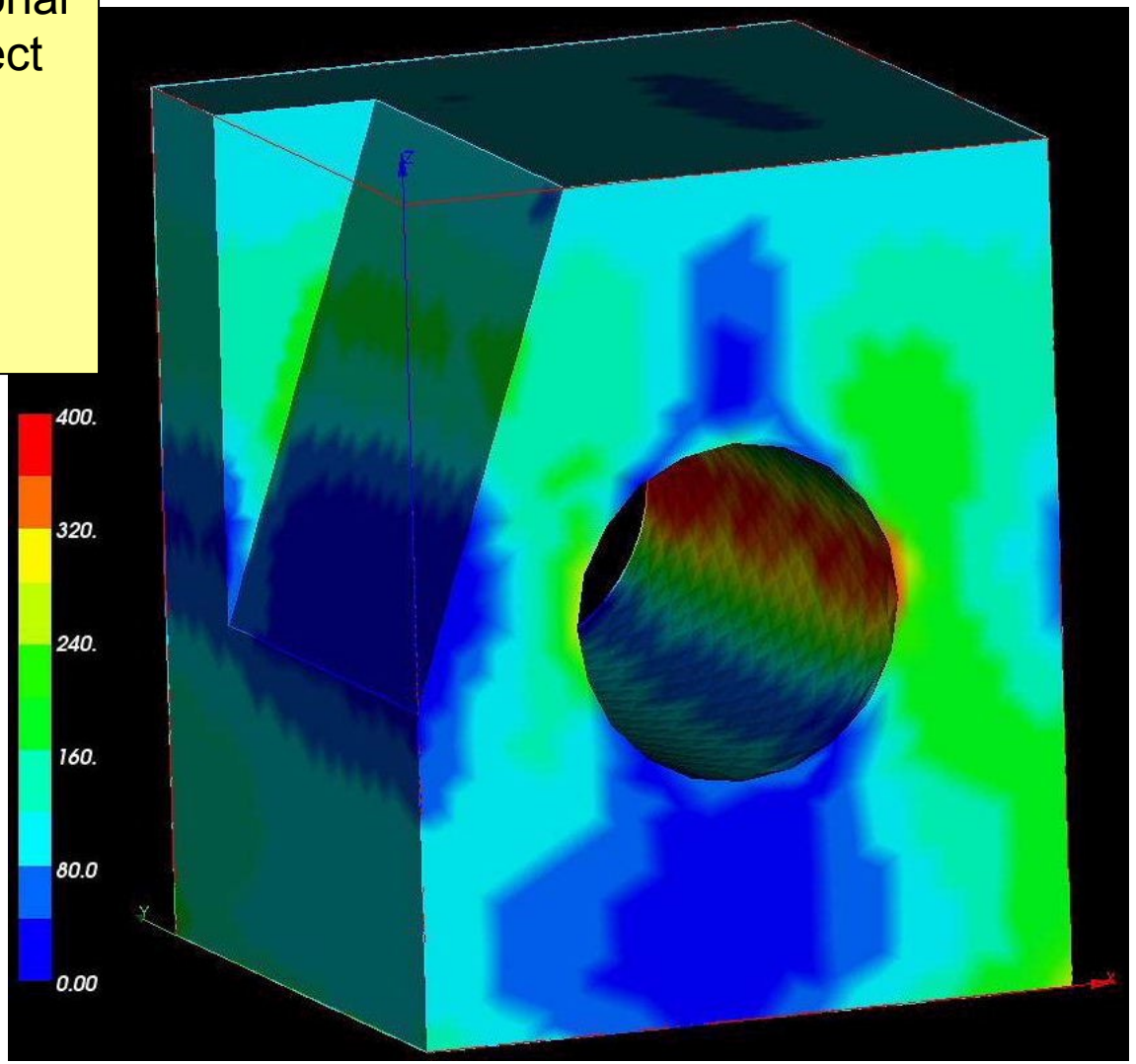
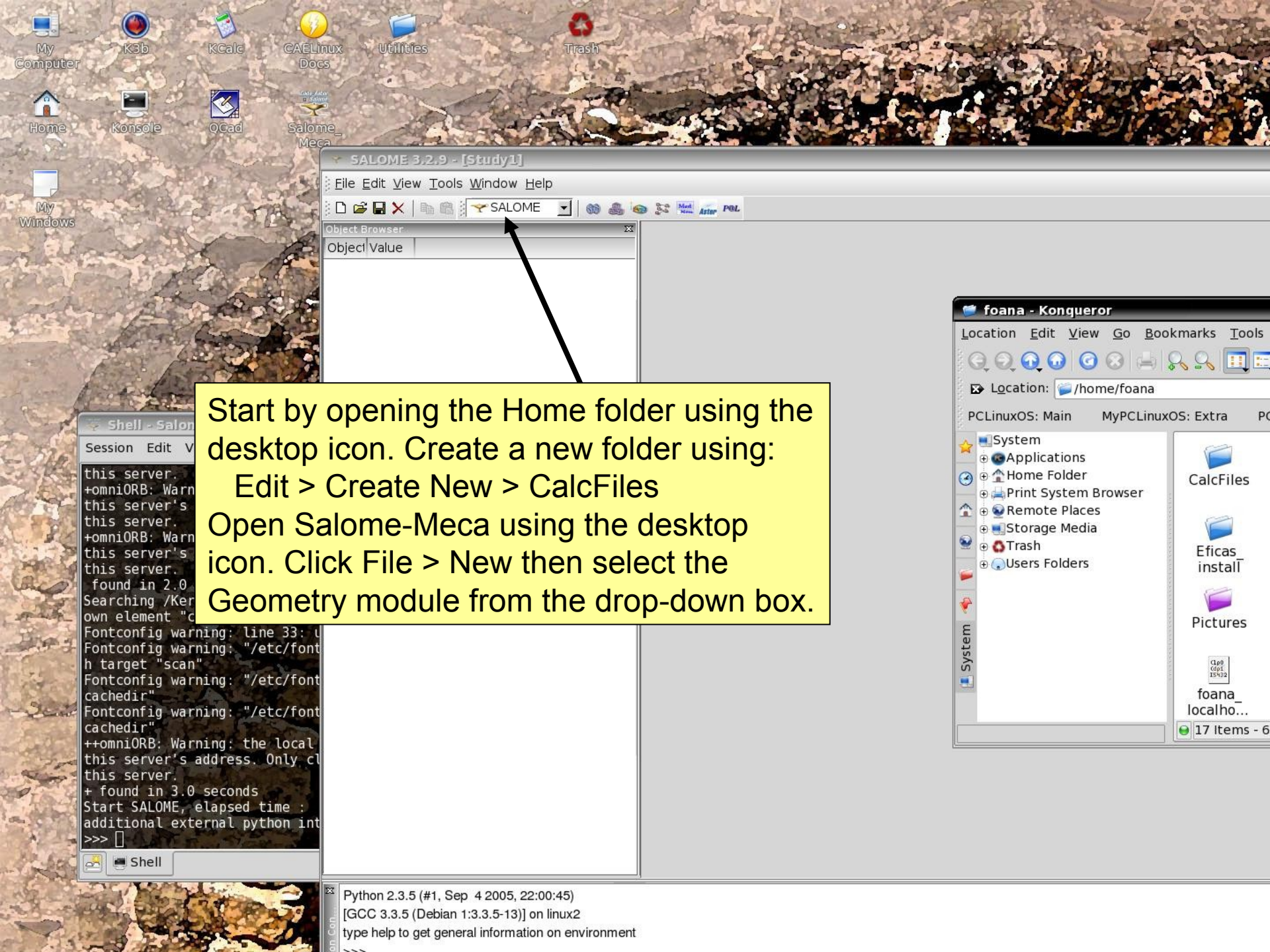
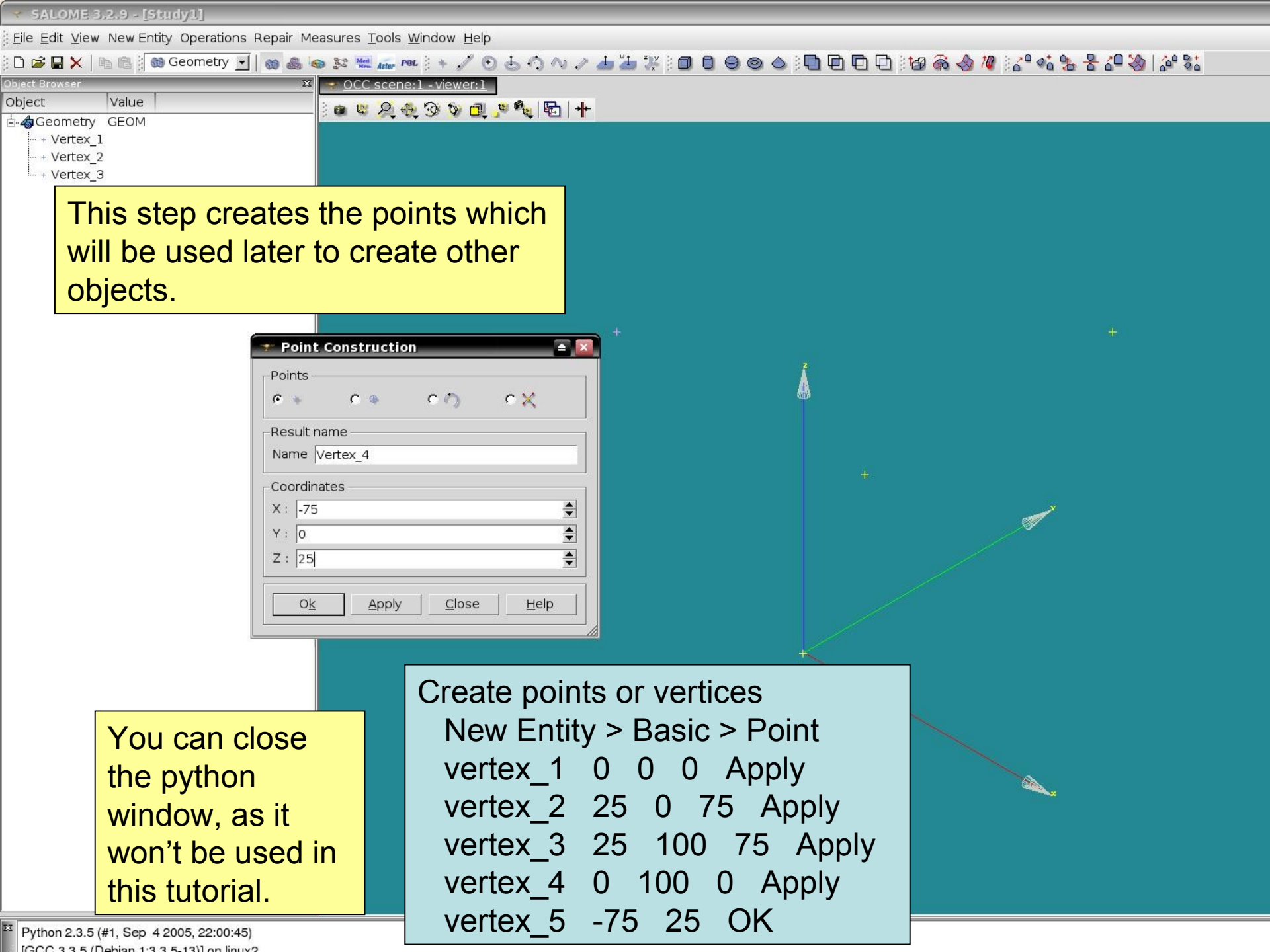
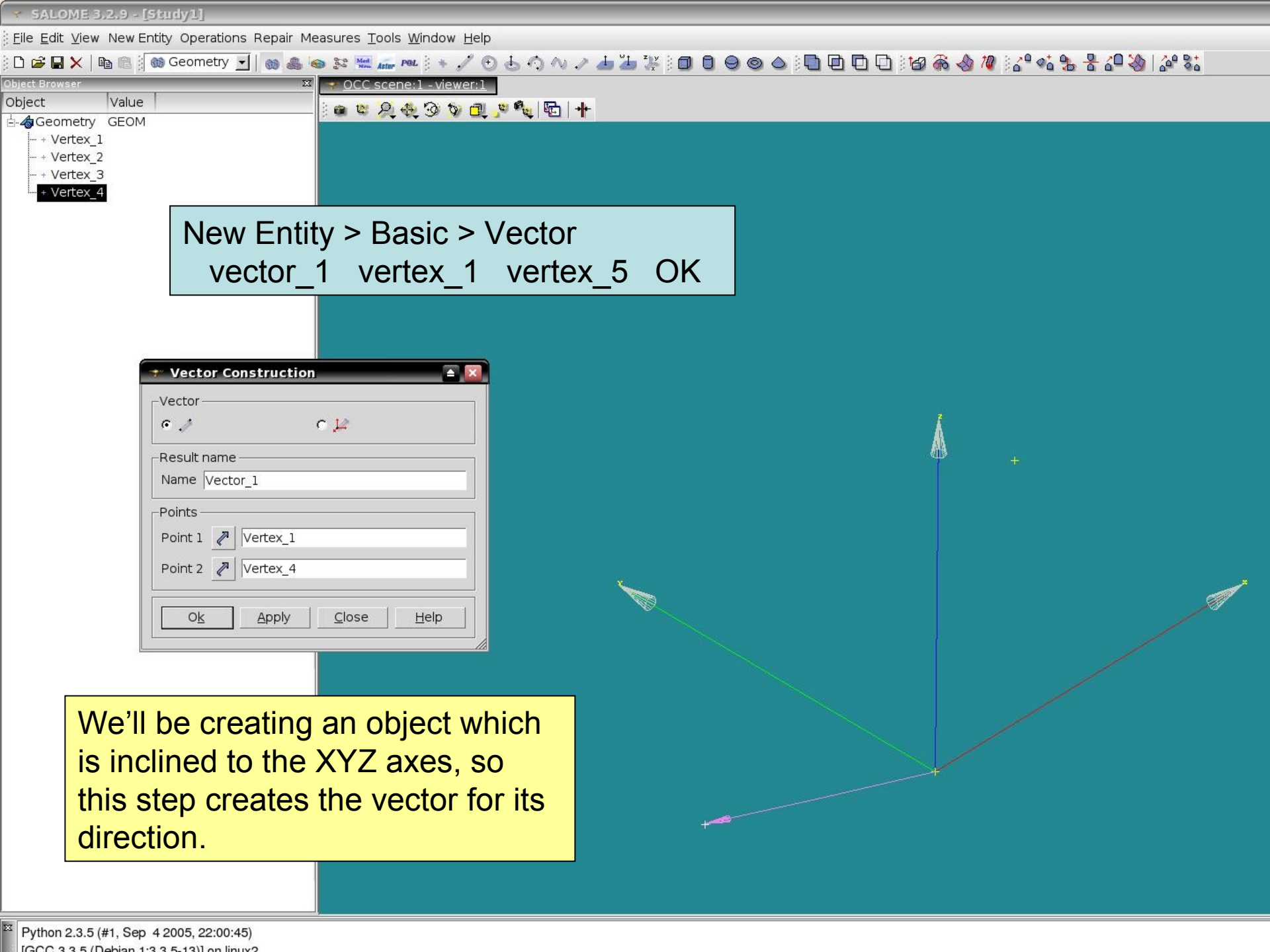
