Installation Steps for GEANT4

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- **STEP 1 : Installation of Essential Libraries**

  - Open the terminal (ctrl +alt+t)

  - Update and upgrade ubuntu software :
    $ sudo apt update
    $ sudo apt upgrade -y

  - Install the following required libraries using command :
    $ sudo apt install build-essential g++ libexpat1-dev libxmu-dev libxmu-headers cmake cmake-curses-gui qt5-default libxaw7-dev libxaw7 mesa-common-dev libglu1-mesa-dev Xerces-c++ libx11-dev

  - **cmake: Higher version of cmake is recommended to install (Do not skip this step)**

    Follow the below steps to install cmake

    https://github.com/Kitware/CMake/releases/download/v3.14.0-rc2/cmake-3.14.0-rc2.tar.gz

    tar -zxvf cmake-3.14.0-rc2.tar.gz

    cd cmake-3.14.0-rc2
    ./configure
    make
    sudo make install

- **STEP 2 : Installation of Geant4**
  The latest version of Geant4 can be downloaded from the given website https://geant4.web.cern.ch/support/download

  - Unpack the Geant4 source package **geant4.10.05.tar.gz** to a location of your choice.
    For illustration *only,* this guide will assume it's been unpacked in a directory named **/Geant4,** so that the Geant4 source package sits in a subdirectory **/Geant4/geant4.10.05**

  - Open the terminal (ctrl+alt+t)

  - Create directories Geant4, geant4.10.05-build
    $ mkdir Geant4
    $ cd Geant4
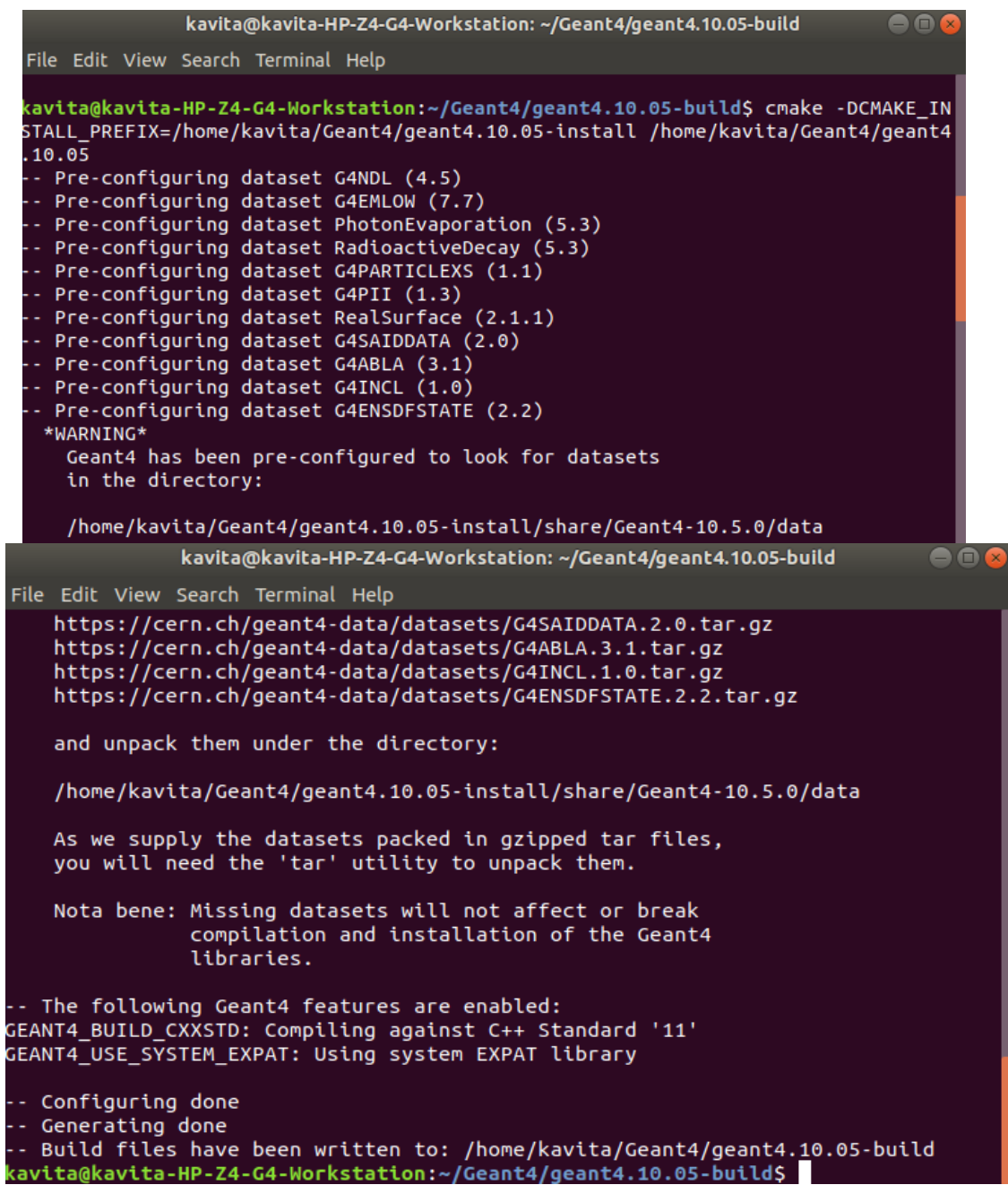 $ mkdir geant4.10.05-build

