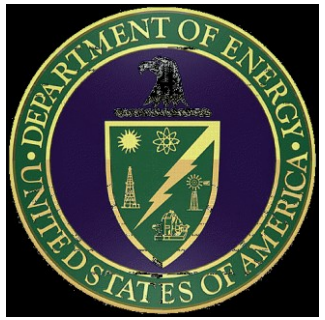

Installing Geant4 v9.5 for Windows

A step-by-step guide for Windows XP/Vista/7 using cmake and Visual C++ 2009 / 2010

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0. Introduction and Requirements

This document provides step-by-step instructions on how to build and install the Geant4 particle physics simulation toolkit in a Windows environment, using Visual C++ and CMake. The final step provides instructions on how to compile a Geant4 application using CMake.

Software requirements
Operating system: Windows XP, Windows Vista or Windows 7
Compiler: Visual C++ (Express) 2009, Visual C++ (Express) 2010
Build tools: CMake (v2.8 or higher STRONGLY recommended)
Geant4 source code: v9.5.0 or newer (recommended at time of writing v9.5-p01)

If you have one of the listed operating systems but dot not have the required build software, follow the *Preparations* instructions in Step 1. Otherwise skip ahead to Step 2.

All screenshots shown were created using *Visual C++ Express 2010, CMake 2.8.7*

Step 1: Preparations

Obtain *Visual C++* compiler

The *Express* editions of *Visual C++* are available from Microsoft free of charge. Download and install *Visual C++ 2010 Express*. At the time of writing, the installer is available at:
http://www.microsoft.com/express/Downloads
If you need help installing *Visual C++*, detailed instructions are given on the next slide.

Obtain *CMake* build tool

The CMake build tool is available from www.cmake.org.
From the tabs along the top, select *Download*. Scroll down to *Binary Distributions* and select *Windows (Win32 Installer)* from the list of available platforms. Execute the installer.

Obtain Geant4 source code

Go to the *Geant4* collaboration download site: http://geant4.cern.ch/support/download.shtml
Chose *ZIP format*. Ones the files is downloaded (~40 Mb), right click the files and chose *extract files*. Specify the directory to which to extract the files. For example purposes only, we will be using

C:\Users\testUser\Documents\geant4

We will refer to this directory as the *Geant4 source directory*

Step 1: Preparations (cont'd)

How to install *Visual C++ Express*

1. Make sure all other programs are closed.
2. Using Internet Explorer, go to http://www.microsoft.com/express/Downloads
3. Click the *Visual C++ 2010 Express* link at the bottom left
4. You are on the *Visual C++ 2010 Express* home page. Click the "install now" button.
5. A pop-up window may appear trying to get you to install Visual Studio Professional instead – if this happens, click on "…or install Visual C++ 2010 Express (English)" in the bottom right.
6. A message should appear at the bottom of your screen asking whether you want to execute "vc_web.exe". Select "Execute".
7. Follow the instructions on the screen.
8. Following the installation, you will get a message asking to restart your computer. Click "restart now".
9. Upon restart there will be a message "setup is loading installation components". Just wait until setup is done.
10. Eventually there will be a message "Setup complete". Hit "Exit". You have now installed *Visual C++ 2010 Express*.