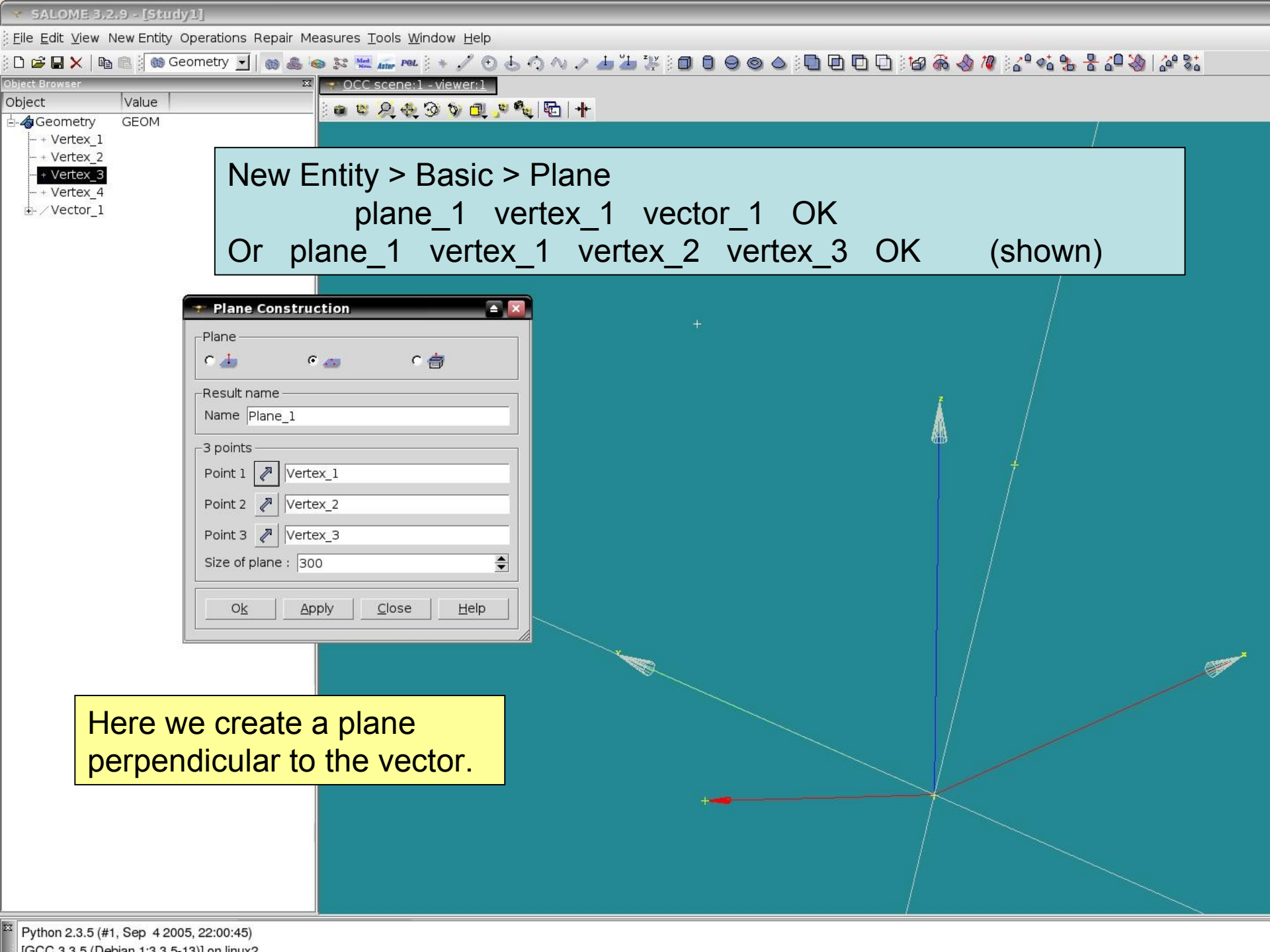
The object of this tutorial is to build a solid object using a number of graphical techniques, then to mesh it and solve, and finally to display the solution.