$ ls

We will see two directories
  geant4.10.05   geant4.10.05-build

- $ cd Geant4/geant4.10.05-build

- To configure the build, change into the build directory and run CMake:
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    $ cmake -DCMAKE_INSTALL_PREFIX=/home/user/Geant4/geant4.10.05-install
<space> /home/user/Geant4/geant4.10.05

===

Here, the CMake Variable **CMAKE_INSTALL_PREFIX** is used to set the *install directory,* the directory under which the Geant4 libraries, headers and support files will be installed.

You will see output:

- Now switch on the data using command :

```
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$ cmake -DGEANT4_INSTALL_DATA=ON .
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```

On executing the CMake command, it will run to configure the build and generate Unix Makefiles to perform the actual build.

We will see output:

```
kavita@kavita-HP-Z4-G4-Workstation:~/Geant4/geant4.10.05-build$ cmake -DGEANT4_I
NSTALL_DATA=ON .
-- Configuring download of missing dataset G4NDL (4.5)
-- Configuring download of missing dataset G4EMLOW (7.7)
-- Configuring download of missing dataset PhotonEvaporation (5.3)
-- Configuring download of missing dataset RadioactiveDecay (5.3)
-- Configuring download of missing dataset G4PARTICLEXS (1.1)
-- Configuring download of missing dataset G4PII (1.3)
-- Configuring download of missing dataset RealSurface (2.1.1)
-- Configuring download of missing dataset G4SAIDDATA (2.0)
-- Configuring download of missing dataset G4ABLA (3.1)
-- Configuring download of missing dataset G4INCL (1.0)
-- Configuring download of missing dataset G4ENSDFSTATE (2.2)
-- The following Geant4 features are enabled:
GEANT4_BUILD_CXXSTD: Compiling against C++ Standard '11'
GEANT4_USE_SYSTEM_EXPAT: Using system EXPAT library

-- Configuring done
-- Generating done
-- Build files have been written to: /home/kavita/Geant4/geant4.10.05-build
kavita@kavita-HP-Z4-G4-Workstation:~/Geant4/geant4.10.05-build$
```

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Now switch on the open GL driver for visulization and required packages for
Geant4 using below command:

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  $ cmake -DGEANT4_USE_QT=ON .
  $ cmake -DGEANT4_USE_OPENGL_X11=ON .
  $ cmake -DGEANT4_INSTALL_DATA=ON .
  $ cmake -DGEANT4_USE_RAYTRACER_X11=ON .
  $ cmake -DGEANT4_USE_GDML=ON .
  $ cmake -DGEANT4_INSTALL_EXAMPLES=ON .   [Don't forget to use "dot"(.)]

                        OR

$ cmake -DGEANT4_USE_QT=ON -DGEANT4_USE_OPENGL_X11=ON
-DGEANT4_INSTALL_DATA=ON -DGEANT4_USE_RAYTRACER_X11=ON
-DGEANT4_USE_GDML=ON -DGEANT4_INSTALL_EXAMPLES=ON .

[Don't forget to use "dot"(.)]


=======================================================================
```

