

Linux_x64 Runtime Environment

GEM 2021.10/IMEX 2021.10/STARS 2021.10

In order to allow running of a single executable across different implementations of Linux, CMG simulators use dynamic links of glibc runtime libraries and IMEX and STARS use dynamic links of Intel runtime libraries. GEM is linked statically with the Intel libraries.

GEM, IMEX, and STARS 2021.10 were built on RHEL 6.2 and are supported on RHEL 6.2, RHEL 6.5, RHEL 7.1, RHEL 7.2, RHEL 7.5, RHEL 7.6, RHEL 7.7, RHEL 8.1 and RHEL 8.2.

Note that for the 2022.10 version we plan to switch GEM, IMEX and STARS for linux_x64 to being built on RHEL 7.2. Thus beginning with the 2022.10 version we will no longer support running on RHEL 6.2, RHEL 6.5 nor 7.1.

GEM, IMEX and STARS 2021.10 were built using INTEL Fortran and INTEL C/C++ Compiler Version 19.0.5.281.

For IMEX and GEM, the compiler version may be determined by using the command-line argument, without quotes, `-compiler_info`. For STARS, the compiler version may be determined by using the command-line argument, without quotes, `-cputime`.

The standard C++ and gcc x64 runtime libraries are required. See `Readme_Linux_libs_2021.pdf` for details.

For IMEX and STARS an environment variable `LD_LIBRARY_PATH` must be set so that the exe can locate the Intel runtime libraries. For GEM, setting `LD_LIBRARY_PATH` is not required as GEM is linked statically with the Intel libraries.

Setting LD_LIBRARY_PATH

To accomplish this, the runtime libraries are stored at the following location:

`${CMG_HOME}/simulator/version/platform/lib`

where simulator = GEM/IMEX/STARS; version = current version, e.g. 2021.10; platform = linux_x64.

This assumes that the environment variable `CMG_HOME` was setup during installation to point to where the simulators are installed.

So, for instance, if IMEX was installed in `/usr/cmg`, then for bash shells and IMEX 2021.10 on linux_x64, the environment variable `LD_LIBRARY_PATH` must be set as follows:

```
export LD_LIBRARY_PATH=/usr/cmg/imex/2021.10/linux_x64/lib
```

The 2021.10 version of CMG Launcher (with LSF, SGE or PBS/Torque support) will set this environment variable automatically for the user if a job is being submitted to run a simulator on a Linux_x64 machine. The `CMG_HOME` environment variable must be set correctly.

See the document `Readme_Linux_libs.pdf` for information on determining the versions of runtime libraries.

To obtain a list of runtime libraries required, including the Intel OpenMP and MKL runtime libraries, the command `ldd` may be used. For instance, on a machine with Linux x64 RHEL 7 update 6, the following was obtained:

```
$ ldd mx202110.exe
linux-vdso.so.1 => (0x00007ffea489a000)
libz.so.1 => /lib64/libz.so.1 (0x00007fcb7056a000)
librt.so.1 => /lib64/librt.so.1 (0x00007fcb70362000)
libmkl_intel_lp64.so => /usr/cmg/imex/mx2021.10/linux_x64/lib/libmkl_intel_lp64.so (0x00007fcb6f7ea000)
libmkl_def.so => /usr/cmg/imex/mx2021.10/linux_x64/lib/libmkl_def.so (0x00007fcb6cf99000)
libmkl_intel_thread.so => /usr/cmg/imex/mx2021.10/linux_x64/lib/libmkl_intel_thread.so (0x00007fcb6aa2c000)
libmkl_core.so => /usr/cmg/imex/mx2021.10/linux_x64/lib/libmkl_core.so (0x00007fcb666fb000)
libm.so.6 => /lib64/libm.so.6 (0x00007fcb663f9000)
libiomp5.so => /usr/cmg/imex/mx2021.10/linux_x64/lib/libiomp5.so (0x00007fcb66004000)
libpthread.so.0 => /lib64/libpthread.so.0 (0x00007fcb65de8000)
libc.so.6 => /lib64/libc.so.6 (0x00007fcb65a1b000)
/lib64/ld-linux-x86-64.so.2 (0x00007fcb70780000)
```

```
libgcc_s.so.1 => /lib64/libgcc_s.so.1 (0x00007fcb65805000)
libdl.so.2 => /lib64/libdl.so.2 (0x00007fcb65601000)
```

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