

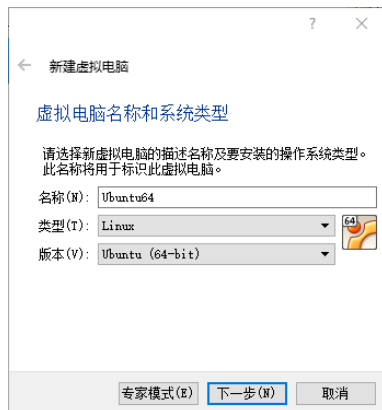
How to run scripts with Geant4?

1. Install Ubuntu OS

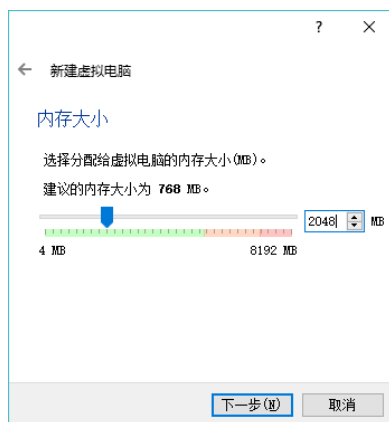
Step 1: Download Ubuntu ISO from the website: <https://www.ubuntu.com/download>

Step 2: Download Oracle VM VirtualBox and install it.

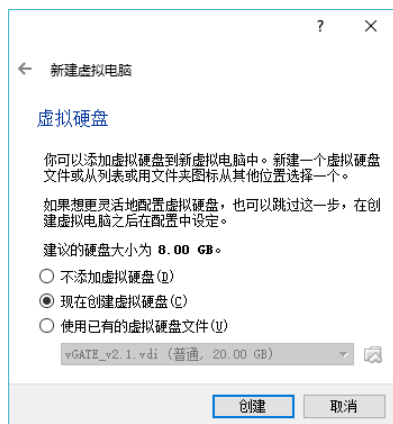
Step 3: Open VirtualBox-> new, give a name to your virtual machine.



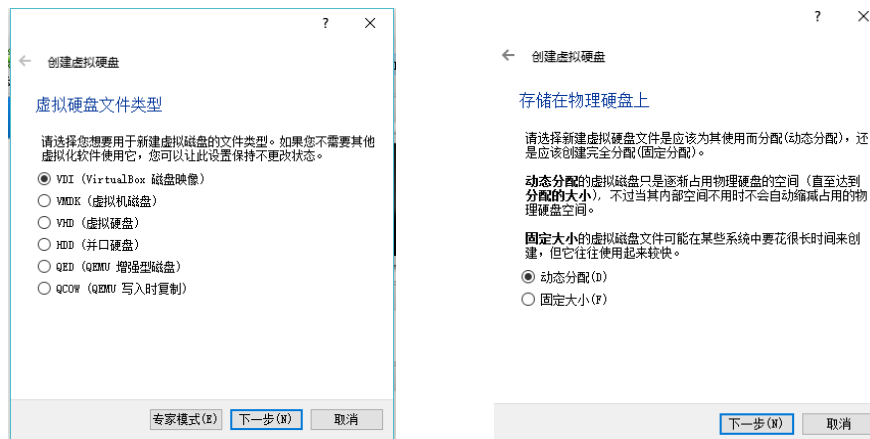
Step 4: Allocate the memory for the virtual computer.



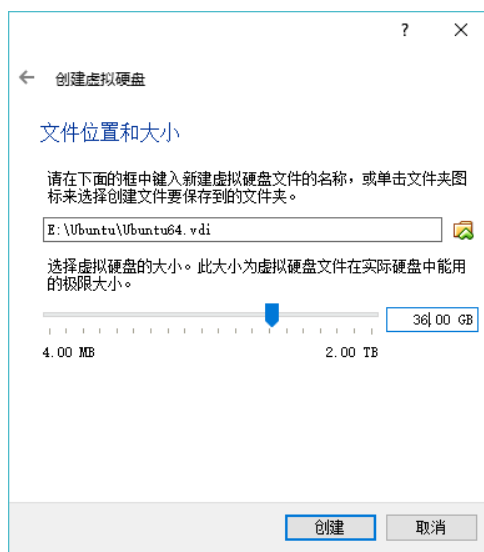
Step 5: Create the virtual hard disk.