You will see output

- After the configuration has run, CMake will have generated Unix Makefiles for building Geant4. To run the build, simply execute make in the build directory
  ```
  ==============================================================
  ```
  $ make -jN (N= no. of cores of CPU, N = 8 for my case)

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- Once the build has completed, you can install Geant4 to the directory you specified earlier in
  `CMAKE_INSTALL_PREFIX` by running:

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$ make install

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- Now we can see a directory with the name **geant4.10.05-install** inside the **Geant4** directory.
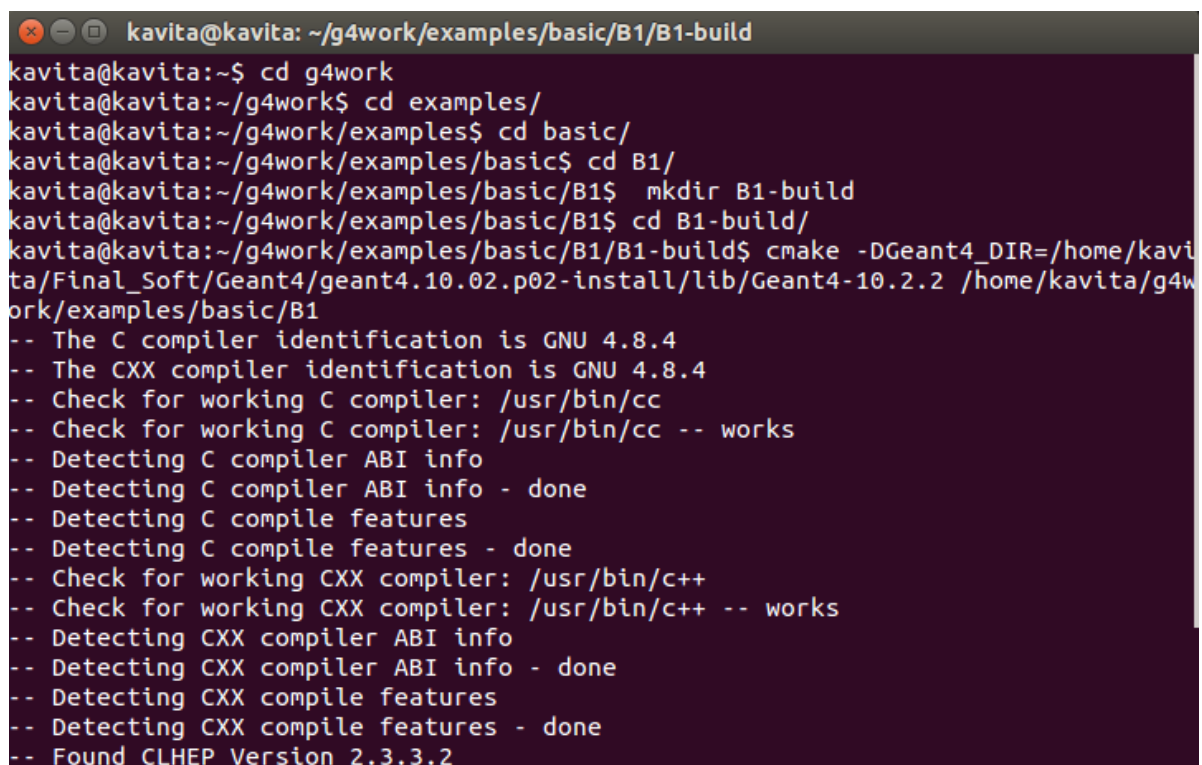
   STEP-3 : Set environment variables in .bashrc

- Open bashrc and add the below line in **bashrc**
   ===
   source <space> /home/user/Geant4/geant4.10.05-install/bin/geant4.sh
   ==

- **STEP 4- Running Example in Geant4 :**

- Open the Terminal(ctrl+alt+t)

- create directory where you want to run example
   $ mkdir working dir. (Example)

- Copy the examples from *home/user/Geant4/geant4.10.05* to **Example** directory (working
   directory) Note: here we have copied folder B1 from basic example.