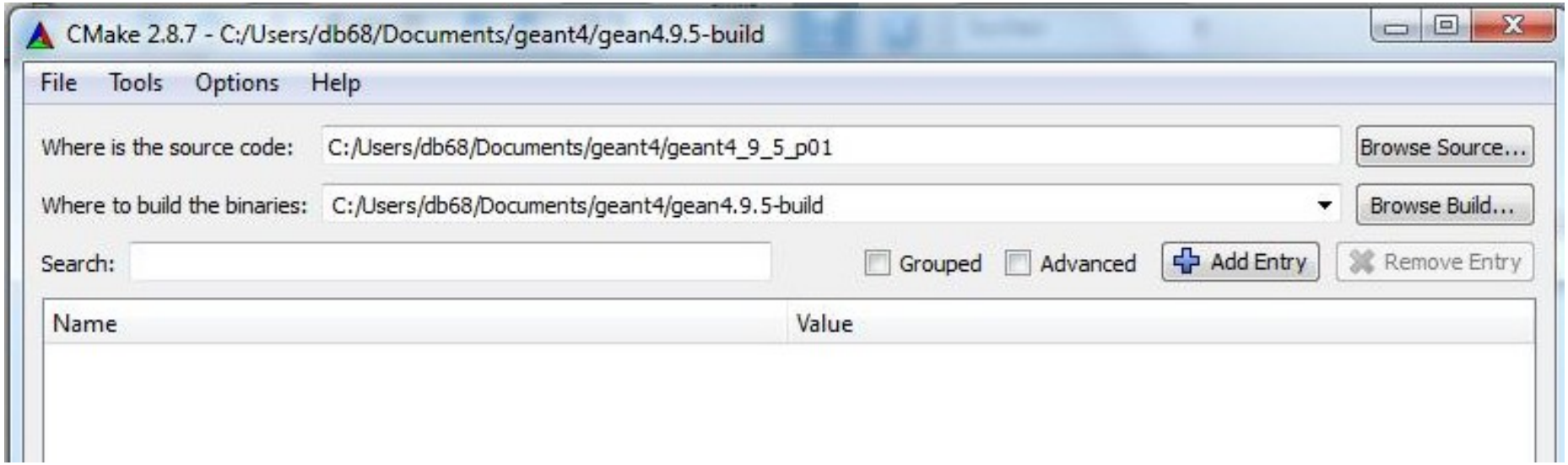
Step 3: Set CMake directories

Open the CMake GUI

Click on the *Browse Source...* button in the top right hand corner of the window. Use the file browser popup to locate the Geant4 source directory, and click *OK*.

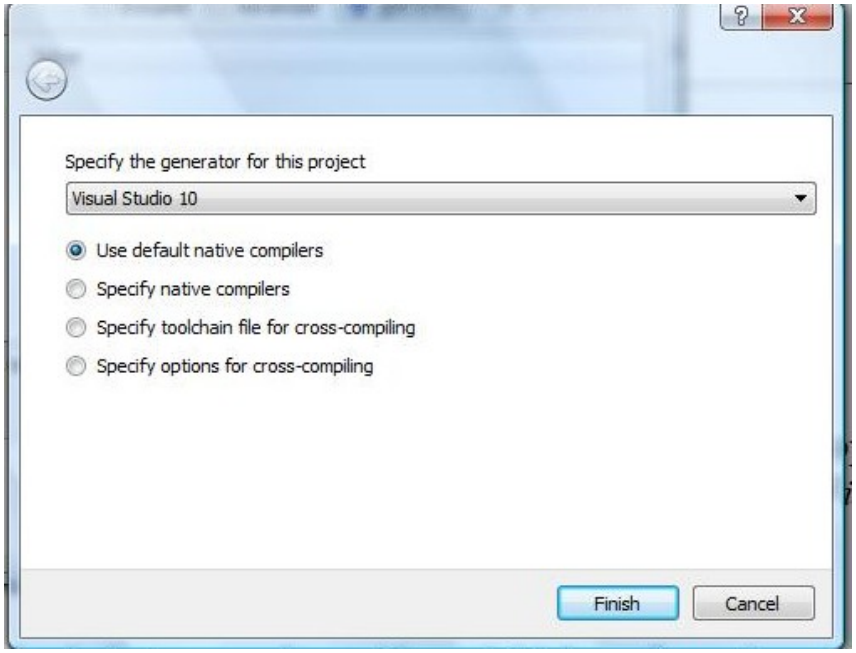
Below *Browse Source...* click *Browse Build...*, and browse to the location you wish to create the build solution. You can create a new directory in the build path dialog. We are using

C:/Users/testUser/Documents/geant4/gean4.9.5-build



Step 4: Configure CMake

Click the *Configure* button on the bottom left of the gui.
Select *Visual Studio 2010* or *Visual Studio 2009* from the drop-down menu.
Make sure that the *Use default native compilers* radio button is selected.



Click *finish.*
At this stage CMake will prepare and check your build environment. If you see a couple of warning messages, don‘t worry. Proceed to the next step.