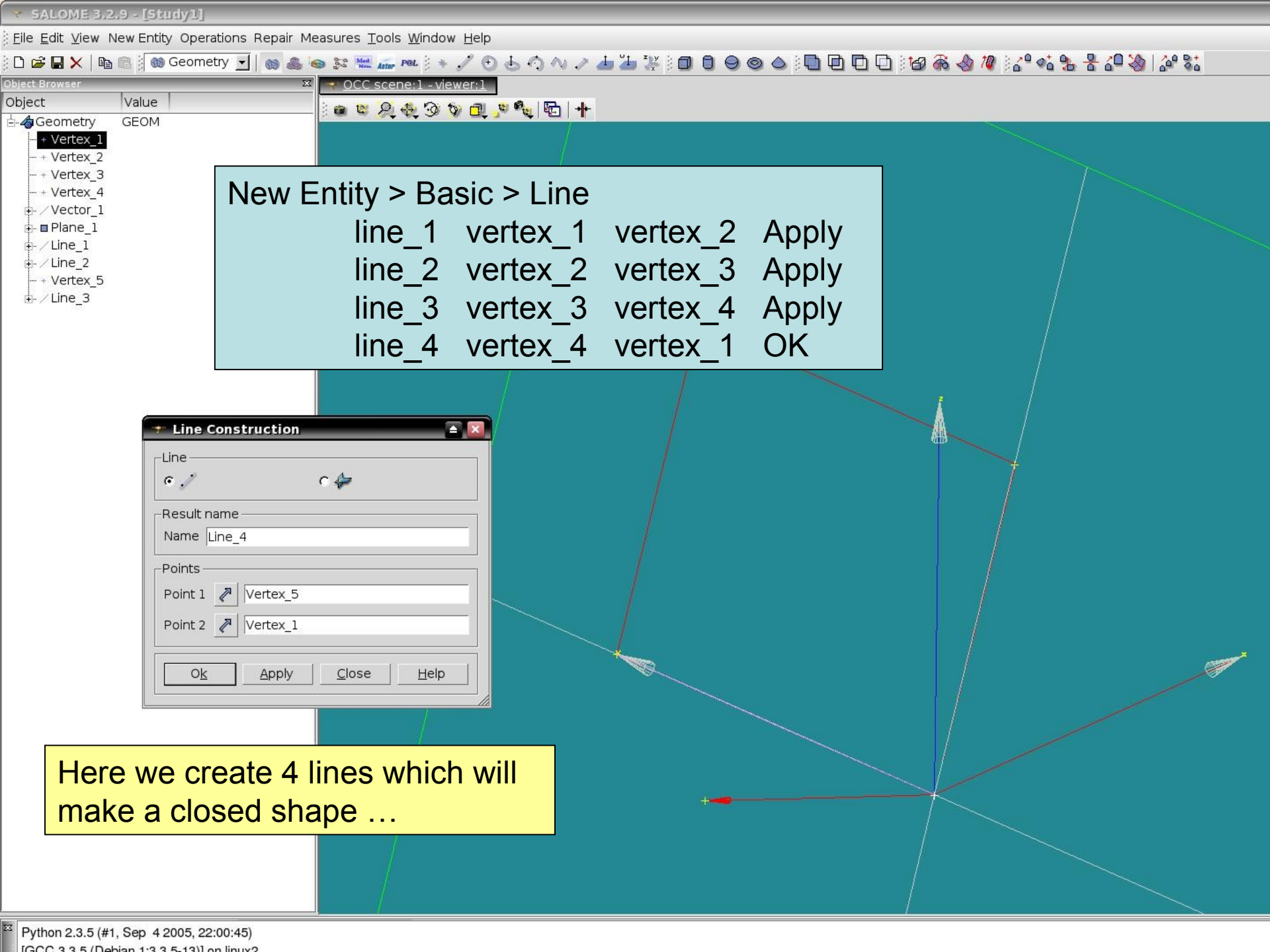


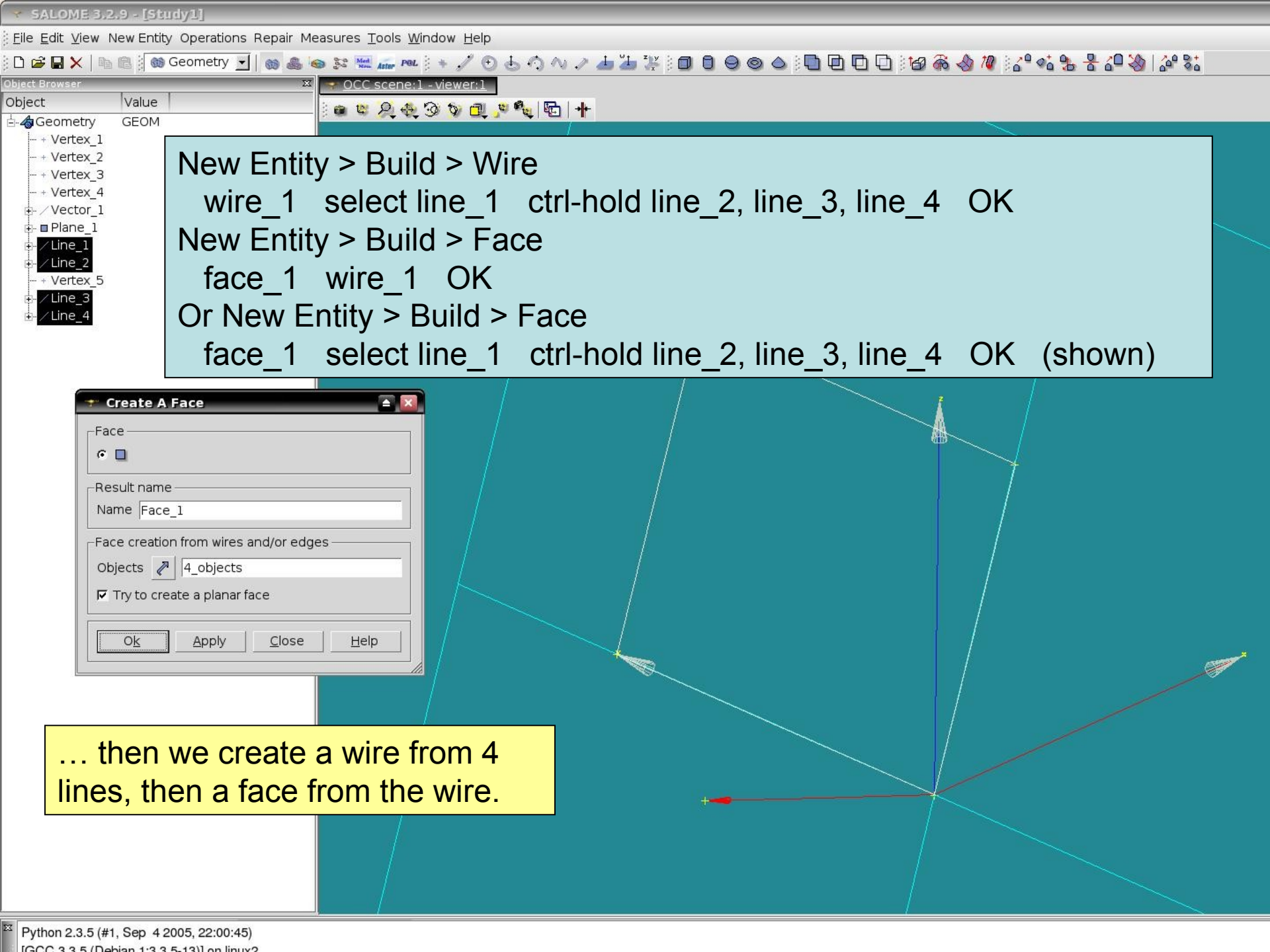

My Computer
K3b
KCalc
CAELinux Docs
Utilities
Trash
Home
Konsole
QCad
Salome_ Meca
My Windows
SALOME 3.2.9 - [Study1]
File Edit View Tools Window Help
SALOME
Object Browser
Object
Value
Start by opening the Home folder using the desktop icon. Create a new folder using:
Edit > Create New > CalcFiles
Open Salome-Meca using the desktop icon. Click File > New then select the Geometry module from the drop-down box.
foana - Konqueror
Location Edit View Go Bookmarks Tools
Location: /home/foana
PCLinuxOS: Main
MyPCLinuxOS: Extra
System
Applications
Home Folder
Print System Browser
Remote Places
Storage Media
Trash
Users Folders
CalcFiles
Eficas_ install
Pictures
foana_ localho...
17 Items - 6
Shell - Salon
Session Edit
this server.
+omniORB: Warn
this server's
this server.
+omniORB: Warn
this server's
this server.
found in 2.0
Searching /Ker
own element "c
Fontconfig warning: line 33: u
Fontconfig warning: "/etc/font
h target "scan"
Fontconfig warning: "/etc/font
cachedir"
Fontconfig warning: "/etc/font
cachedir"
++omniORB: Warning: the local
this server's address. Only cl
this server.
+ found in 3.0 seconds
Start SALOME, elapsed time :
additional external python int
>>>
Shell
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)
[GCC 3.3.5 (Debian 1:3.3.5-13)] on linux2
type help to get general information on environment
>>>

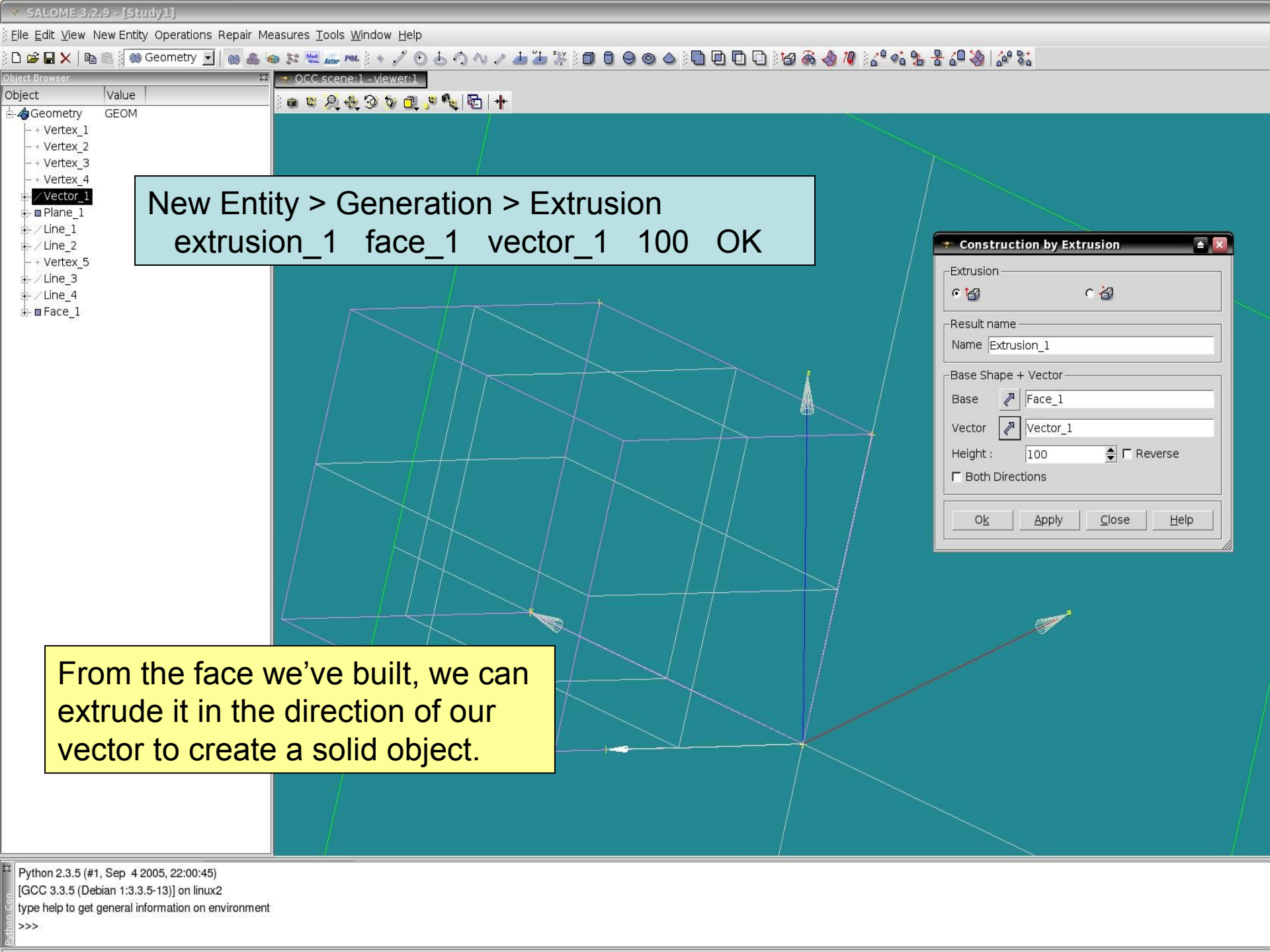

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry GEOM
Vertex_1
Vertex_2
Vertex_3
OCC scene:1 - viewer:1
This step creates the points which will be used later to create other objects.
Point Construction
Points
Result name
Name Vertex_4
Coordinates
X : -75
Y : 0
Z : 25
Ok
Apply
Close
Help
You can close the python window, as it won't be used in this tutorial.
Create points or vertices
New Entity > Basic > Point
vertex_1 0 0 0 Apply
vertex_2 25 0 75 Apply
vertex_3 25 100 75 Apply
vertex_4 0 100 0 Apply
vertex_5 -75 25 OK
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

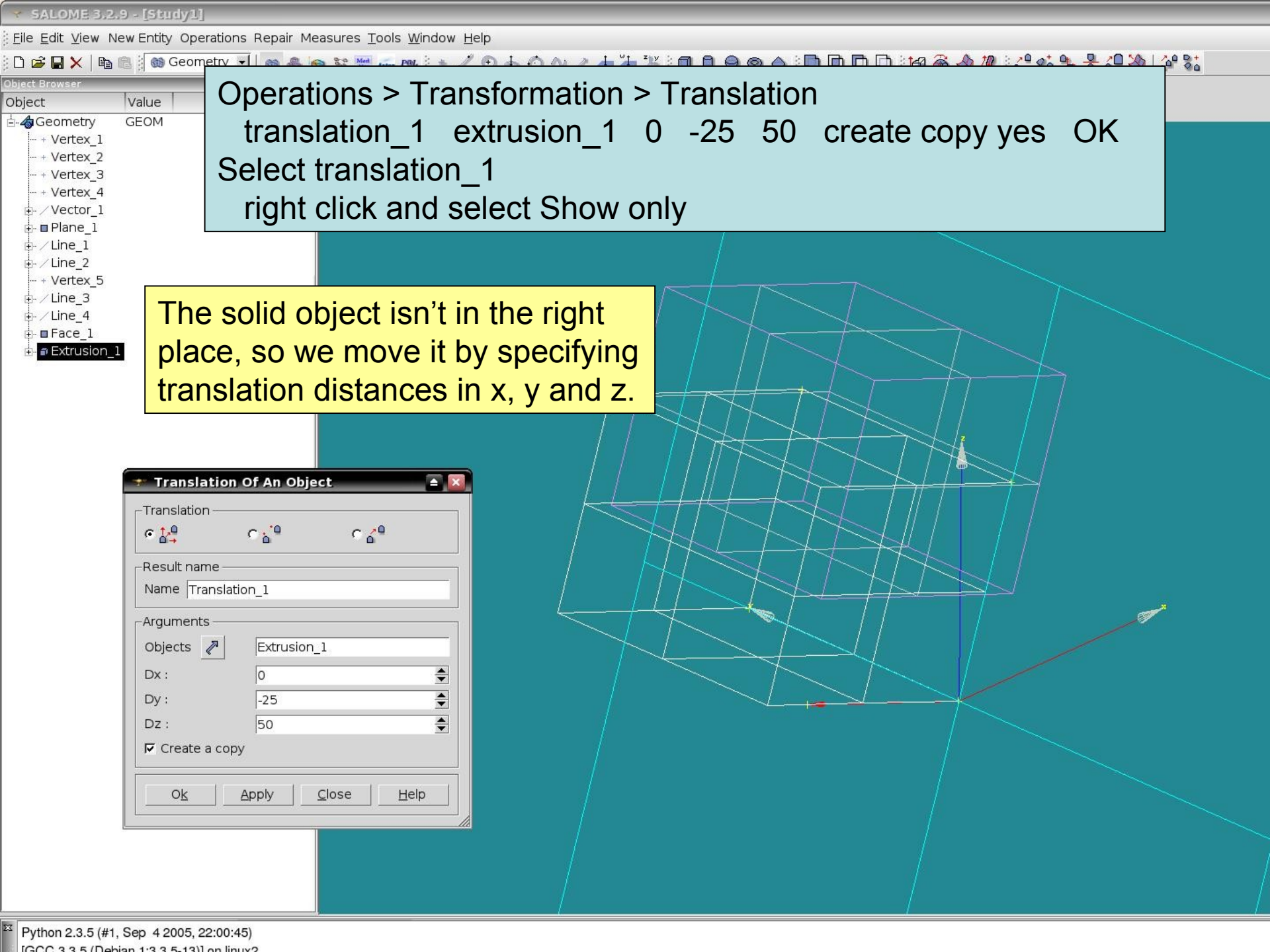

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
OCC scene:1 - viewer:1
New Entity > Basic > Vector
vector_1 vertex_1 vertex_5 OK
Vector Construction
Vector
Result name
Name Vector_1
Points
Point 1 Vertex_1
Point 2 Vertex_4
Ok
Apply
Close
Help
We'll be creating an object which is inclined to the XYZ axes, so this step creates the vector for its direction.
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