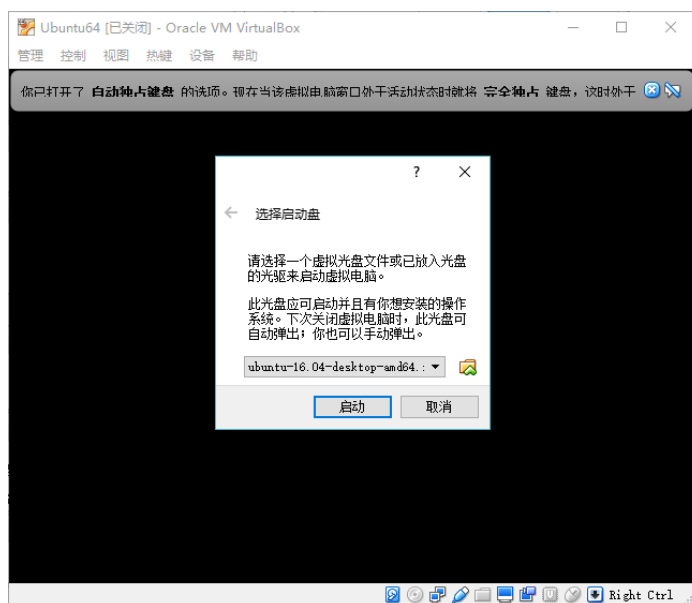
Step 6: Create the file type of the virtual hard disk.



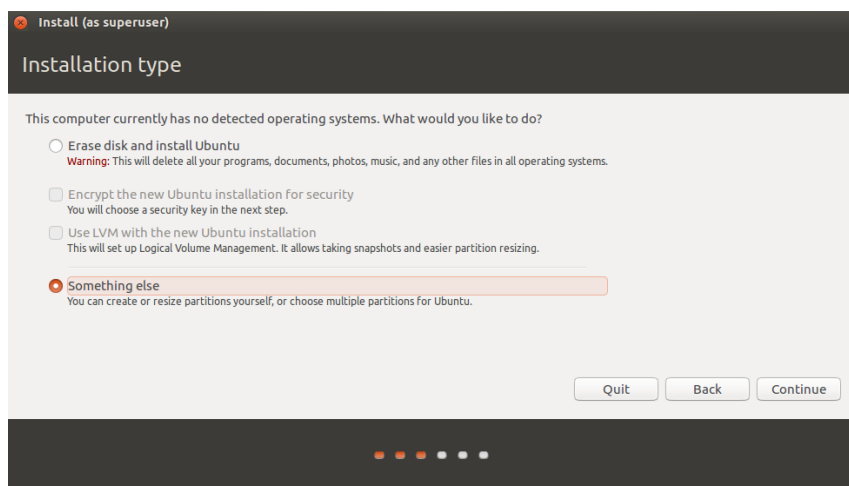
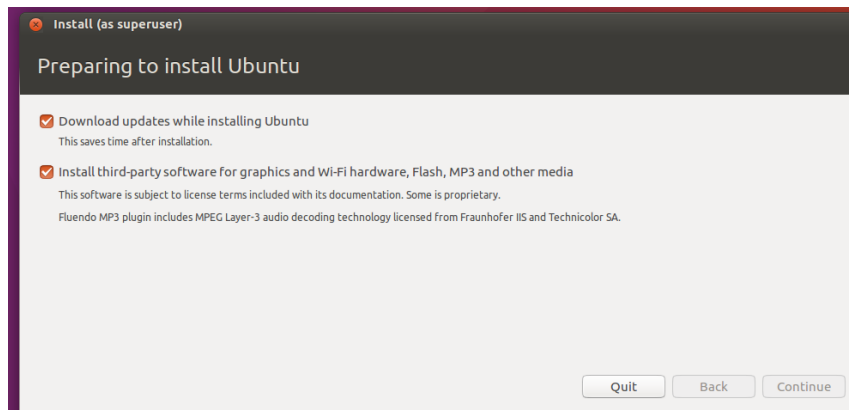
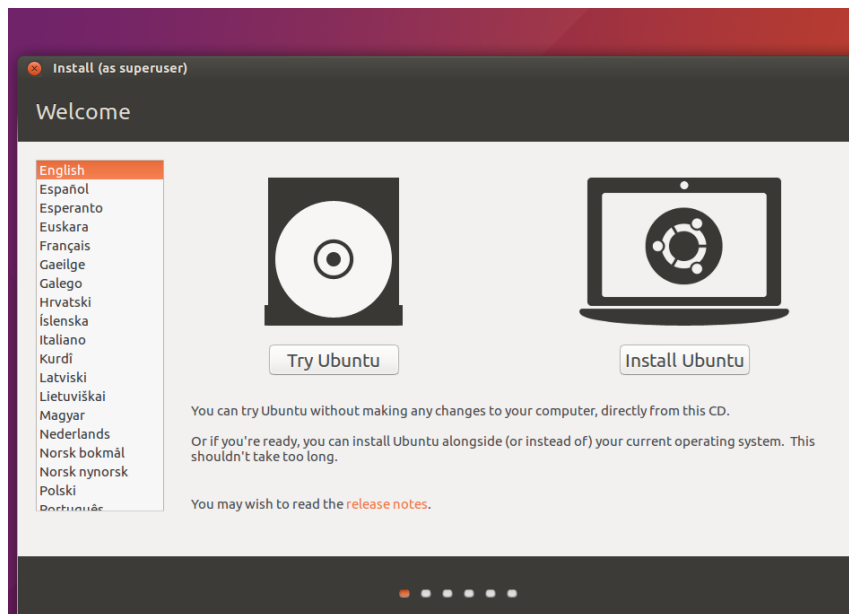
Step 7: Specify the positions and size for the virtual computer.