Step 4: Configure CMake (cont'd)

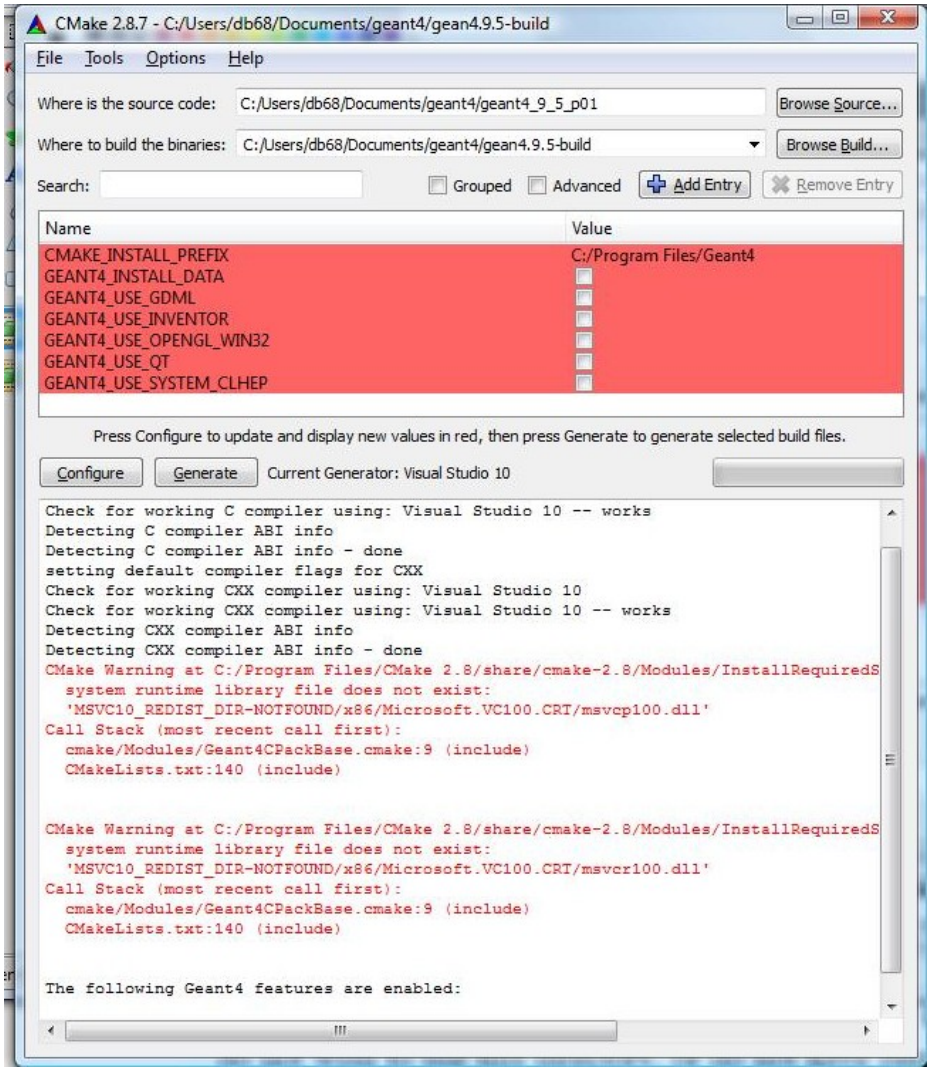
Add data to intallation

When Cmake was configured in the previous step, there were probably a few warning messages (screenshot).

In order to download necessary data files, click the checkbox next to GEANT4_INSTALL_DATA. You will need CMake v2.8 or newer + internet connection. To use visualization, you will also need to check GEANT4_USE_OPENGL_WIN32.

