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Step by Step Geant4 Installation

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1. Download following source files from link (below):

A) CHEP source file (latest source file: clhep-2.3.3.2.tgz)

http://proj-clhep.web.cern.ch/proj-clhep/clhep23.html

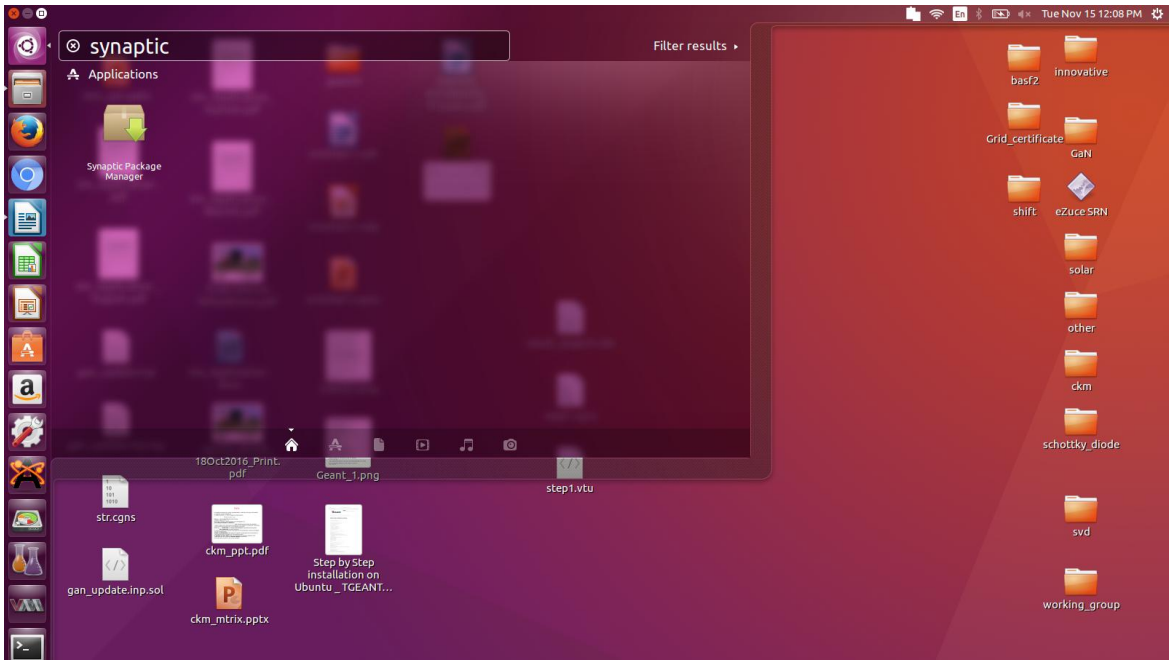
B) Geant4 source file (latest source file: geant4.10.02.p02 tar file)
https://geant4.web.cern.ch/geant4/support/download.shtml

About CLHEP: CLHEP is a C++ library which provides utility classes for general numerical programming, vector arithmetic, geometry, random number generation, and linear algebra used in the field of high energy physics.

C) Install required libraries needed for Geant4 installation through synaptic package using below command (on terminal):