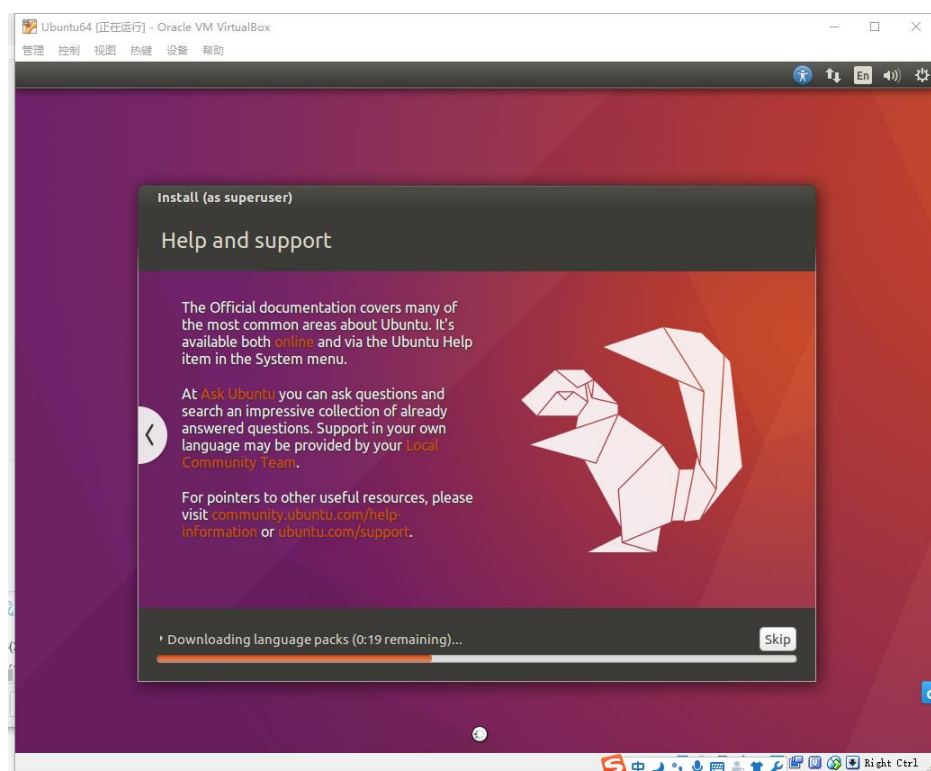
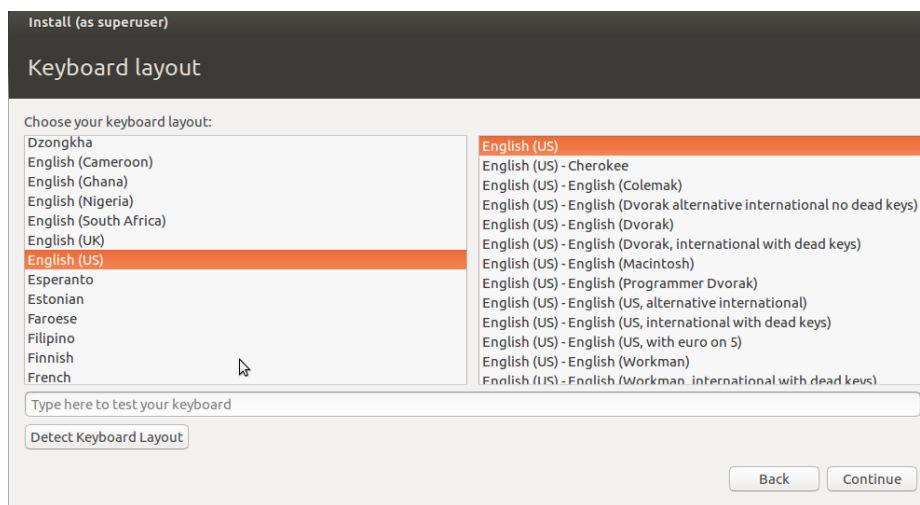
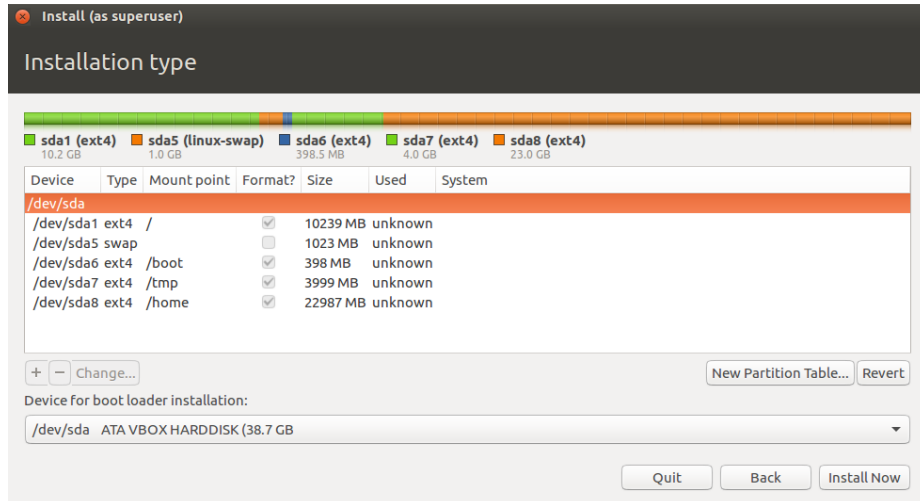