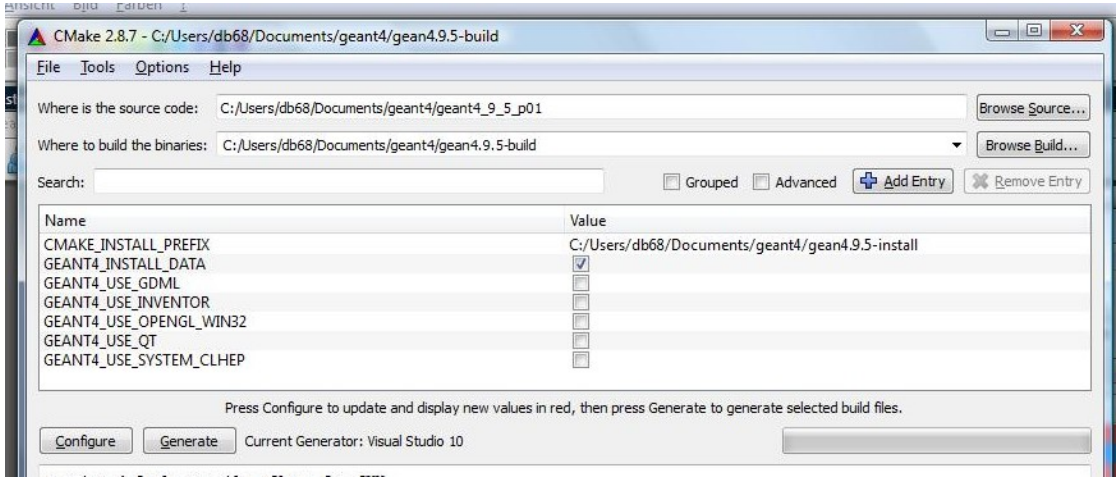
You can also change the installation destination by clicking on the path next to CMAKE_INSTALL_PREFIX. As an example, we will chose *C:/Users/db68/Documents/geant4/gean4.9.5-install*

Now click *Configure* again.

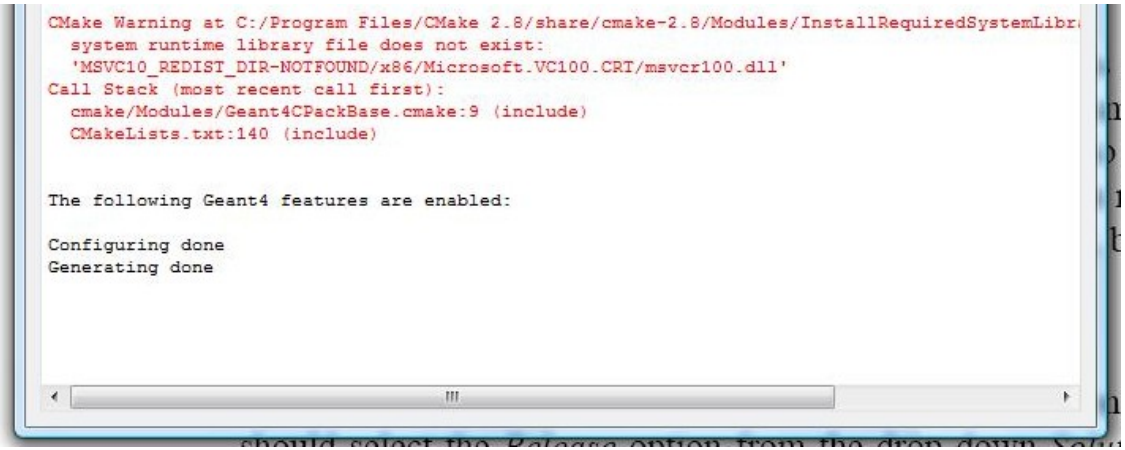


Step 5: Generate Visual C++ project

Make sure all configuration issues have been resolved
All red items should have turned white. If they haven‘t, keep clicking *Configure* until they do.



