and accelerations were incorrect on SDRC file.

User Subroutines:

1. USPCHT did not get correct cptim and timinc values.
2. Documentation and templet corrections for subroutine UPSTRECH.
3. Incorrect values of die forces in subroutine MOTION.
4. ELMVAC routine gave wrong value for layer thickness if called with post code 20 and nonzero number of layers.
5. PLOTV was not called in an electromagnetic analysis.
6. Use of option UMOTION could lead to exit number 38 during increment zero.

Miscellaneous:

1. Buckle estimates gave wrong results or exit 3301 if FORCDT option was used.
2. Buckle estimate with Lanczos method in combination with LARGE DISP option may have been off by 1 if recycling occurred in the last load step.
3. Possible problems if TRANSFORMATION option is combined with:
    a. Lorenzi J-Integral calculations
    b. Updated Lagrange procedure with ORIENTATION option
    c. Increment splitting in Contact and use of follower force stiffness matrix.
4. Possible core dump or strange behavior if a binary post file was written and:
    a. number of distributed load lists > 200
    b. number of post variables > 200
    c. number of non-homogeneous NURBS coordinates > 200.
5. AUTO THERM loadcase followed by another loadcase with AUTO THERM in combination with CONTACT option may have given wrong results during the second AUTO THERM part. Also, if increment split occurred in the last increment of an AUTO THERM session, the results would have been wrong.
6. Possible core dump on reading the restart file in analysis involving deformable-to-deformable contact or SOLVER, 4.
7. Error occurred if an even number of composite layers were used in design sensitivity analysis.

V. Currently Known Problems in MARC K7.3.2 Release

The following problems occur in single, single machine parallel, and the network versions unless stated otherwise:

1. Spectrum response analysis does not provide stresses and strains in output or post file.
2. Analysis may prematurely become unstable with Newmark-Beta implicit dynamics algorithm in an analysis involving contact where a few or several nodes separate from the contact surface within a span of few increments. In such cases, the vibrations propagate to generate spurious energy.
3. Results may be questionable when using hourglass elements for plasticity analysis if coarse mesh is used since the gradual spread of plasticity may not be captured. For finer meshes, the results should converge to a more accurate value.
4. Potential core dump on selecting post codes that are not appropriate for analysis type, e.g. requesting creep strains when creep is not involved in an analysis or requesting six stresses for a plane strain element.
5. Setname should not be numerically defined.
6. In a coupled analysis during the heat transfer portion, the temperatures are tied using tying type 100 regardless of tie type except 31, 32, 33, and 34.
7. Soil material model may give incorrect results on multiple CPUs.
8. In coupled fluid-solid interaction problems, MOONEY option may not be read.
9. Nodal stress values for 6-node triangular element are incorrect when PRINT NODE option is used.
10. AUTO STEP with temperature based load stepping criterion gives incorrect result in coupled analysis.
11. Continuous binary post file generated after RESTART may generate core dump.
12. Demo problem e7x13c fails on the SGI Irix 5.3, R4000 single processor version.

VI. MARC K7.3.2 Capabilities Supported in Parallel

All capabilities of MARC K7.2 with the exception of the features listed in V.1 below are supported in parallel.

However, a list of functionality supported which deserve a special mention is:

1. Linear and Nonlinear Static Analysis
2. Time domain Dynamic Analysis
3. Deformable-to-Deformable and Deformable-to-Rigid Contact with Friction
4. All material models (Linear and Nonlinear)
5. Coupled Analysis
6. Heat Transfer
7. Electrostatics
8. Magnetostatics
9. Follower Force
10. All automatic load stepping procedures including auto load, auto increment, proportional increment, auto time, auto creep, and dynamic change

VI.1 Features Supported in Single CPU Mode Only

1. Analysis with Adaptive Meshing
2. Rezoning
3. Electromagnetics
4. Fluids and Coupled Phenomenon *(please note that Structural-Thermal Coupling is supported)*
5. Radiation
6. Buckling
7. Eigenvalue Extraction
8. Auto-Therm, Auto-Therm-Creep
9. Response Spectrum
10. Out-of-Core Matrix Solution
11. Acoustic Analysis
12. Hydrodynamics
13. Harmonics and Eigenvalue Analysis
14. Fluid-Solid Interaction
15. User Defined Tying *(please note that tyings in deformable-to-deformable contact are automatic and are supported)*

16. Gap Elements
17. J-Integral
18. Explicit Dynamics
19. Design Sensitivity and Optimization
20. Contact:
    a. Beam-to-Beam
    b. Multi-Stage Forming (for example, use of the APPROACH model definition and SYNCHRONIZED history definition options)
    c. Load Controlled Dies
    d. Spline Option
    e. Stress-based Separation
21. Joule Heating