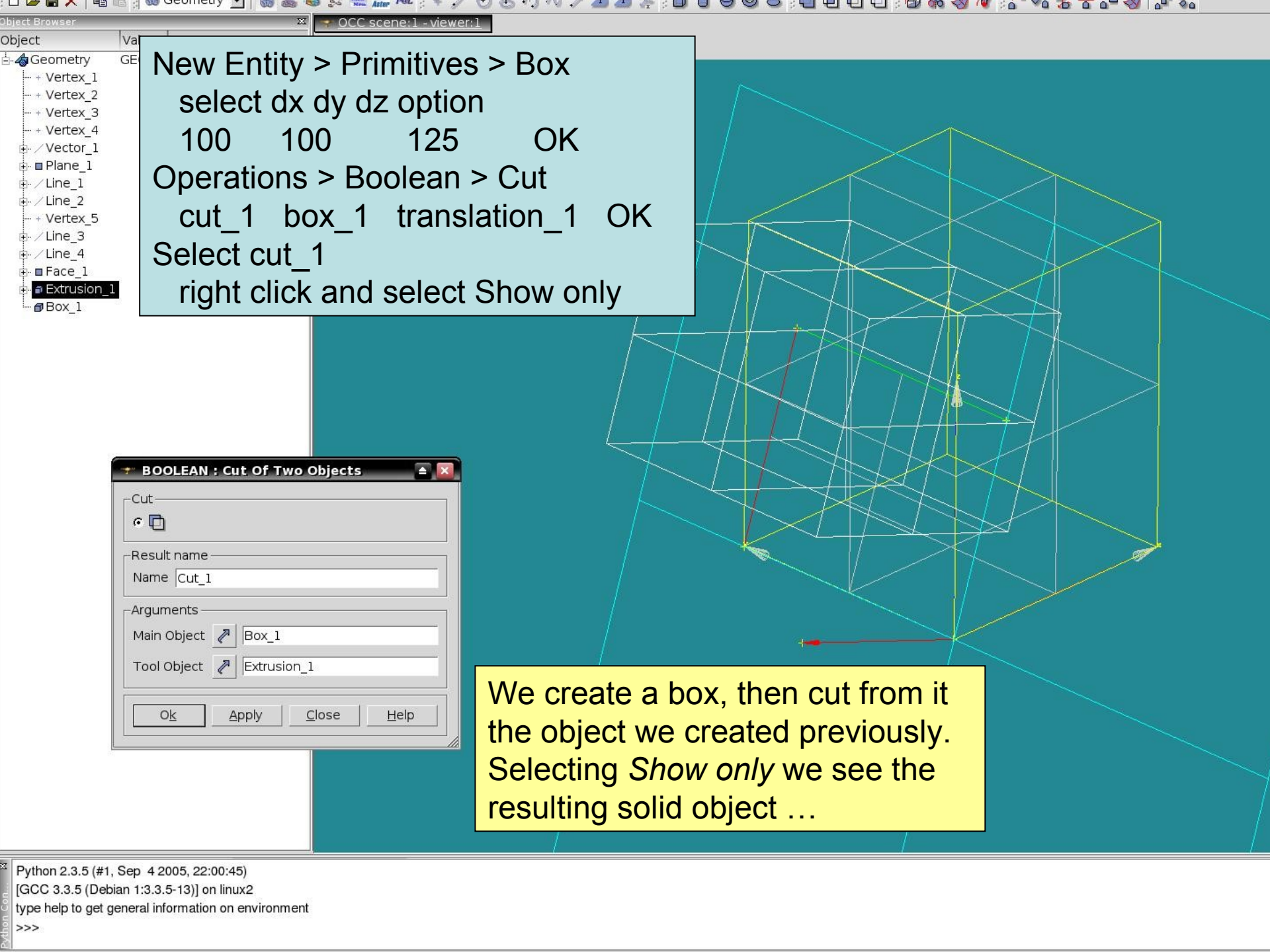

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
OCC scene:1 - viewer:1
New Entity > Basic > Plane
plane_1 vertex_1 vector_1 OK
Or plane_1 vertex_1 vertex_2 vertex_3 OK (shown)
Plane Construction
Plane
Result name
Name Plane_1
3 points
Point 1 Vertex_1
Point 2 Vertex_2
Point 3 Vertex_3
Size of plane : 300
Ok
Apply
Close
Help
Here we create a plane perpendicular to the vector.
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

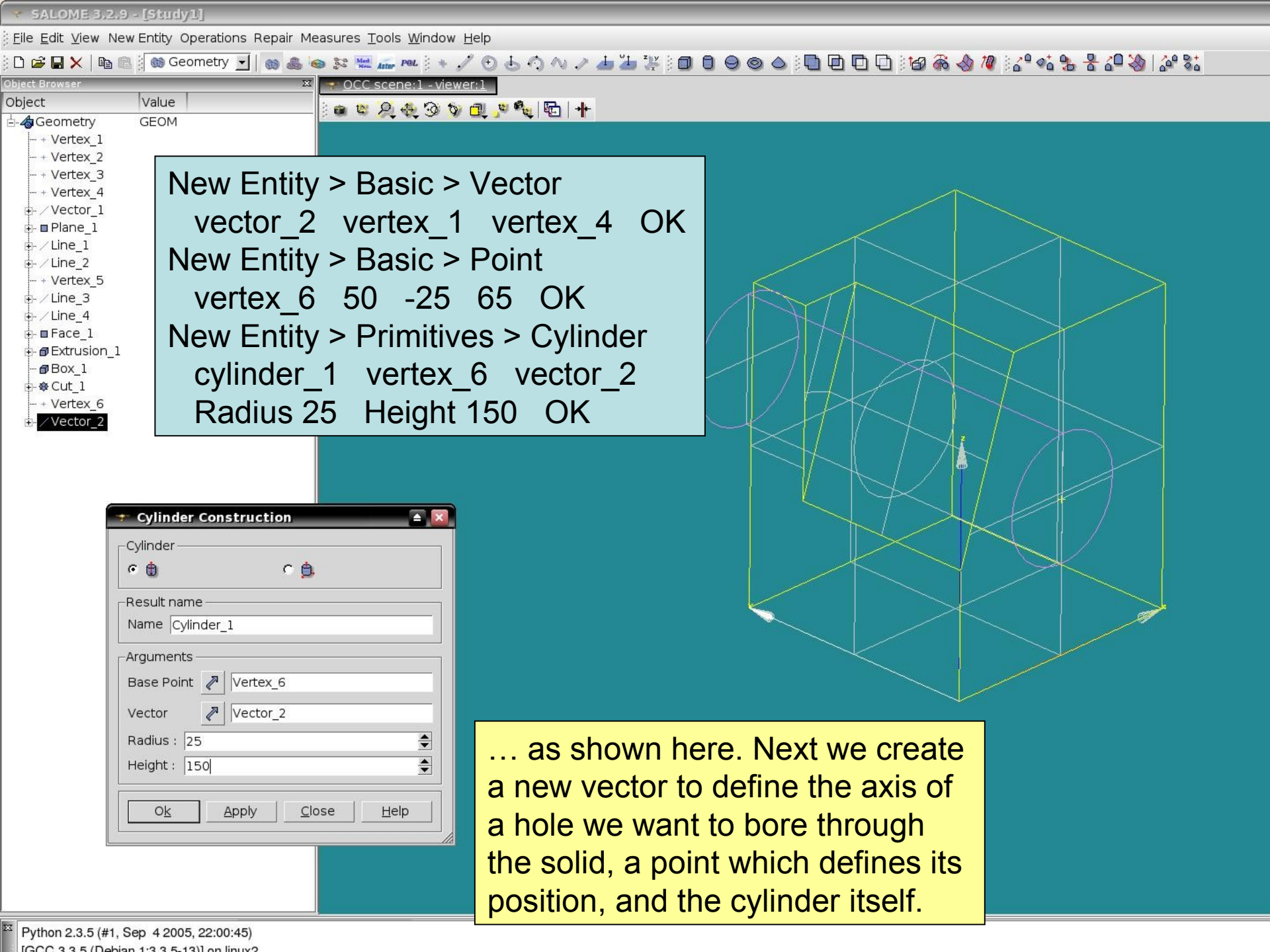

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
OCC scene:1 - viewer:1
New Entity > Basic > Line
line_1 vertex_1 vertex_2 Apply
line_2 vertex_2 vertex_3 Apply
line_3 vertex_3 vertex_4 Apply
line_4 vertex_4 vertex_1 OK
Line Construction
Line
Result name
Name Line_4
Points
Point 1 Vertex_5
Point 2 Vertex_1
Ok
Apply
Close
Help
Here we create 4 lines which will make a closed shape …
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

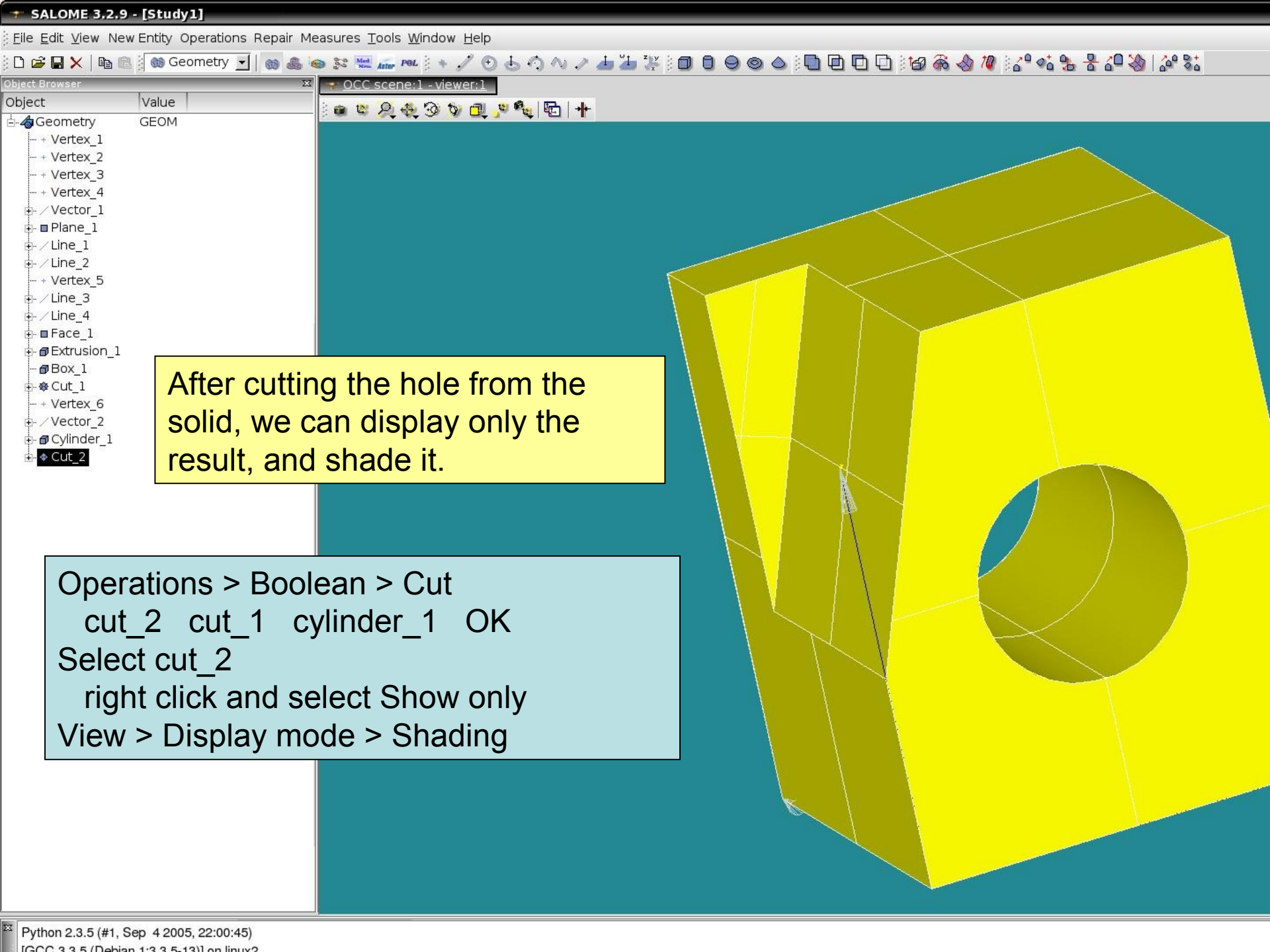

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
OCC scene:1 - viewer:1
New Entity > Build > Wire
wire_1 select line_1 ctrl-hold line_2, line_3, line_4 OK
New Entity > Build > Face
face_1 wire_1 OK
Or New Entity > Build > Face
face_1 select line_1 ctrl-hold line_2, line_3, line_4 OK (shown)
Create A Face
Face
Result name
Name
Face_1
Face creation from wires and/or edges
Objects
4_objects
Try to create a planar face
Ok
Apply
Close
Help
… then we create a wire from 4 lines, then a face from the wire.
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