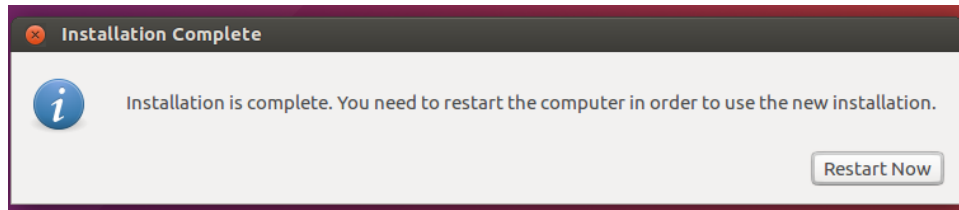
Step 8: Start the virtual computer and import the Ubuntu ISO as the startup disk.



Step 9: Install Ubuntu.







Step 10: Restart.

2. Install Geant4 toolkit

Step 1: Open the terminal and install gcc compiler: `sudo apt-get install build-essential`

Step 2: Install the necessary library files: `sudo apt-get install libgl1-mesa-dev libglu1-mesa-dev libxt-dev libXmu-dev libXi-dev zlib1g-dev libgl2ps-dev libexpat1-dev libxerces-c-dev`

Step 3: Install the cmake toolkit: `sudo apt-get install cmake`

Step 4: Download Geant4 software from the homepage: <http://geant4.web.cern.ch/geant4/>

Step 5: Unzip the compressed file and then create an empty folder named `geant4_build`

Step 6: Please `cd` to `geant4_build` and then pre-install: `cmake ../geant4_build`

Step 7: Compile: `make -jN`, where N is the processor number.

```
wfh@wfh-VirtualBox: ~/Prog/Geant4/geant4_build
esRandom.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzRotation.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzRotationC.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzRotationD.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzVectorB.cc.o
[ 1%] Linking CXX shared library ../../BuildProducts/lib/libG4expat.so
[ 1%] Built target G4expat
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzVector.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzVectorC.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzVectorK.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzVectorL.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/LorentzVectorR.cc.o
[ 1%] Building CXX object source/externals/clhep/CMakeFiles/G4clhep.dir/src/mixmax.cc.o
```

```
wfh@wfh-VirtualBox: ~/Prog/Geant4/geant4_build
rc/G4OpenGLQtExportDialog.cc.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/src/G4OpenGLQtMovieDialog.cc.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/src/G4OpenGLVboDrawer.cc.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/src/G4OpenGLQtViewer.cc.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/src/G4OpenGLStoredQt.cc.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/src/G4OpenGLStoredQtSceneHandler.cc.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/src/G4OpenGLStoredQtViewer.cc.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/include/moc_G4OpenGLQtExportDialog.cpp.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/include/moc_G4OpenGLQtMovieDialog.cpp.o
[100%] Building CXX object source/visualization/OpenGL/CMakeFiles/G4OpenGL.dir/include/moc_G4OpenGLQtViewer.cpp.o
[100%] Linking CXX shared library ../../BuildProducts/lib/libG4GMocren.so
[100%] Built target G4GMocren
[100%] Linking CXX shared library ../../BuildProducts/lib/libG4OpenGL.so
[100%] Built target G4OpenGL
wfh@wfh-VirtualBox: ~/Prog/Geant4/geant4_build$
```


Step 8: Install: make install.

```
wfh@wfh-VirtualBox: ~/Prog/Geant4/geant4_build
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLTrans
Form3D.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4VisFeatures
OfOpenGL.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLImmed
iateQt.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLImmed
iateQtViewer.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLQt.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLQtExp
ortDialog.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLQtMov
ieDialog.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLVboDr
awer.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLQtVie
wer.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLStore
dQt.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLStore
dQtSceneHandler.hh
-- Installing: /home/wfh/Prog/Geant4/geant4_install/include/Geant4/G4OpenGLStore
dQtViewer.hh
wfh@wfh-VirtualBox:~/Prog/Geant4/geant4_build$
```