- Go to the working directory
   $ cd Example
   $ cd basic
   $ cd B1
   $ mkdir B1-build
   $ cd B1-build

- compile example using command
     $ cmake -DGeant4_DIR=/home/user/geant4-install/lib/Geant4-G4VERSION <space>
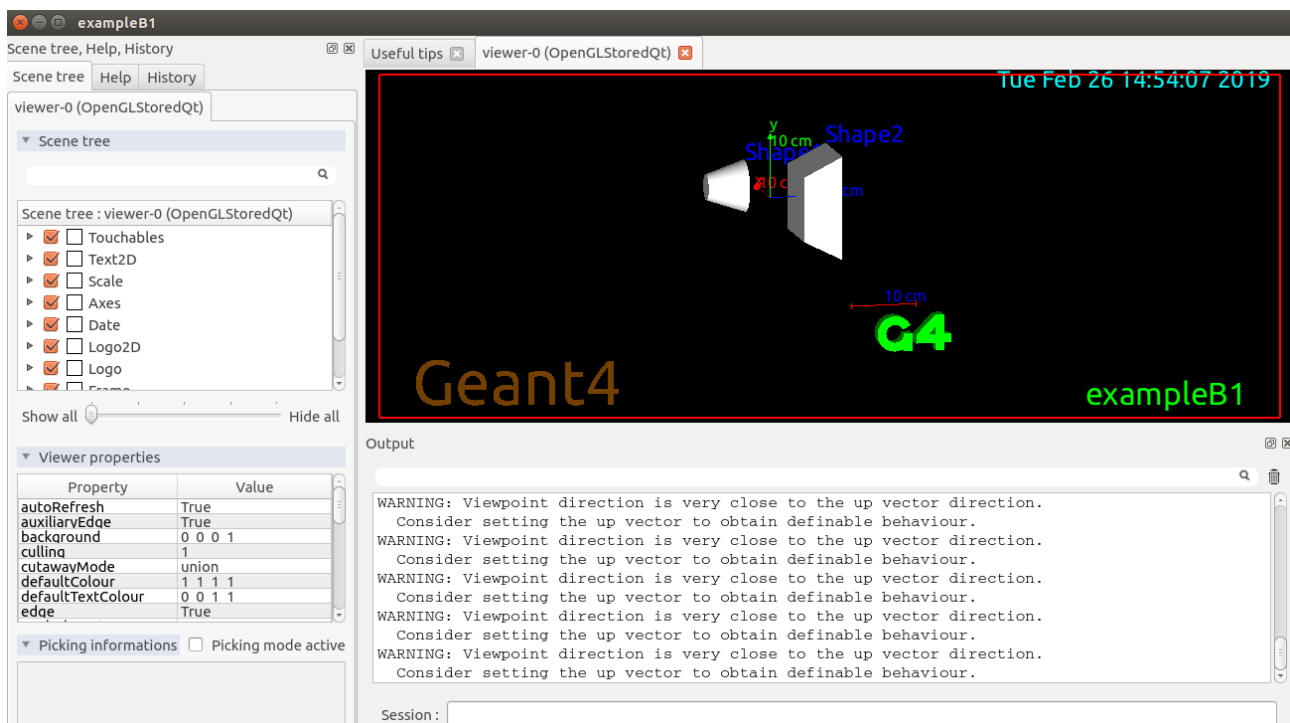   /home/user/Example/B1

You will see the output

- Use Command :
  $ make -jN (N is number of core in computer)

- Use Command : $ ./exampleB1

Note :- This installation has been tested on Ubuntu 14/16/18.

Reference :

http://geant4-userdoc.web.cern.ch/geant4-userdoc/UsersGuides/InstallationGuide/html/installguide.html