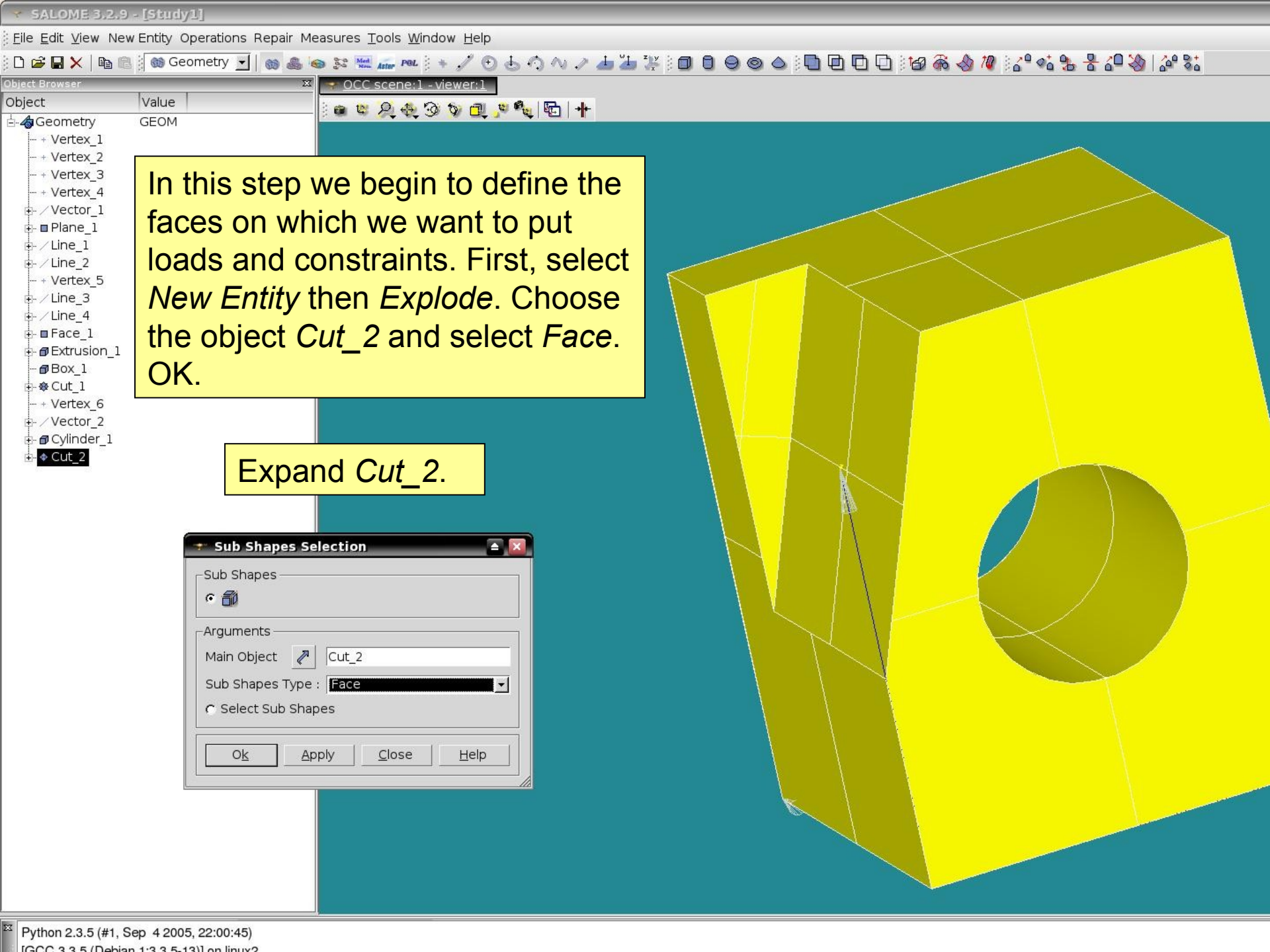

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
OCC scene:1 - viewer:1
New Entity > Generation > Extrusion
extrusion_1 face_1 vector_1 100 OK
Construction by Extrusion
Extrusion
Result name
Name
Extrusion_1
Base Shape + Vector
Base
Face_1
Vector
Vector_1
Height :
100
Reverse
Both Directions
Ok
Apply
Close
Help
From the face we've built, we can extrude it in the direction of our vector to create a solid object.
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)
[GCC 3.3.5 (Debian 1:3.3.5-13)] on linux2
type help to get general information on environment
>>>
Python Con

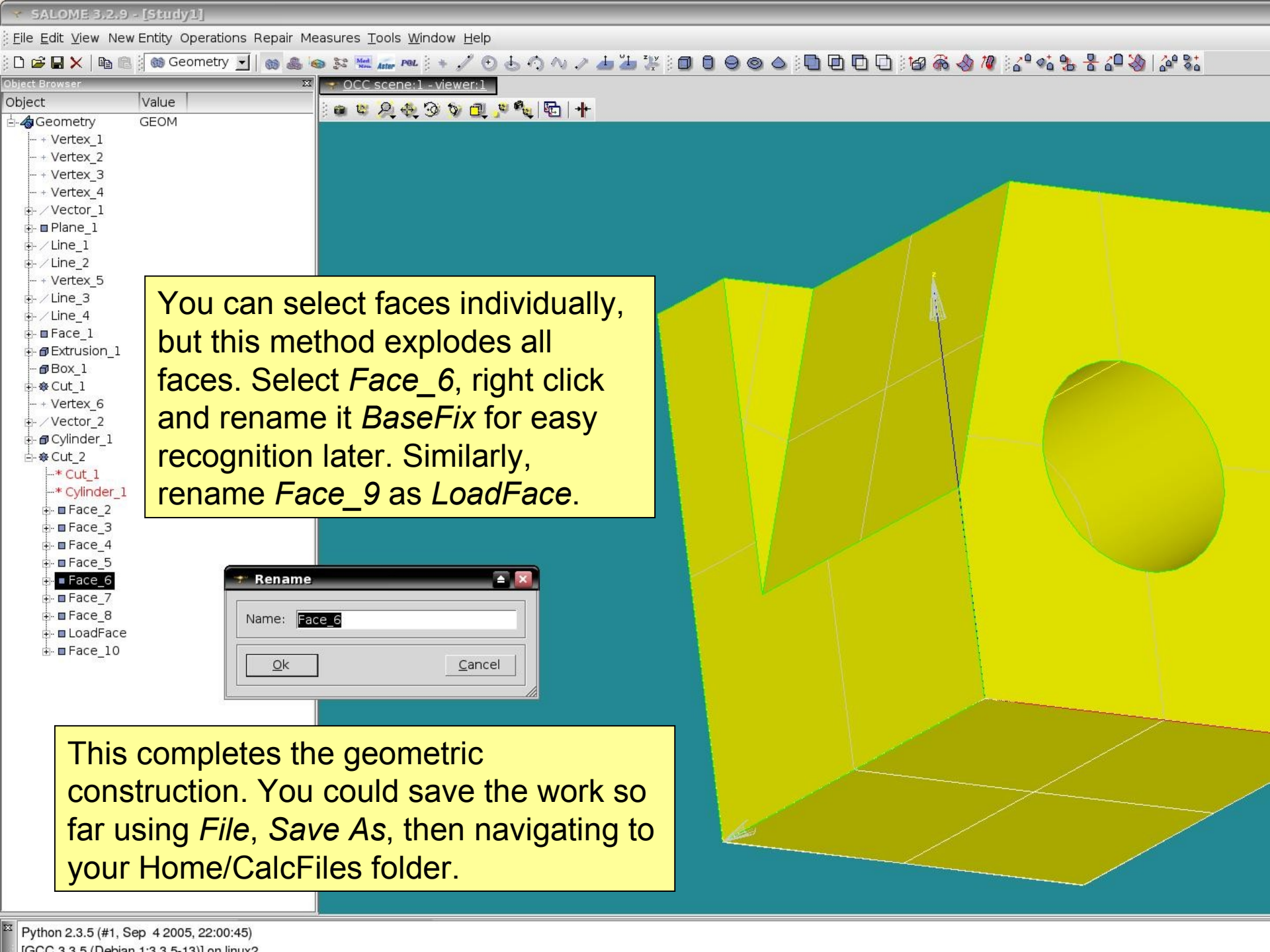

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Operations > Transformation > Translation
translation_1 extrusion_1 0 -25 50 create copy yes OK
Select translation_1
right click and select Show only
The solid object isn't in the right place, so we move it by specifying translation distances in x, y and z.
Translation Of An Object
Translation
Result name
Name Translation_1
Arguments
Objects
Extrusion_1
Dx :
0
Dy :
-25
Dz :
50
Create a copy
Ok
Apply
Close
Help
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

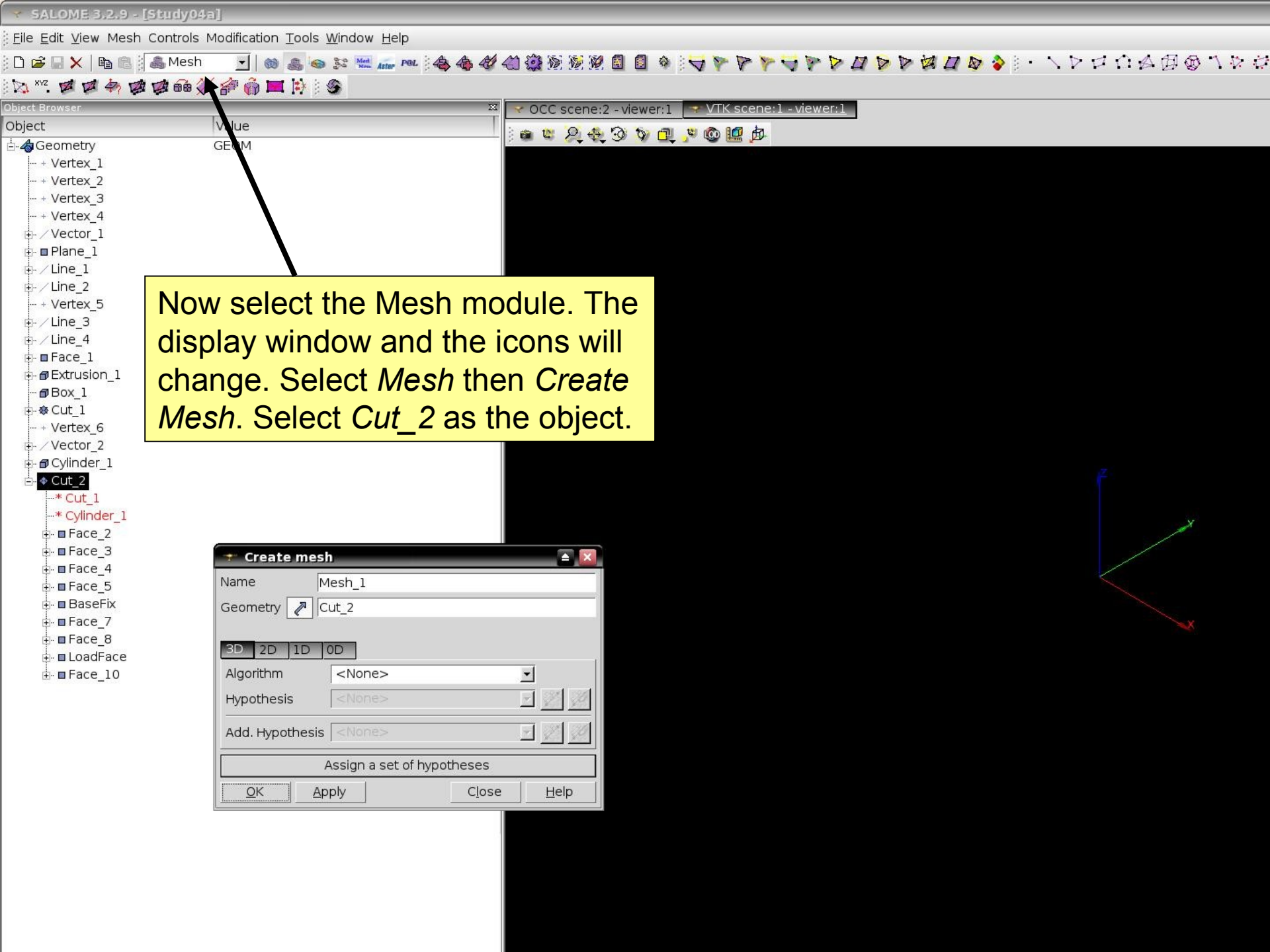

Object Browser
Object
Geometry
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
OCC scene:1 - viewer:1
New Entity > Primitives > Box
select dx dy dz option
100 100 125 OK
Operations > Boolean > Cut
cut_1 box_1 translation_1 OK
Select cut_1
right click and select Show only
BOOLEAN : Cut Of Two Objects
Cut
Result name
Name Cut_1
Arguments
Main Object Box_1
Tool Object Extrusion_1
Ok
Apply
Close
Help
We create a box, then cut from it the object we created previously. Selecting Show only we see the resulting solid object …
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)
[GCC 3.3.5 (Debian 1:3.3.5-13)] on linux2
type help to get general information on environment
>>>