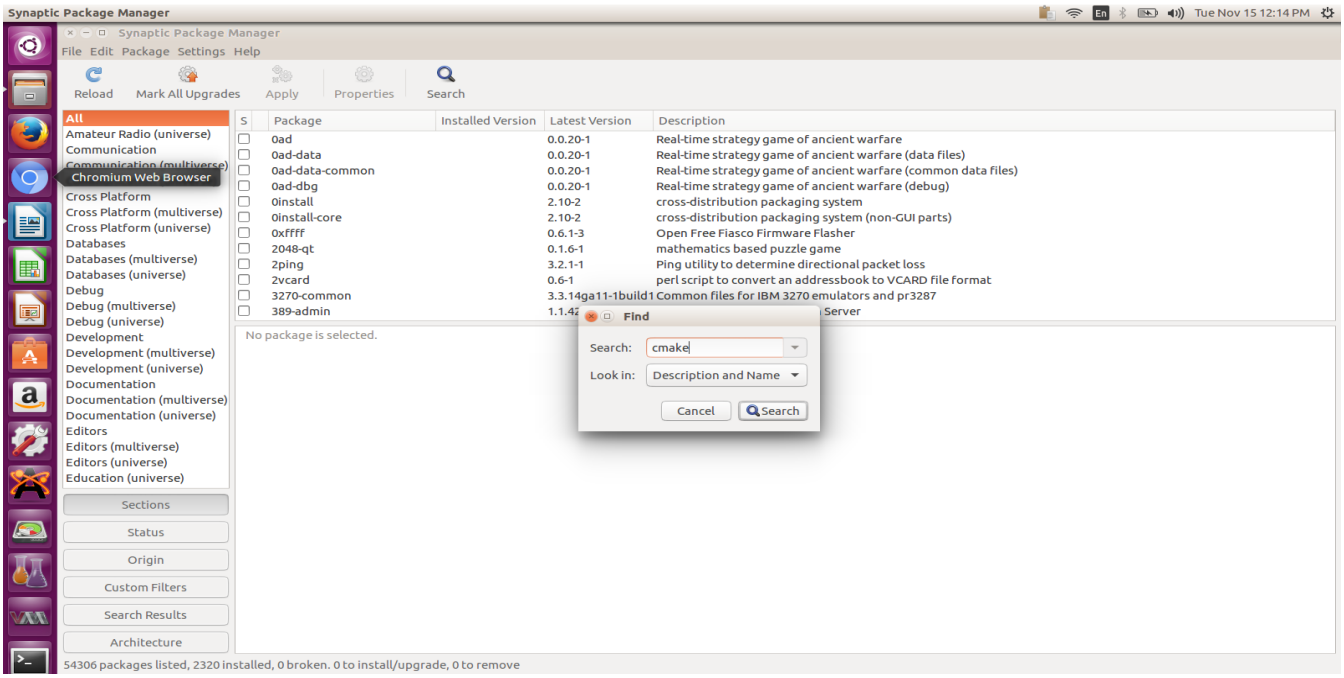
$ sudo apt-get install synaptic

- open synaptic manager (see Screen 1)
- Screen 1 :-



- Click on Synaptic manager.
- It will ask for super user(root) password.
- Search & install following libraries one by one (see example Screen 2)

Screen 2:-



- **Libraries:** g++-4.9, Make, Cmake-3.3 or higher, Xerces-c++, Opengl, Qt4 or Qt5, motif UI, x11, libxmu-dev, libxmu-header

2. Start Installation:

A) CLHEP Installation:

- Create a directory “CLHEP” (on terminal):
  $ mkdir CLHEP
  $ cd CLHEP
- Copy the clhep tar file (clhep-2.3.3.2.tgz) in the directory “CLHEP”
- Untar the tar file using command (on terminal):
  $ tar -zxvf clhep-2.3.3.2.tgz
- This command will give the source file in the form of directory “2.3.3.2”.
- Create another directory “CLHEP_build” inside “CLHEP” dir, where the CLHEP lib will be installed.
  $ mkdir CLHEP_build
  $ ls
  $ 2.3.3.2 CLHEP_build (Note: here you see two directories)
  $ cd CLHEP_build

- **Follow Below Installation Steps:**
  $ cmake -DCMAKE_INSTALL_PREFIX=/home/user/CLHEP/2.3.3.2/CLHEP- install /home/user/CLHEP/2.3.3.2
  $ make -jN

$ make test
$ make install
where N is the number of parallel jobs you require (e.g. if your machine has a dual core processor, you can set N to 2 (I used 6 for my case))
This will generate the directory "CLHEP-install".