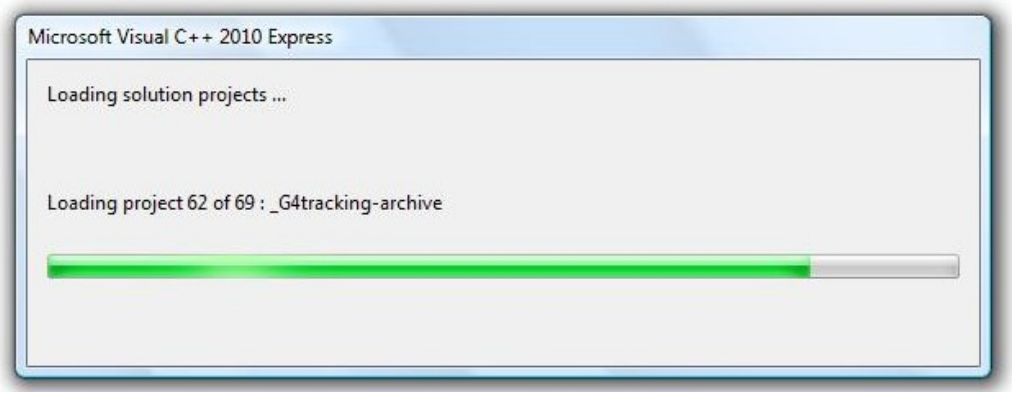
Generate the Visual Studio solution
Click *Generate* at the bottom left of the GUI. When CMake reports „*Configuring Done. Generating done.*“ in the logging window, you were sucessful. Close CMake.



Step 6: Open Visual C++ project

Open the solution file in Visual C++

Start Visual C++ and under the files menu chose *Open>Project/Solution.* Navigate to your build directory (in our example this is *C:\Users\testUser\Documents\geant4\gean4.9.5-build*) and open the *Geant4.sln* solution file. It may take a minute for Visual Studio to read the solutions.



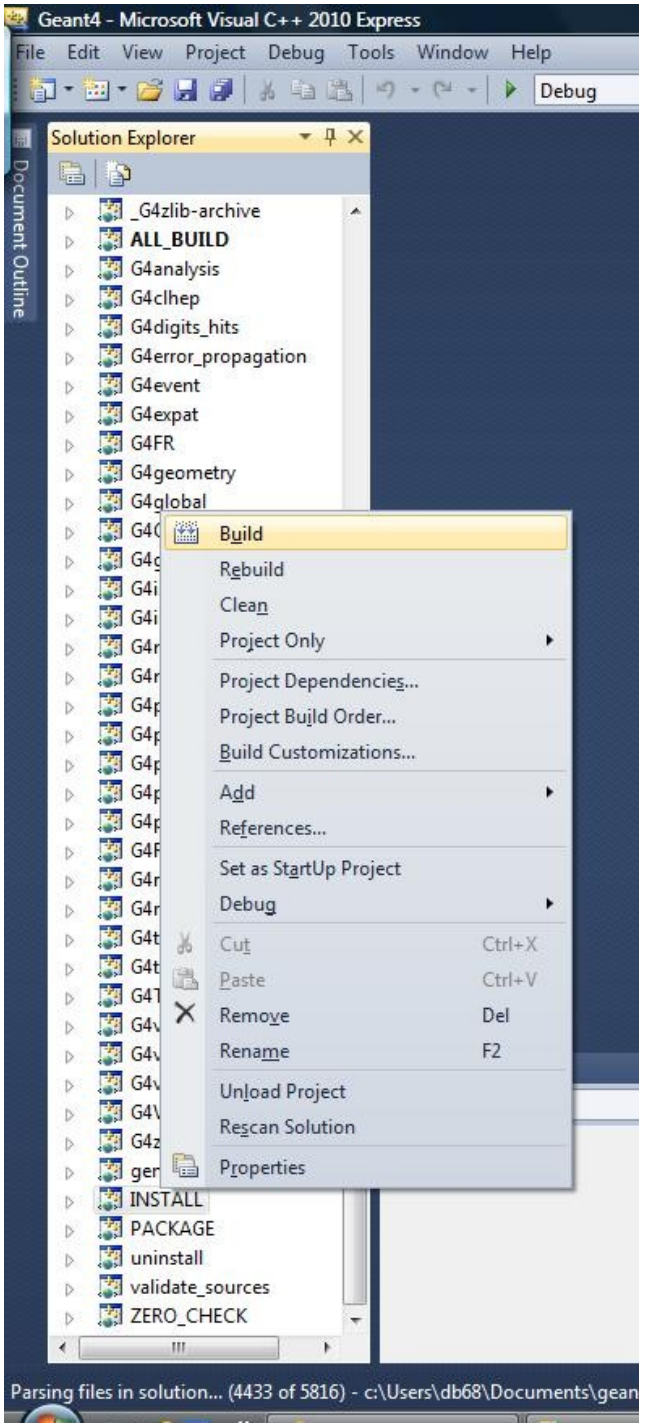
Step 7: Build Geant4

Your project screen should look similar to the screen on the right.