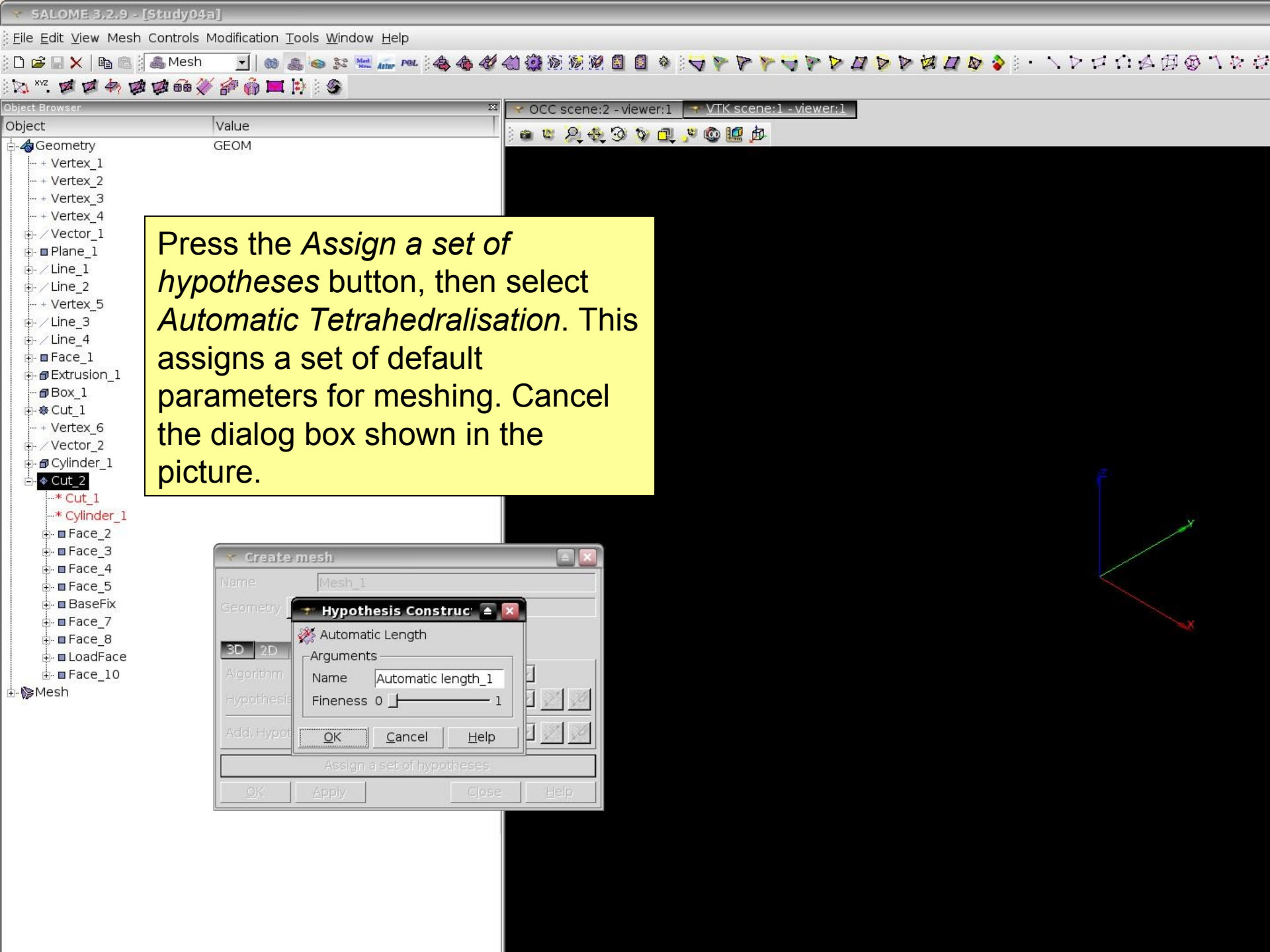

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
OCC scene:1 - viewer:1
New Entity > Basic > Vector
vector_2 vertex_1 vertex_4 OK
New Entity > Basic > Point
vertex_6 50 -25 65 OK
New Entity > Primitives > Cylinder
cylinder_1 vertex_6 vector_2
Radius 25 Height 150 OK
Cylinder Construction
Cylinder
Result name
Name Cylinder_1
Arguments
Base Point Vertex_6
Vector Vector_2
Radius : 25
Height : 150
Ok
Apply
Close
Help
… as shown here. Next we create a new vector to define the axis of a hole we want to bore through the solid, a point which defines its position, and the cylinder itself.
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

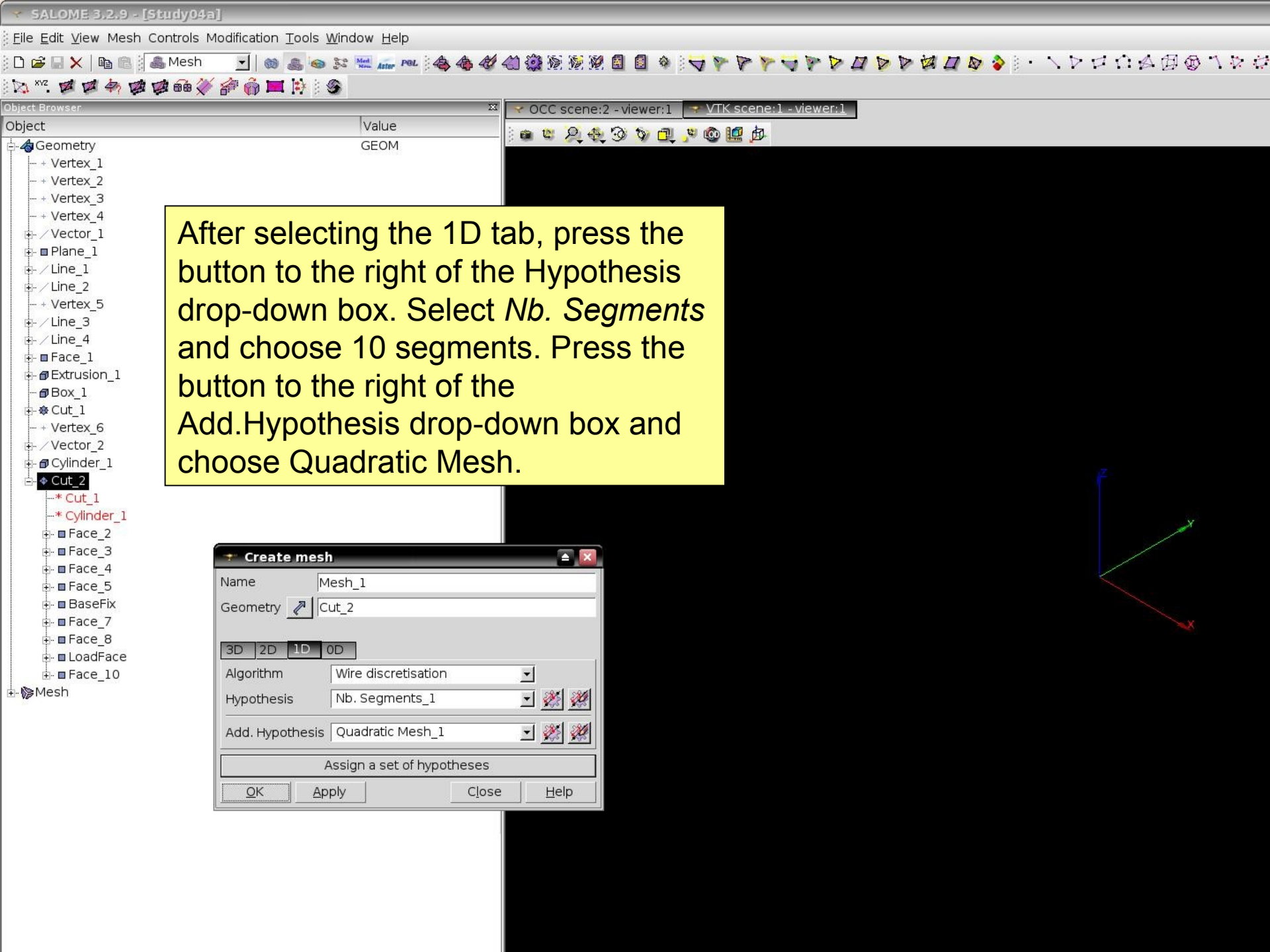

SALOME 3,2,9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
Cylinder_1
Cut_2
OCC scene:1 - viewer:1
After cutting the hole from the solid, we can display only the result, and shade it.
Operations > Boolean > Cut
cut_2 cut_1 cylinder_1 OK
Select cut_2
right click and select Show only
View > Display mode > Shading
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

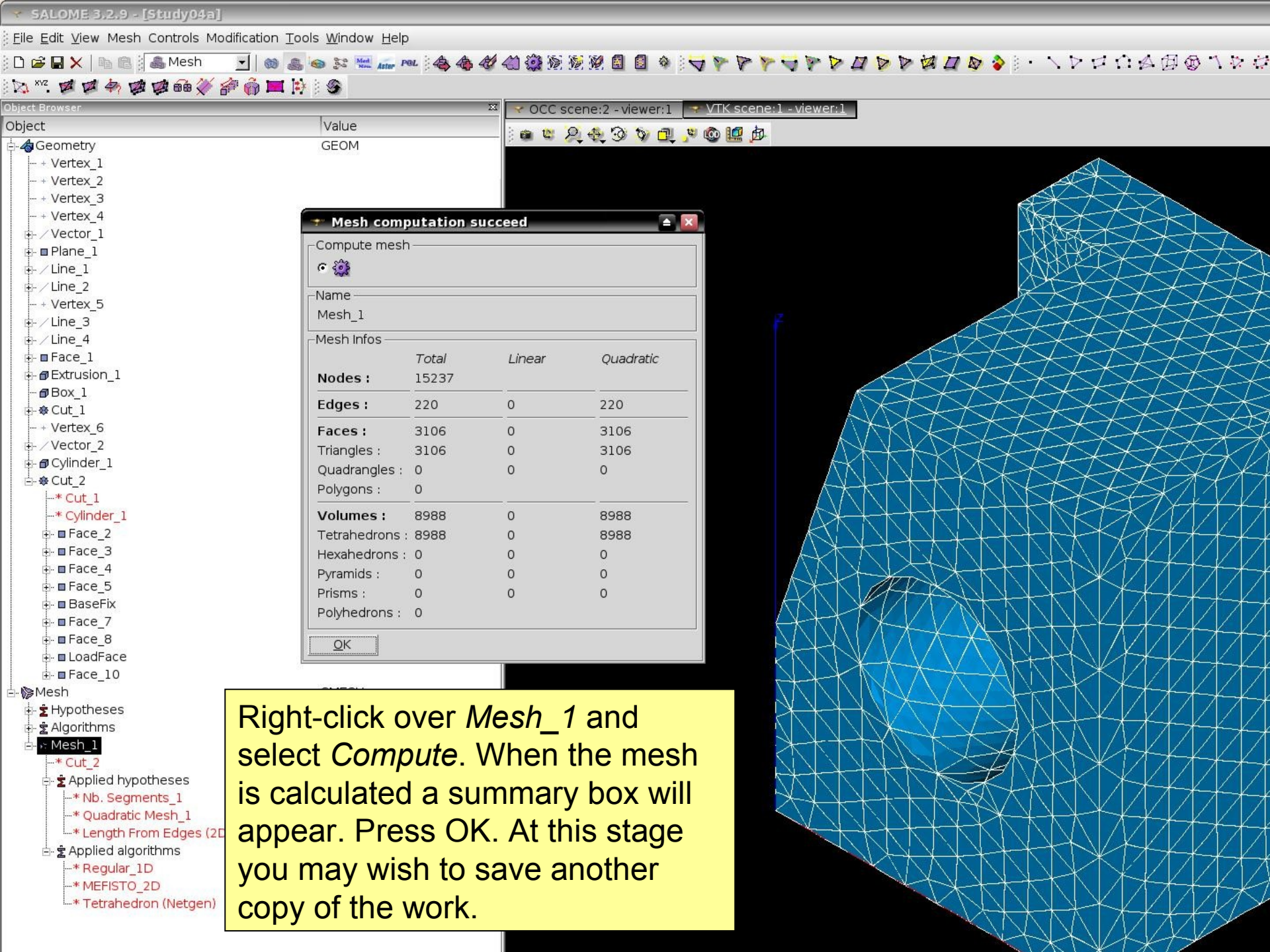

SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
Cylinder_1
Cut_2
OCC scene:1 - viewer:1
In this step we begin to define the faces on which we want to put loads and constraints. First, select *New Entity* then *Explode*. Choose the object *Cut_2* and select *Face*. OK.
Expand *Cut_2*.
Sub Shapes Selection
Sub Shapes
Arguments
Main Object
Cut_2
Sub Shapes Type :
Face
Select Sub Shapes
Ok
Apply
Close
Help
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)


SALOME 3.2.9 - [Study1]
File Edit View New Entity Operations Repair Measures Tools Window Help
Geometry
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
Cylinder_1
Cut_2
Cut_1
Cylinder_1
Face_2
Face_3
Face_4
Face_5
Face_6
Face_7
Face_8
LoadFace
Face_10
OCC scene:1 - viewer:1
You can select faces individually, but this method explodes all faces. Select Face_6, right click and rename it BaseFix for easy recognition later. Similarly, rename Face_9 as LoadFace.
Rename
Name: Face_6
Ok
Cancel
This completes the geometric construction. You could save the work so far using File, Save As, then navigating to your Home/CalcFiles folder.
Python 2.3.5 (#1, Sep 4 2005, 22:00:45)