Step 9: Download the data from Geant4 homepage and set the environment variables for the data.

```
.bashrc ✖ geant4.sh ✖
63 # Resource file paths
64 # - Datasets
65 #export G4NEUTRONHPDATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/G4NDL4.5 >
66 #export G4LEDDATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/G4EMLW6.50 > /de
67 #export G4LEVELGAMMADATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/PhotonEva
68 #export G4RADIOACTIVEDATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/Radioact
69 #export G4NEUTRONXSDATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/G4NEUTRONX
70 #export G4PIIDATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/G4PII1.3 > /dev/
71 #export G4REALSURFACEDATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/RealSurf
72 #export G4SAIDXSDATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/G4SAIDDATA1.1
73 #export G4ABLA3DATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/G4ABLA3.0 > /de
74 #export G4ENSDFSTATEDATA=""cd $geant4_envbindir/./share/Geant4-10.3.0/data/G4ENSDFST
75
76 export G4NEUTRONHPDATA=/home/wfh/Prog/Geant4/geant4.10.03/data/G4NDL4.5
77 export G4LEDDATA=/home/wfh/Prog/Geant4/geant4.10.03/data/G4EMLW6.50
78 export G4LEVELGAMMADATA=/home/wfh/Prog/Geant4/geant4.10.03/data/PhotonEvaporation4.3
79 export G4RADIOACTIVEDATA=/home/wfh/Prog/Geant4/geant4.10.03/data/RadioactiveDecay5.1
80 export G4NEUTRONXSDATA=/home/wfh/Prog/Geant4/geant4.10.03/data/G4NEUTRONXS1.4
81 export G4PIIDATA=/home/wfh/Prog/Geant4/geant4.10.03/data/G4PII1.3
82 export G4REALSURFACEDATA=/home/wfh/Prog/Geant4/geant4.10.03/data/RealSurface1.0