- Set environment variables in .bashrc
  export CLHEP_DIR=/home/user/CLHEP/2.3.3.2/CLHEP-install/
  export CLHEP_INCLUDE_DIR=${CLHEP_DIR}/include/
  export CLHEP_LIBRARY=${CLHEP_DIR}/lib/
  export LD_LIBRARY_PATH=${CLHEP_LIBRARY}:${LD_LIBRARY_PATH}
  export PATH=$CLHEP_DIR/bin/:$PATH

B) Geant4 installation

- Create a directory "Geant4" (on terminal)
  $ mkdir Geant4
- Copy the source tar file in this directory and untar it using command:
  $ tar -zxvf geant4.10.02.p02.tar.gz
- This will generate source directory "geant4.10.02.p02" inside the directory "Geant4".
- Create another directory "geant4_build" inside the directory "Geant4"
  $ mkdir geant4_build $ cd geant4_build
- Follow below installation steps:

$ cmake\ -DCMAKE_INSTALL_PREFIX=/home/user/Geant4/geant4.10.02.p02-install -DGEANT4_USE_QT=ON -DGEANT4_USE_OPENGL_X11=ON -DGEANT4_INSTALL_DATA=ON -DGEANT4_USE_RAYTRACER_X11=ON -DGEANT4_USE_GDML=ON -DGEANT4_USE_SYSTEM_CLHEP=ON -DCLHEP_INCLUDE_DIR=/home/user/CLHEP/2.3.3.2/CLHEP- install/include/ -DCLHEP_LIBRARY=/home/user/CLHEP/2.3.3.2/CLHEP- install/lib/libCLHEP.so -DGEANT4_INSTALL_EXAMPLES=ON /home/user/Geant4/geant4.10.02.p02

$ make -jN (I used N=6 for my case) (This step will take time ~1 hour)
$ make install

This will generate directory "geant4.10.02.p02-install".

- Set environment variables in .bashrc
  source /home/user/Geant4/geant4.10.02.p02-install/bin/geant4.sh

3. How to compile and Run the Examples:

- Create a work directory "g4work" and copy the directory "B1" from /home/user/Geant4/geant4.10.02.p02-install/share/geant4.10.02/examples/basic/B1 to the work directory using below commands:

$ mkdir g4work
$ cp -r /home/user/Geant4/geant4.10.02.p02-install/share/ geant4.10.02/examples/basic/B1 /home/user/g4work/

$ cd g4work/B1/
$ export G4WORKDIR=~/g4work/B1/
$ make

This will generate a directory “bin” inside directory ~/g4work/B1/ which will have executable green file “exampleB1”(see Screen-3).

Screen 3

- Now copy the executable green file “exampleB1” in the directory B1 where the macro files(ex. = vis.mac, init_vis.mac etc.) are present and run it using below command:

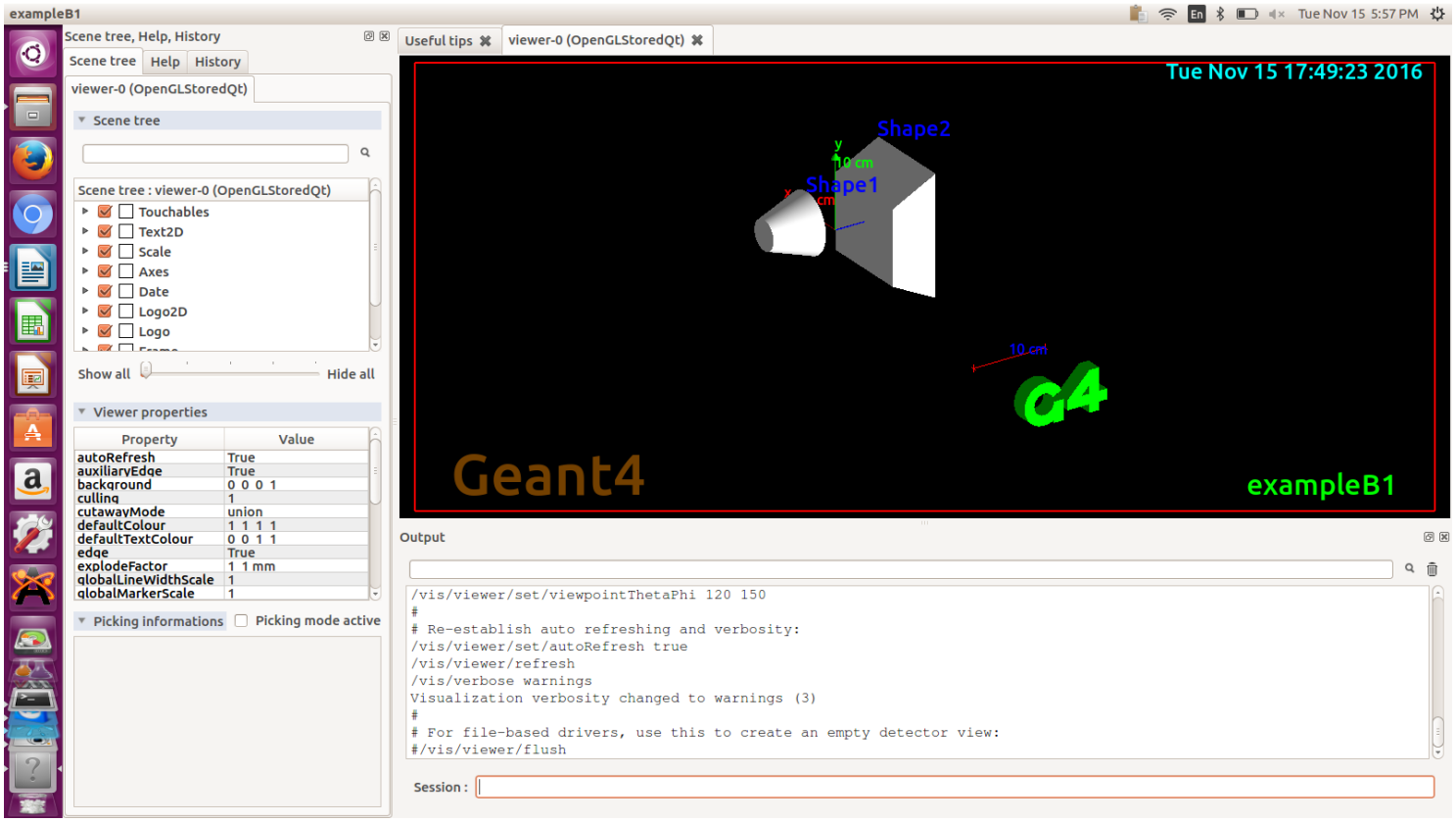
$ cd g4work/B1/bin/Linux-g++/
$ ls
$ exampleB1 (green colour)
$ cp exampleB1 /home/user/g4work/B1/
$ cd g4work/B1/
$. /exampleB1

This will generate the Geometry (Screen 4).

Screen 4

```
yogesh@yogesh-Latitude-E5420: ~/g4work/B1

yogesh@yogesh-Latitude-E5420:~/g4work/B1/bin/Linux-g++$ ls
exampleB1
yogesh@yogesh-Latitude-E5420:~/g4work/B1/bin/Linux-g++$ cp exampleB1 /home/yogesh/g4work/B1/
yogesh@yogesh-Latitude-E5420:~/g4work/B1/bin/Linux-g++$ cd ../../
yogesh@yogesh-Latitude-E5420:~/g4work/B1$ ls
bin              exampleB1     exampleB1.in   G4History.macro  History  init_vis.mac  run1.mac
src  vis.mac
CMakeLists.txt  exampleB1.cc  exampleB1.out  GNUmakefile      include  README        run2.mac
tmp
yogesh@yogesh-Latitude-E5420:~/g4work/B1$ ./exampleB1
Available UI session types: [ Qt, GAG, tcsh, csh ]
```



If you are done with this, you have successfully installed Geant4 in your laptop and have run one example (Basic B1).

If you still face any difficulty in installation, you can write your query at
kavita.phy@mnit.ac.in (Kavita Lalwani)
2015rpy9528@mnit.ac.in (Yogesh Kumar Saini)

Note (For cmake error): If you are facing error of cmake upgrade while installing geant4 or CLHEP, kindly download the upgraded version via below command: (latest cmake: cmake-3.7.0.tar.gz or cmake-3.7.1.tar.gz)

Download from

http://www.cmake.org/

install

```
sudo apt-get install build-essential
```

Untar

```
tar xf cmake-3.7.0.tar.gz
cd cmake-3.7.0
./configure
make
```

Now you choose an installation type with checkinstall

```
sudo apt-get install checkinstall
sudo checkinstall
```

Now check the version of cmake which you installed

```
cmake --version
```