Upgrading Your Geant4 Release

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News
- 22 April 2010 - Patch-01 to release 9.3 is available from the download area.
- 16 March 2010 - 2010 planned developments.
- 19 February 2010 - Patch-03 to release 9.2 is available from the archive download area.

through matter. Its areas of application include in medical and space science. The two main

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upgrades and Methods in Physics Research A 506

Collaboration

Of Geant4, from experiments

Who we are: collaborating
institutions, members, organization and

Next Geant4 release, 9.4, coming December 2010
Major versus Minor releases
What to look for in the release notes
How to upgrade
Next Geant4 Release, 9.4

- Geant4 version 9.4
  - scheduled for release on December 17th, 2010
  - improvements for physics and usability
    - as such, we will recommend all users upgrade to this release unless they have a specific reason to hold back
Major versus Minor Releases

- **Geant4 release numbers are of the form X.Y**
  - X is the Major release number
  - Y is the Minor release number

- Release 9.4 is a Minor release
- Release 10.0 will be the next Major release

- Minor releases **ARE NOT ALLOWED** to break user code.
  - So, for example, when you move from release 9.3 to 9.4, you should not need to change your user code
  - You will likely get slightly different results in the new minor release
  - And you may have access to additional new features
  - But nothing in your code should break as a result of the upgrade

- Major releases **ARE ALLOWED** to break user code.
  - So, for example, when you move from release 9.4 to 10.0, you may need to change your user code.
  - The release notes will tell you what you might need to change.
Patch Releases

- A Patch release corrects bugs in a regular release
  - Release number ends in p01, p02, etc.
  - Such as Geant4.9.3.p01
- Contains only bug fixes
  - No new features
- It is always advisable to downloaded the latest patch
  - The patch release notes will tell you exactly what has changed, so you can decide whether you absolutely need to upgrade
Beta Releases

- A Beta release introduces new features before they have been deemed sufficiently tested for general users
  - Release number ends in Beta1, Beta2, etc.
  - Such as Geant4.9.4.Beta1 scheduled for release June 25th, 2010
  - A chance for a thorough user test of many of the changes intended for the December release
  - Not intended for general users but only for those who are willing to take the risk inherent in a beta
  - Users should move to this release only if they really love testing things, or if a Geant4 collaborator informs them that this Beta will solve their specific problem
What to Look for in the Release Notes

Each Geant4 release comes with a set of release notes. Read them before you move to the new release.

In particular, read:
- Supported platforms/compilers
- CLHEP version
- Items for migration of the user code
- Expected effects on physics and performance

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Supported Platforms and Compilers

- May change at Major or Minor release
- If your platform and compiler are no longer in the supported list, you can either upgrade them or just try with what you have:
  - If Geant4 still builds and starts OK, don’t worry
  - If there are problems with build or startup, try upgrading to the new supported platform or compiler

1. Supported and Tested Platforms

Official platforms:
- Linux, gcc-4.1.2 and gcc-4.3.2 (SLC5).
  Tested on 32 and 64 bit architectures (Intel or AMD) with Scientific Linux CERN 4 (SLC4) (based on RedHat Linux Enterprise 4) and Scientific Linux CERN 5 (SLC5) (based on RedHat Linux Enterprise 5). Geant4 has also been successfully compiled on other RedHat versions as well as Debian and Suse.
- MacOSX 10.5 with gcc-4.0.1 and 10.6 with gcc-4.2.1

More verified configurations:
- Linux, gcc-4.4.2, gcc-4.3.2, gcc-3.4.6 (SLC4)
- Linux, Intel-icc 11.1

Platforms configured but neither tested nor supported:
- AIX 4.3.2, xlc 6.0
- DEC V4.0, cxx C++ V6.1-027
- HP 10.20, aCC C++ B3910B A.01.23
- MacOSX 10.4, gcc-3.3
- SGI V6.5.5, CC 7.2.1
- SUN Solaris 5.8, C++ CC-5.5.
CLHEP Version

- May change at Major or Minor release
- We don’t change CLHEP versions very often, but if we do it will be for a good reason
- If you use the wrong CLHEP version, your code may still link and run but your results may not be correct.

2. CLHEP and AIDA

This release of Geant4 has been verified with CLHEP, release 2.0.4.5. Use of a different CLHEP version may cause incorrect simulation results.

Geant4 9.3 examples with histogramming co-work with analysis tools compliant to AIDA 3.2.1 interfaces (for details, see Appendix 2 of the Users Guide for Application Developers). AIDA headers can be downloaded from: http://aida.freehep.org
Items for Migration of the User Code

- For a Minor release, there will not be much here

3. Items for migration of the user code

Listed here is some relevant information on developments included in this release, some of which may require migrations (mainly for users of advanced Geant4 features) in order to upgrade from release 9.1 to release 9.2. Note that for all users a full re-installation of libraries (or a full recompilation) and a recompilation of user applications is required.