You are now ready to build Geant4.

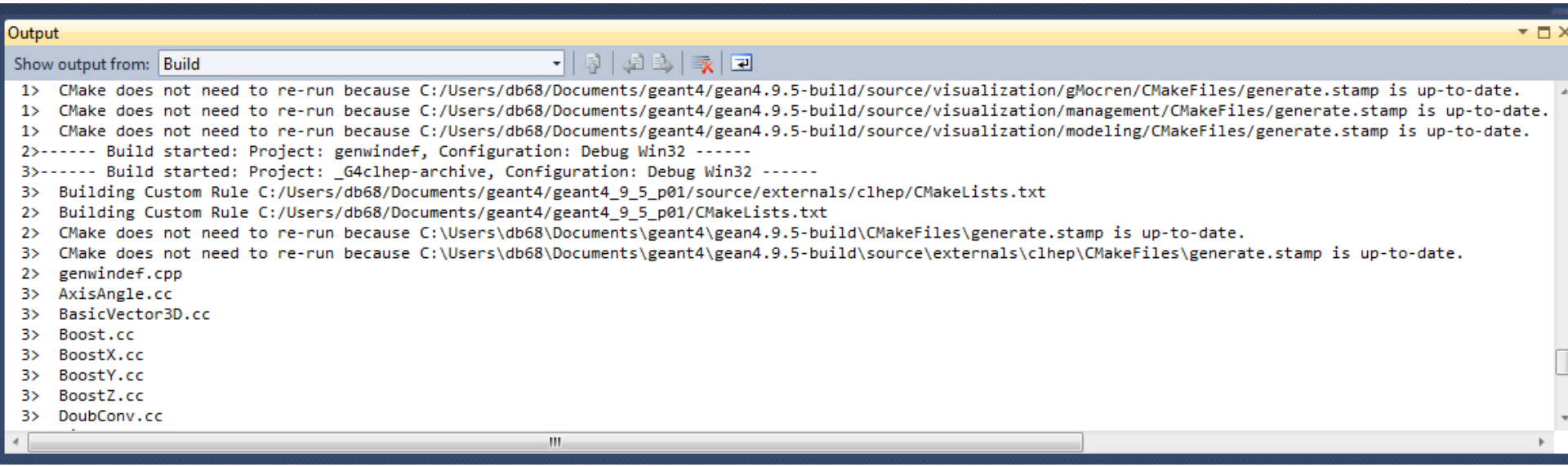
In order to build Geant4, right-click the INSTALL solution in the solution explorer on the left and blick *Build*.

Depending on your computer, this may take up to a few hours.



Step 7: Build Geant4 (cont'd)

Upon starting the Geant4 build, the Output window should show something similar to the screenshot below:



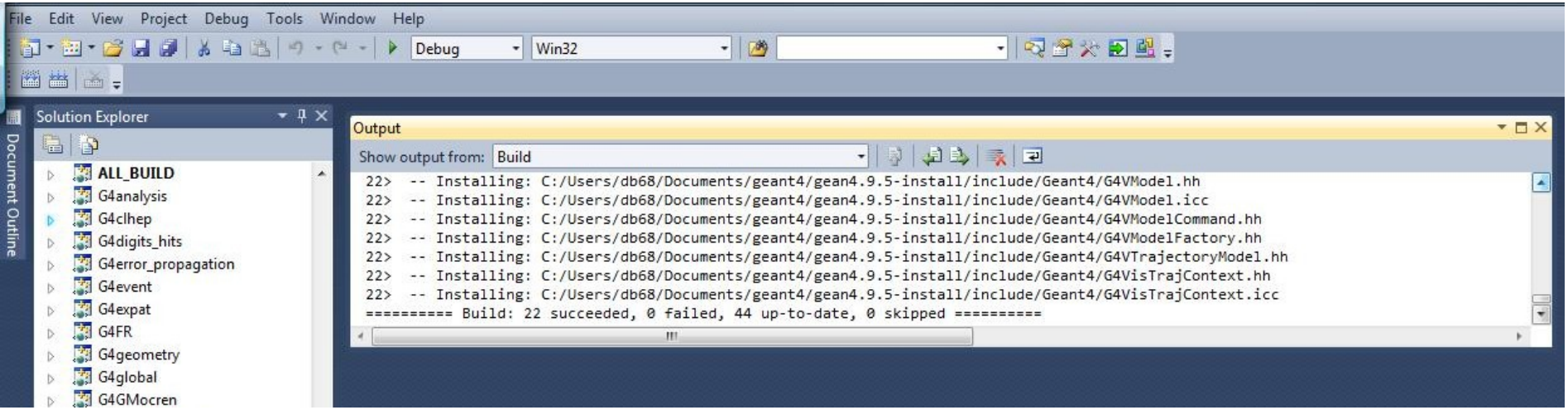
This is a good sign that your build is progressing and you can leave the system to compile. This may take awhile.

Step 7(cont'd): Build Geant4

After the Geant4 compilation is finished, the output window at the bottom of your screen should show a message like

Build: 66 succeeded, 0 failed, 0 up-to-date, 0 skipped*

CONGRATULATIONS!!! You have just compiled Geant4. You can now exit Visual Studio.



Step 8: Set Environment Variables

Add the path to the Geant4 dlls to your PATH environment variable

Go to the *Windows Control Panel* and open the *System* item

1. Click on *Advanced System Settings* (in Windows XP chose the *Advanced* tab)
2. In the *System Properties* window, click the button labeled *Environment Variables*
3. Under *User Entries* select *PATH* and click the *Edit* button
   - If you are SURE that there is no entry called PATH, create one using *New*
4. In the „*Edit User Variable*“ dialog box, add a semicolon behind the last entry and append the path to the Geant4 dlls you built in step 7. In the example, these are located at
   C:\Users\testUser\Documents\geant4\gean4.9.5-install\bin
   Be SURE to APPEND this path to your PATH variable rather than overwriting it, otherwise other software installed on your system may stop working.

5. You will also need to add environment variables to point to your data directories. Click „New“ and create an environment variable called G4LEDATA. As “value“ enter the path to your electromagnetics data. In our example this would be
   C:\Users\db68\Documents\geant4\gean4.9.5-install\share\Geant4-9.5.1\data\G4EMLOW6.23

6. Once you are done editing, click *OK*

Step 9: Building an application

The steps for building an application using Geant4 is very similar to building Geant4:

1. **Open the CMake GUI**
2. **Click on *Browse Source...* and select the directory of the application you wish to build**
   for example *C:\Users\testUsers\Documents\geant4\geant4_9_5_p01\examples\basic\B1*
3. **Click on *Browse Build...* and select the target directory to store build files**
   for example *C:\Users\testUsers\Documents\geant4\B1-Build*
4. **Click *Configure* and chose *Visual C++ Express 2010*. Change CMAKE_INSTALL_PREFIX to the directory where the binary should be build**
   This directory should exist and you must have write permissions there.
   for example create *C:\Users\testUsers\Documents\geant4\B1-binary*
5. **Click *Configure* until all red lines have become white**
6. **Click *Generate***
7. **Exit CMake**
8. **Navigate to your build directory and open the solution file with *Visual C++***
   for example *C:\Users\testUsers\Documents\geant4\B1-Build\B1.sln*
9. **In the *Visual C++ Solution Explorer* right-click *Install* and chose *Build***

Congratulations. You have just compiled your first Geant4 application.

Step 10: Executing your example

To execute your compiled Geant4 application:

1. **Navigate to your binary directory**
   In the example this was *C:\Users\testUsers\Documents\geant4\B1-binary*

2. **Execute the binary by double clicking it**
   In the example, double click C:\Users\testUsers\Documents\geant4\B1-binary\bin\exampleB1.exe

3. **The binary will probably launch in a new terminal window**

   Congratulations. You have just executed your first Geant4 application.