83 export G4SAIDXSDATA=/home/wfh/Prog/Geant4/geant4.10.03/data/G4SAIDDATA1.1
84 export G4ABLA3DATA=/home/wfh/Prog/Geant4/geant4.10.03/data/G4ABLA3.0
85 export G4ENSDFSTATEDATA=/home/wfh/Prog/Geant4/geant4.10.03/data/G4ENSDFSTATE2.1
86 export G4TENDL1DATA=/home/wfh/Prog/Geant4/geant4.10.03/data/G4TENDL1.3
87
88 # - Fonts for Freetype
89 # FREETYPE SUPPORT NOT AVAILABLE
```

3. Run scripts with Geant4 toolkit

Step 1: Please cd to the folder contained the scripts. Eg. cd ../examples/basic/B3/B3a/

Step 2: Create a new folder: mkdir test

Step 3: Cd to the new folder: cd test

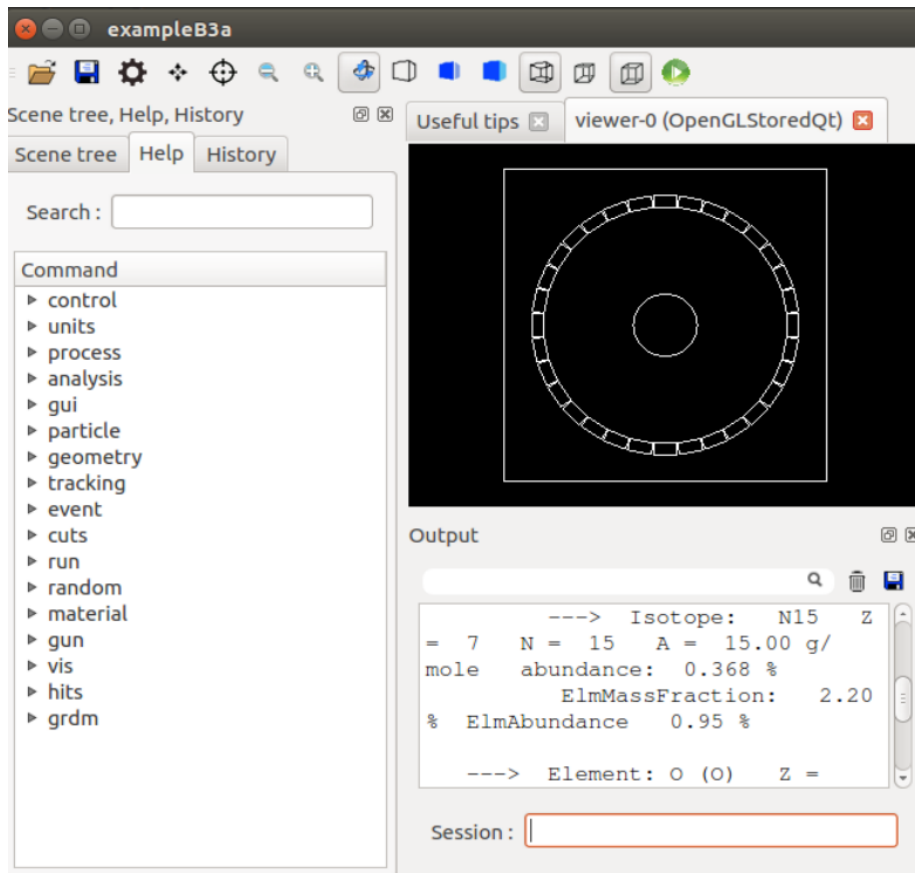
Step 4: Compile: cmake ..

```
wfh@wfh-VirtualBox: ~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test
wfh@wfh-VirtualBox:~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a$ cd test/
wfh@wfh-VirtualBox:~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test$
cmake ..
-- The C compiler identification is GNU 5.3.1
-- The CXX compiler identification is GNU 5.3.1
-- Check for working C compiler: /usr/bin/cc
-- Check for working C compiler: /usr/bin/cc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Detecting C compile features
-- Detecting C compile features - done
-- Check for working CXX compiler: /usr/bin/c++
-- Check for working CXX compiler: /usr/bin/c++ -- works
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- Configuring done
-- Generating done
-- Build files have been written to: /home/wfh/Prog/Geant4/geant4.10.03/e
xamples/basic/B3/B3a/test
wfh@wfh-VirtualBox:~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test$
```