- For a Major release, pay careful attention to this section

3. Items for migration of the user code

Listed here is some relevant information on developments included in this release, some of which may require migrations (mainly for advanced uses of features in Geant4) in order to upgrade from release 8.3 to release 9.0. Note that a full re-installation of libraries (or a full recompilation) and a recompilation of user applications is anyhow required.

Geometry

The static constants for the geometrical tolerance kCarTolerance, kRadTolerance and kAngTolerance which used to be defined at global scope, have been now removed. Advanced applications making use of such constants in the code are required to retrieve the values for Cartesian, Angular and Radial tolerances through the class G4GeometryTolerance, a new class providing the methods, respectively: GetSurfaceTolerance(), GetRadialTolerance() and GetAngularTolerance(). Applications with setups of unusual dimensions (e.g. smaller than 1 mm or larger than 1 km) can now adjust these values, and must do so before creating any part of the geometry description. Please see the User's Guide for Application Developers for the details.
Expected effects on physics and performance

- This section tells you what to expect in terms of changed results, changed running time and changed memory.

5. Expected effects on physics and performance

Geometry
- Implementation improvements in G4Cones and G4Tubes bring speed improvements on the order of 20% for those shapes with pure-tracking (i.e. without field propagation or physics).

Low-energy Electromagnetic physics
- An updated version of the G4LogLogInterpolation class is included in this release. This update improves the speed of low energy EM Physics processes that use this class. Only insignificant changes result in the interpolated values obtained and in physics observables.

Standard Electromagnetic physics
- More precise multiple scattering model for electrons and positrons provides wider shower (about 0.5% measured for the CMS calorimeter).
- New relativistic Bremsstrahlung model is applied for electrons and positrons; it provides gamma spectra which agree with thin-target CERN and SLAC data.
- The usage of the Spline approximation of dEdx and cross section tables provides a Bragg peak position which is stable within 0.1 mm versus variation of production cut or step limit.
- Visible energy in sampling calorimeters may increase on the order of 1% due to upgraded model of multiple-scattering and usage of Spline approximation.

Hadronic physics
- Changes to the Bertini cascade code have resulted in several changes to energy spectra and shower shapes:
  - the bug fix to multiplicity sampling resulted in cutting the quasi-elastic peak height in half, more in line with the binary cascade;
How to Upgrade (1)

- Check the release notes to see if your existing Platform, Compiler and CLHEP version are still OK
  - Minor release upgrades generally do not require changes to any of these, but check the notes
  - Upgrade if need be

- If you’ve followed the recommended installation instructions, you will have your user code in a G4WORKDIR that is NOT inside your Geant4 installation directory
  - Good:
    - ~/mydir/Geant4/geant4.9.3.p01/...
    - ~/mydir/g4work/myUserCode
  - Not so Good:
    - ~/mydir/Geant4/geant4.9.3.p01
    - ~/mydir/Geant4/geant4.9.3.p01/myUserCode

- The point of keeping your user code separate from the Geant4 installation is that your user code may work with several different Geant4 versions, and if you decide later to delete a particular Geant4 version, you won’t accidentally delete your user code
How to Upgrade (2)

- Unpack the new Geant4 version
  - For example, to:
    - ~/mydir/Geant4/geant4.9.3/...

- Make sure you do not have any left over G4 environment variables
  - `printenv | grep “G4”`
  - Get a new session, clean up your .login or .cshrc, or do whatever is necessary

- Run `./Configure -build`
  - From within the newly unpacked Geant4 release

- Run `./Configure`
  - From within the newly unpacked Geant4 release
  - and if your installation required you to run `./Configure -install`, re-do that now too

- Clean up the old compilation products of your user code
  - Delete the bin, lib and tmp directories from your G4WORKDIR
  - These contain your user code linked against the old Geant4 release
  - You need to remove these so that when you remake your user code it will be completely remade with the new Geant4 release

- Run make
  - From within your user code directory
In Case of Trouble

- Did you review the Release Notes?

- Did you remember to remove all pre-existing G4 environment variables?
  - Otherwise you may be pointing to some mix of old and new releases

- Did you remember to delete the old bin, lib and tmp directories from your G4WORKDIR?
  - Otherwise you may have part of your code compiled against one Geant4 release and part of your code compiled against another Geant4 release

- Check the Geant4 Installation and Configuration Forum
  - There’s a very good search function at the top of that page
  - Someone might have had the same issue and the solution might already be there
  - If the problem is something new, post it to the forum