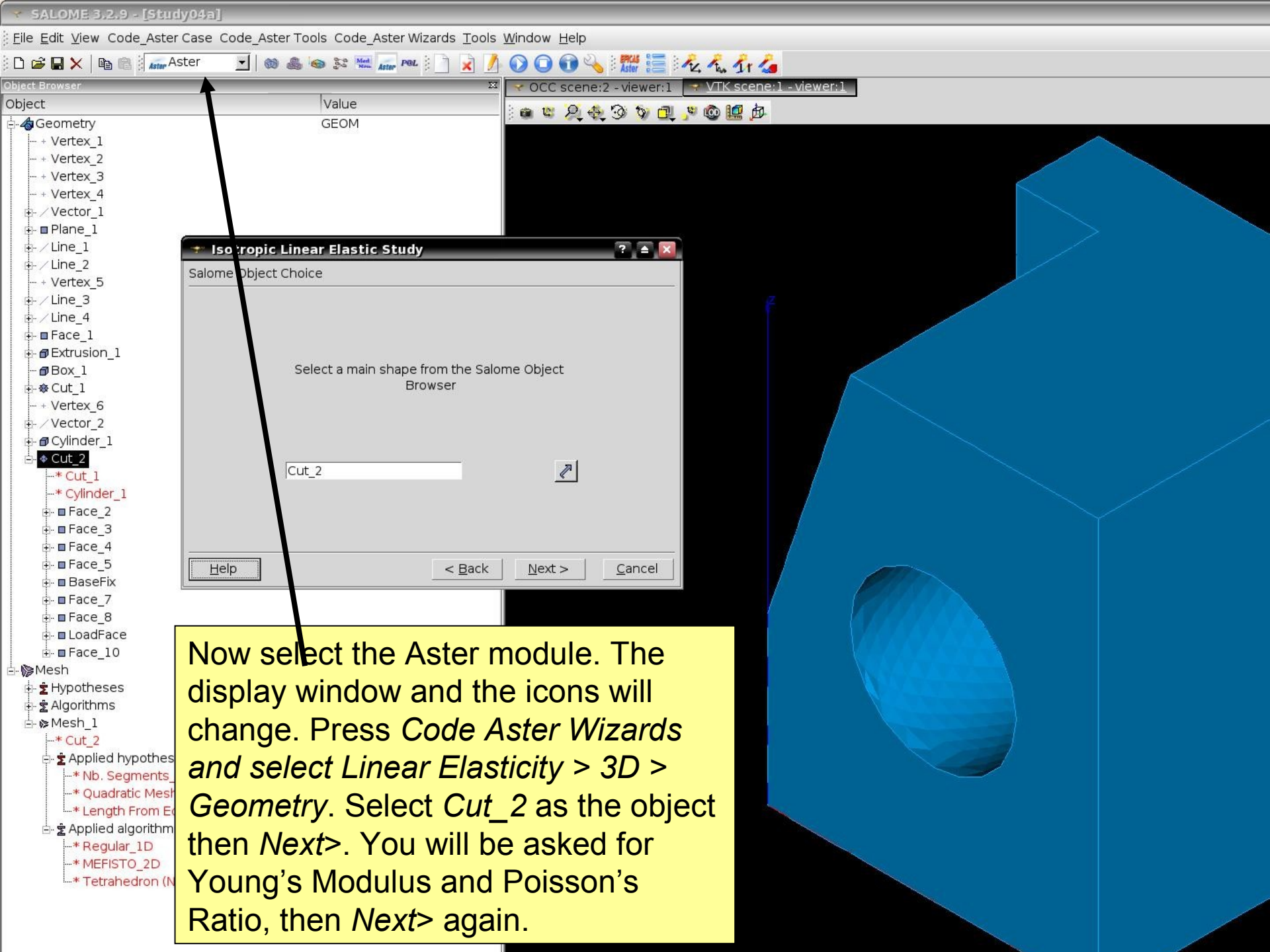

SALOME 3.2.9 - [Study04a]
File Edit View Mesh Controls Modification Tools Window Help
Mesh
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
Cylinder_1
Cut_2
* Cut_1
* Cylinder_1
Face_2
Face_3
Face_4
Face_5
BaseFix
Face_7
Face_8
LoadFace
Face_10
OCC scene:2 - viewer:1
VTK scene:1 - viewer:1
Now select the Mesh module. The display window and the icons will change. Select *Mesh* then *Create Mesh*. Select *Cut_2* as the object.
Create mesh
Name
Mesh_1
Geometry
Cut_2
3D
2D
1D
0D
Algorithm
<None>
Hypothesis
<None>
Add. Hypothesis
<None>
Assign a set of hypotheses
OK
Apply
Close
Help

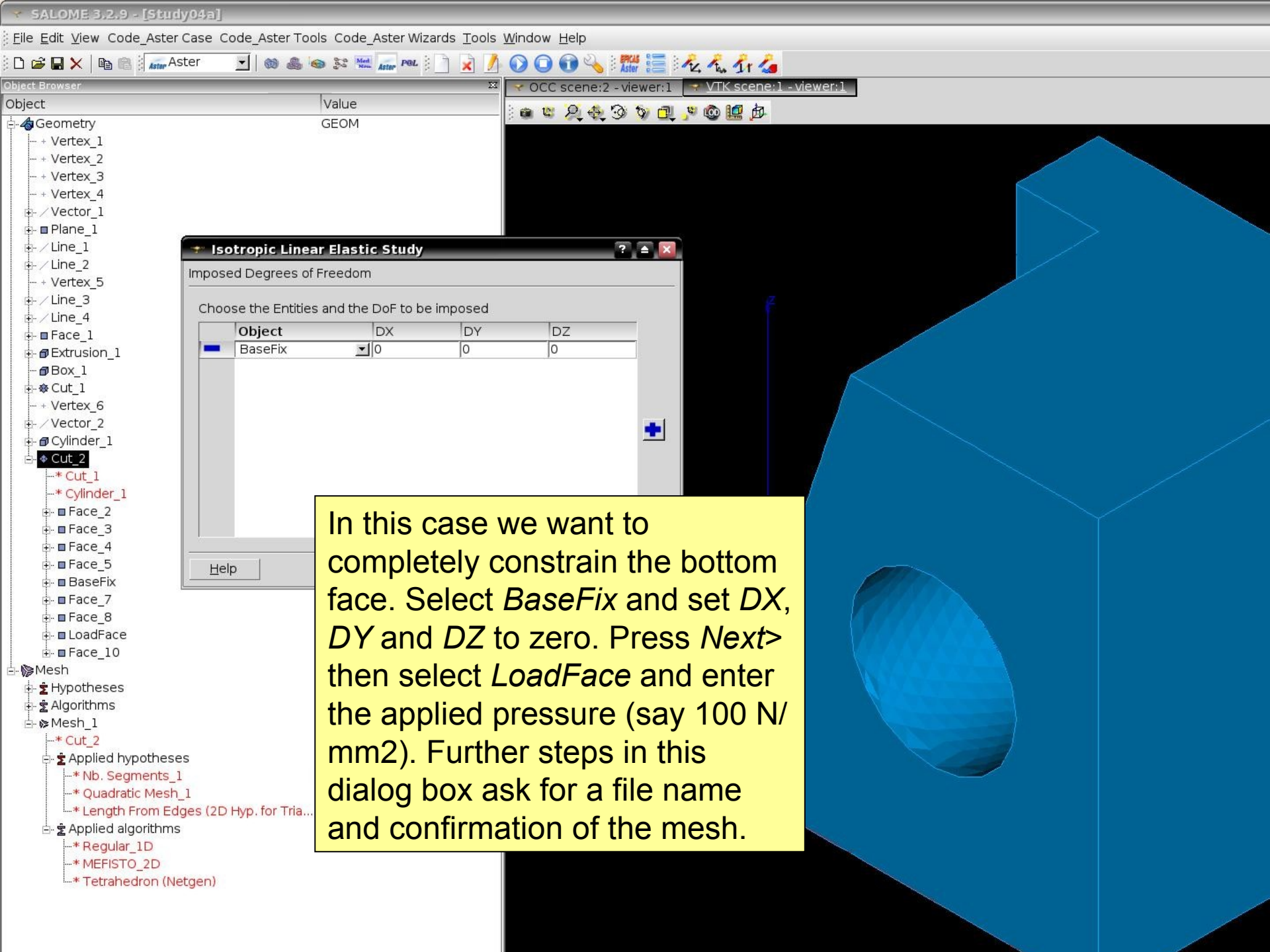

SALOME 3.2.9 - [Study04a]
File Edit View Mesh Controls Modification Tools Window Help
Mesh
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
Cylinder_1
Cut_2
Cut_1
Cylinder_1
Face_2
Face_3
Face_4
Face_5
BaseFix
Face_7
Face_8
LoadFace
Face_10
Mesh
OCC scene:2 - viewer:1
VTK scene:1 - viewer:1
Press the Assign a set of hypotheses button, then select Automatic Tetrahedralisation. This assigns a set of default parameters for meshing. Cancel the dialog box shown in the picture.
Create mesh
Name
Mesh_1
Geometry
Hypothesis Construc
Automatic Length
3D
2D
Arguments
Name
Automatic length_1
Fineness 0
1
OK
Cancel
Help
Algorithm
Hypothesis
Add. Hypot
Assign a set of hypotheses
OK
Apply
Close
Help

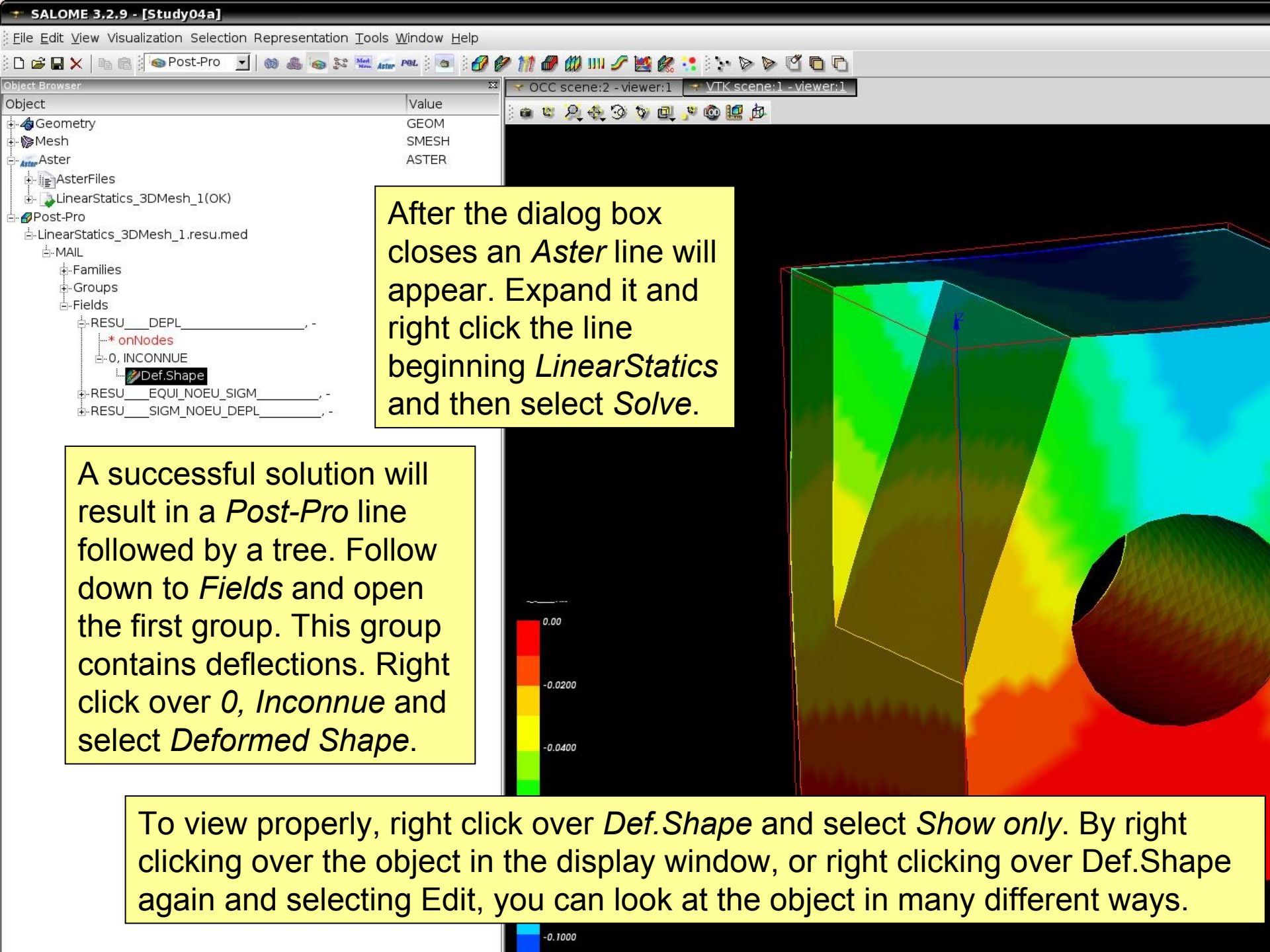

SALOME 3.2.9 - [Study04a]
File Edit View Mesh Controls Modification Tools Window Help
Mesh
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
Cylinder_1
Cut_2
* Cut_1
* Cylinder_1
Face_2
Face_3
Face_4
Face_5
BaseFix
Face_7
Face_8
LoadFace
Face_10
Mesh
OCC scene:2 - viewer:1
VTK scene:1 - viewer:1
After selecting the 1D tab, press the button to the right of the Hypothesis drop-down box. Select Nb. Segments and choose 10 segments. Press the button to the right of the Add.Hypothesis drop-down box and choose Quadratic Mesh.
Create mesh
Name
Mesh_1
Geometry
Cut_2
3D
2D
1D
0D
Algorithm
Wire discretisation
Hypothesis
Nb. Segments_1
Add. Hypothesis
Quadratic Mesh_1
Assign a set of hypotheses
OK
Apply
Close
Help