VI.2 K7.3.2 Parallel Features Beyond Those Supported in K6.3

1. RESTART is now supported in parallel.

VII. List of Build Platforms for Single Processor Version of MARC K7.3.2 Release

Machine	Processor	OS
SUN (1)	Ultra2	Solaris 2.5
SUN (2)	Sparc	Solaris 2.4
HP (3)	PA8000 (PA-RISC 2.0)	HP-UX 11.0
HP (4)	PA8000 (PA-RISC 2.0)	HP-UX 10.20
HP (5)	PA-RISC 1.1	HP-UX 10.20
SGI (6)	R8000/R10000 (-mips4, -64)	IRIX 6.2
SGI (7)	R5000 (-mips3, -n32)	IRIX 6.3
SGI (8)	R4000 (-mips2, -o32)	IRIX 5.3
DEC (9)	Alpha 4100	OSF/1 V4.0
DEC (10)	Alpha 5500	OSF/1 V3.2
IBM (11)	RS6000	AIX 4.3.1
IBM (12)	RS6000	AIX 4.1.5
IBM (13)	RS6000	AIX 3.2.5
PC (14)	Pentium	NT 4.0, Build 1381, Service Pack 3
PC (15)	Dec-Alpha	NT 4.0, Build 1381, Service Pack 3

Machine	FORTRAN Compiler used for the build	C Compiler used for the build
SUN (1)	F77-4.2	4.2
SUN (2)	F77-4.2	4.2
HP (3)	F90-v2.0	ANSI C v2.0
HP (4)	F77-B.10.20.09	A.10.32.18
HP (5)	F77-B.10.20.01	A.10.32.03
SGI (6)	F77-6.2 (Compatible with 7.2.1)	6.2
SGI (7)	F77-7.1	7.1
SGI (8)	F77-4.0.2	4.0
DEC (9)	F77-5.1	6.0
DEC (10)	F77-4.0	5.7
IBM (11)	XLF-5.1.0	3.6.4
IBM (12)	XLF-3.2.5	3.1.4
IBM (13)	XLF-3.2.5	3.1
PC (14)	F90-DF5.0 & DF6.0	Visual C++ 5.0
PC (15)	F90-DF5.0	Visual C++ 5.0

VIII. List of Build Platforms for Single Machine Parallel Version of MARC K7.3.2 Release

Machine	Processor	OS
SUN (1)	Ultra2	Solaris 2.5
HP (2)	PA8000 (PA-RISC 2.0)	HP-UX 11.0
HP (3)	PA8000 (PA-RISC 2.0)	HP-UX 10.2
SGI (4)	R8000/R10000 (-mips4, -64)	IRIX 6.2
DEC (5)	Alpha 4100	OSF/1 V4.0
PC (6)	Pentium	NT 4.0, Build 1381, Service Pack 3
PC (7)	Alpha	NT 4.0, Build 1381, Service Pack 3
SPP 1600 (8)	PA 7200 (PA-RISC 1.1)	SPP-UX 5.2
SPP 2000 (9)	PA 8000 (PA-RISC 2.0)	SPP-UX 5.2
IBM (10)	RS6000 (SP machines)	AIX 4.1.5
IBM (11)	RS6000 (SP machines)	AIX 4.3.2

Machine	FORTRAN Compiler used for the build	C Compiler used for the build	MPI Libraries used for the build
SUN (1)	F77-4.2	4.2	HPC 2.0 RTE 3.0
HP (2)	F90-v2.0	v2.0	MPI 1.4.0
HP (3)	F77-B.10.20.09	G.10.32.05	MPI 1.4.0
SGI (4)	F77-6.2	6.0	MPI 3.2; Array 3.2
DEC (5)	F77-4.1	5.2	MPI 1.6
PC (6)	F90-DF5.0 & DF6.0	Visual C++ 5.0	MSU Winmpich 0.9 Beta
PC (7)	F90-DF5.0	Visual C++ 5.0	MSU Winmpich 0.9 Beta
SPP 1600 (8)	F77-1.2.1	1.2.1	MPI 01.03.01
SPP 2000 (9)	F77-1.2.1	1.2.1	MPI 01.03.01
IBM (10)	XLF-4.1	CC 3.1.4	PPE 2.2
IBM (11)	XLF-5.1	CC 3.6.4	PPE 2.4

IX. List of Build Platforms for Network Parallel Version of MARC K7.3.2 Release

Machine	Processor	OS
SUN (1)	Ultra2	Solaris 2.5
HP (2)	PA8000 (PA-RISC 2.0)	HP-UX 11.0
HP (3)	PA8000 (PA-RISC 2.0)	HP-UX 10.2
SGI (4)	R8000/R10000 (-mips4, -64)	IRIX 6.2
DEC (5)	Alpha 4100	OSF/1 V4.0
IBM (6)	RS6000	AIX 4.3.1
PC (7)	Pentium	NT 4.0, Build 1381, Service Pack 3

Machine	FORTRAN Compiler used for the build	C Compiler used for the build	MPI Libraries used for the build
SUN (1)	F77-4.2	4.2	MPICH V1.1.2
HP (2)	F90-v2.0	v2.0	MPICH V1.1.2
HP (3)	F77-B.10.20.09	G.10.32.05	MPICH V1.1.2
SGI (4)	F77-6.2	6.0	MPICH V1.1.2
DEC (5)	F77-4.1	5.2	MPICH V1.1.2
IBM (6)	XLF-5.1.0	3.6.4	MPICH V1.1.2
PC (7)	F90-DF5.0 & DF6.0	Visual C++ 5.0 & 6.0	Genias Patent MPI 4.11