Step 5: Build: make -j2

```
wfh@wfh-VirtualBox: ~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test
-- Build files have been written to: /home/wfh/Prog/Geant4/geant4.10.03/e
xamples/basic/B3/B3a/test
wfh@wfh-VirtualBox:~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test$
make
Scanning dependencies of target exampleB3a
[ 11%] Building CXX object CMakeFiles/exampleB3a.dir/exampleB3a.cc.o
[ 22%] Building CXX object CMakeFiles/exampleB3a.dir/src/B3aActionInitial
ization.cc.o
[ 33%] Building CXX object CMakeFiles/exampleB3a.dir/src/B3PrimaryGenerat
orAction.cc.o
[ 44%] Building CXX object CMakeFiles/exampleB3a.dir/src/B3DetectorConstr
uction.cc.o
[ 55%] Building CXX object CMakeFiles/exampleB3a.dir/src/B3StackingAction
.cc.o
[ 66%] Building CXX object CMakeFiles/exampleB3a.dir/src/B3aEventAction.c
c.o
[ 77%] Building CXX object CMakeFiles/exampleB3a.dir/src/B3aRunAction.cc.
o
[ 88%] Building CXX object CMakeFiles/exampleB3a.dir/src/B3PhysicsList.cc
.o
[100%] Linking CXX executable exampleB3a
[100%] Built target exampleB3a
wfh@wfh-VirtualBox:~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test$
```

Step 6: Execute: ./exampleB3a



```
wfh@wfh-VirtualBox: ~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test
wfh@wfh-VirtualBox:~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test$
./exampleB3a
Available UI session types: [ Qt, GAG, tcsh, csh ]

Graphics systems deleted.
Visualization Manager deleting...
G4 kernel has come to Quit state.
UserDetectorConstruction deleted.
UserPhysicsList deleted.
UserActionInitialization deleted.
UserRunAction deleted.
UserPrimaryGenerator deleted.
RunManager is deleting RunManagerKernel.
G4SDManager deleted.
EventManager deleted.
Units table cleared.
Total navigation history collections cleaned: 2
===== Deleting memory pools =====
Pool ID '20G4NavigationLevelRep', size : 0.00288 MB
Pool ID '24G4ReferenceCountedHandleIvE', size : 0.000961 MB
Pool ID '15G4CountedObjectIvE', size : 0.000961 MB
Number of memory pools allocated: 3; of which, static: 0
Dynamic pools deleted: 3 / Total memory freed: 0.0048 MB
=====
G4Allocator objects are deleted.
UImanager deleted.
StateManager deleted.
RunManagerKernel is deleted. Good bye :)
wfh@wfh-VirtualBox:~/Prog/Geant4/geant4.10.03/examples/basic/B3/B3a/test$
```