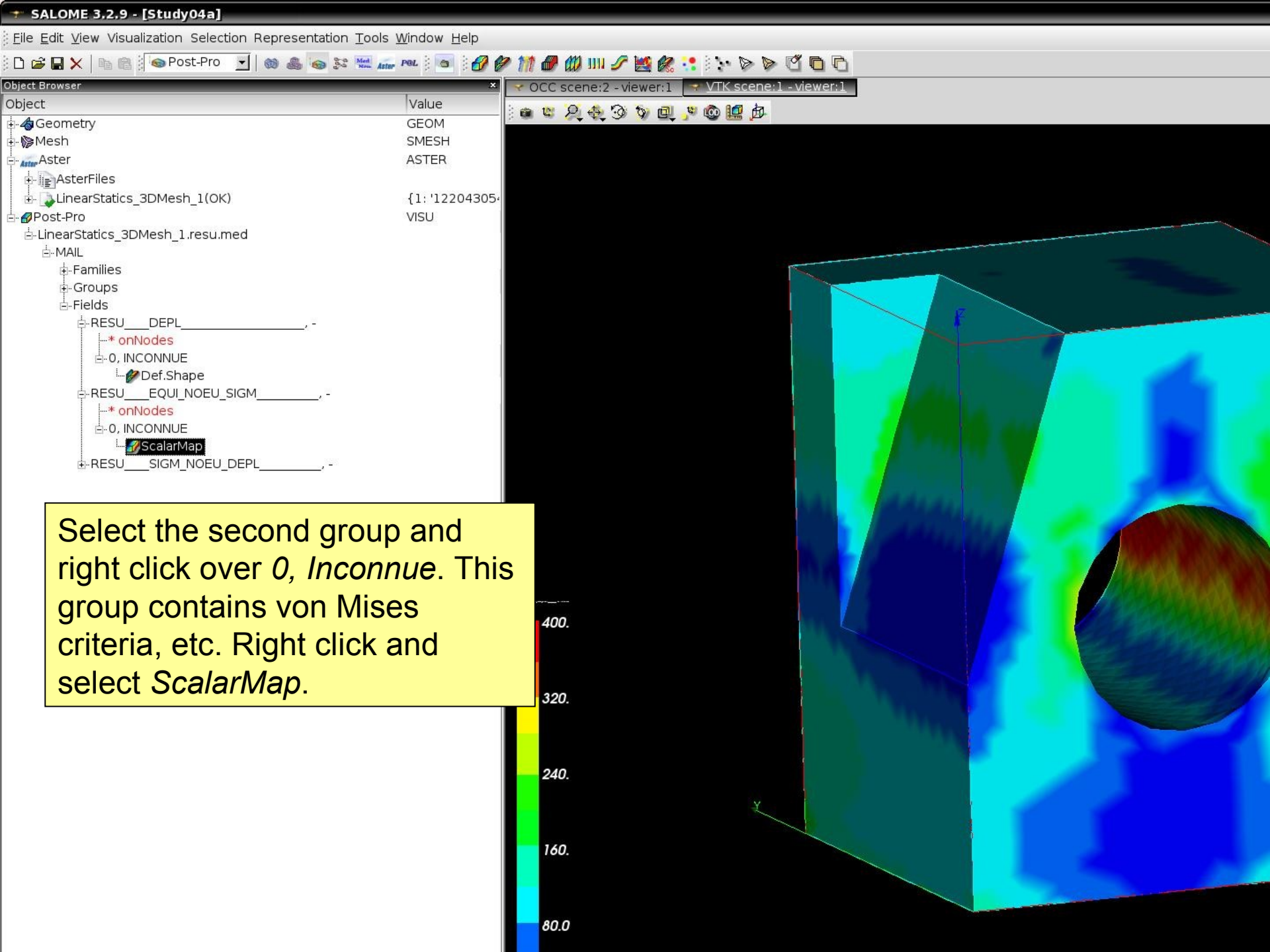


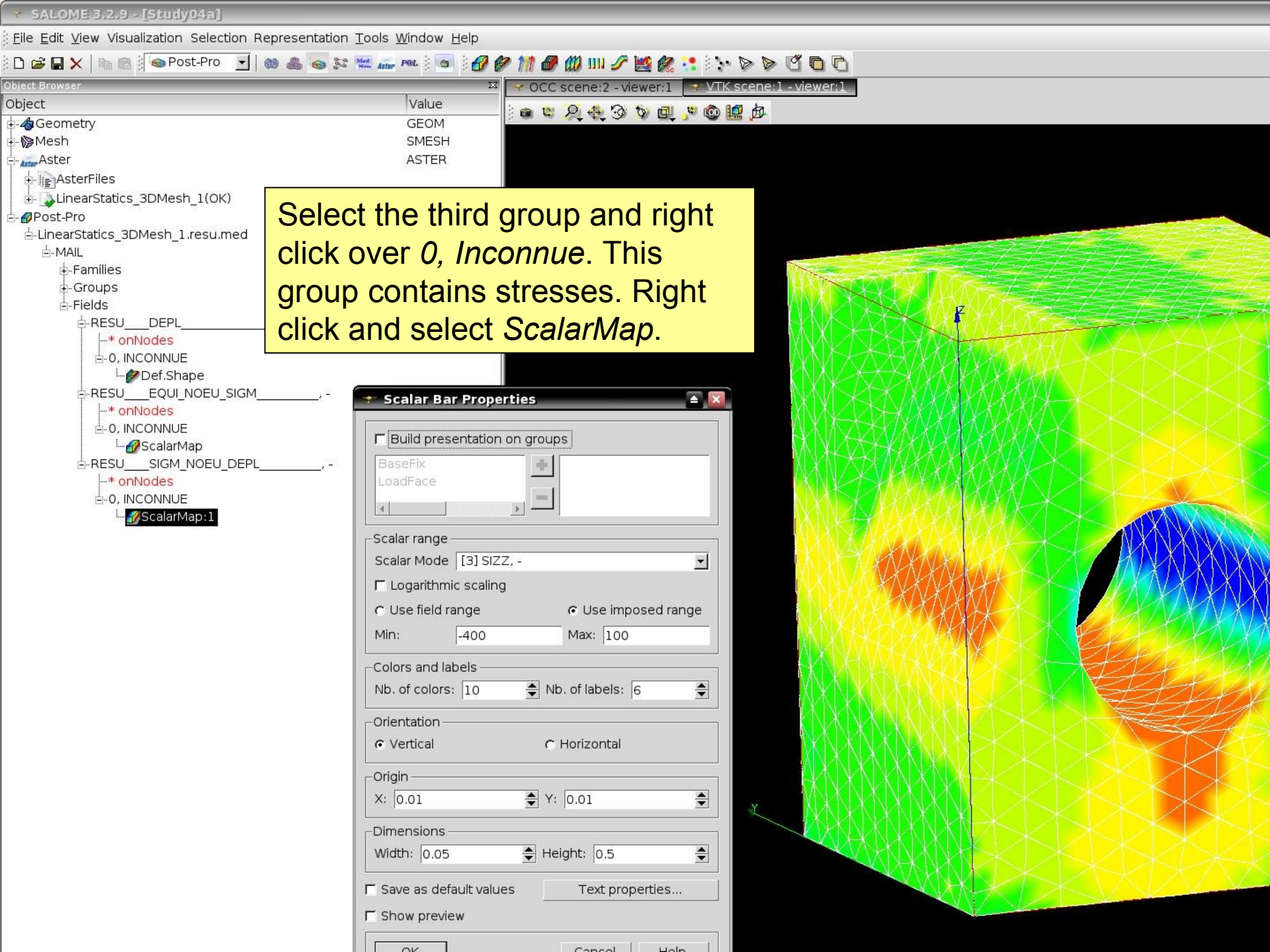
Right-click over *Mesh_1* and select *Compute*. When the mesh is calculated a summary box will appear. Press OK. At this stage you may wish to save another copy of the work.


SALOME 3.2.9 - [Study04a]
File Edit View Code_Aster Case Code_Aster Tools Code_Aster Wizards Tools Window Help
Aster
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
Cylinder_1
Cut_2
* Cut_1
* Cylinder_1
Face_2
Face_3
Face_4
Face_5
BaseFix
Face_7
Face_8
LoadFace
Face_10
Mesh
Hypotheses
Algorithms
Mesh_1
* Cut_2
Applied hypothes
* Nb. Segments_
* Quadratic Mesh
* Length From E
Applied algorithm
* Regular_1D
* MEFISTO_2D
* Tetrahedron (N
Isotropic Linear Elastic Study
Salome Object Choice
Select a main shape from the Salome Object Browser
Cut_2
Help
< Back
Next >
Cancel
OCC scene:2 - viewer:1
VTK scene:1 - viewer:1
Now select the Aster module. The display window and the icons will change. Press Code Aster Wizards and select Linear Elasticity > 3D > Geometry. Select Cut_2 as the object then Next>. You will be asked for Young's Modulus and Poisson's Ratio, then Next> again.


SALOME 3.2.9 - [Study04a]
File Edit View Code_Aster Case Code_Aster Tools Code_Aster Wizards Tools Window Help
Aster
Object Browser
Object
Value
Geometry
GEOM
Vertex_1
Vertex_2
Vertex_3
Vertex_4
Vector_1
Plane_1
Line_1
Line_2
Vertex_5
Line_3
Line_4
Face_1
Extrusion_1
Box_1
Cut_1
Vertex_6
Vector_2
Cylinder_1
Cut_2
* Cut_1
* Cylinder_1
Face_2
Face_3
Face_4
Face_5
BaseFix
Face_7
Face_8
LoadFace
Face_10
Mesh
Hypotheses
Algorithms
Mesh_1
* Cut_2
Applied hypotheses
* Nb. Segments_1
* Quadratic Mesh_1
* Length From Edges (2D Hyp. for Tria...
Applied algorithms
* Regular_1D
* MEFISTO_2D
* Tetrahedron (Netgen)
OCC scene:2 - viewer:1
VTK scene:1 - viewer:1
Isotropic Linear Elastic Study
Imposed Degrees of Freedom
Choose the Entities and the DoF to be imposed
Object
DX
DY
DZ
BaseFix
0
0
0
Help
In this case we want to completely constrain the bottom face. Select *BaseFix* and set *DX*, *DY* and *DZ* to zero. Press *Next>* then select *LoadFace* and enter the applied pressure (say 100 N/ mm2). Further steps in this dialog box ask for a file name and confirmation of the mesh.


SALOME 3.2.9 - [Study04a]
File Edit View Visualization Selection Representation Tools Window Help
Post-Pro
Object Browser
Object
Value
Geometry
GEOM
Mesh
SMESH
Aster
ASTER
AsterFiles
LinearStatics_3DMesh_1(OK)
Post-Pro
LinearStatics_3DMesh_1.resu.med
MAIL
Families
Groups
Fields
RESU____DEPL_____, -
onNodes
0, INCONNUE
Def.Shape
RESU____EQUI_NOEU_SIGM_____, -
RESU____SIGM_NOEU_DEPL_____, -
OCC scene:2 - viewer:1
VTK scene:1 - viewer:1
0.00
-0.0200
-0.0400
-0.1000
After the dialog box closes an Aster line will appear. Expand it and right click the line beginning LinearStatics and then select Solve.
A successful solution will result in a Post-Pro line followed by a tree. Follow down to Fields and open the first group. This group contains deflections. Right click over 0, Inconnue and select Deformed Shape.
To view properly, right click over Def.Shape and select Show only. By right clicking over the object in the display window, or right clicking over Def.Shape again and selecting Edit, you can look at the object in many different ways.


SALOME 3.2.9 - [Study04a]
File Edit View Visualization Selection Representation Tools Window Help
Post-Pro
Object Browser
Object
Value
Geometry
GEOM
Mesh
SMESH
Aster
ASTER
AsterFiles
LinearStatics_3DMesh_1(OK)
{1: '12204305
Post-Pro
VISU
LinearStatics_3DMesh_1.resu.med
MAIL
Families
Groups
Fields
RESU____DEPL_____, -
* onNodes
0, INCONNUE
Def.Shape
RESU____EQUI_NOEU_SIGM_____, -
* onNodes
0, INCONNUE
ScalarMap
RESU____SIGM_NOEU_DEPL_____, -
OCC scene:2 - viewer:1
VTK scene:1 - viewer:1
400.
320.
240.
160.
80.0
Select the second group and right click over 0, Inconnue. This group contains von Mises criteria, etc. Right click and select ScalarMap.


SALOME 3.2.9 - [Study04a]
File Edit View Visualization Selection Representation Tools Window Help
Post-Pro
Object Browser
Object
Value
Geometry
GEOM
Mesh
SMESH
Aster
ASTER
AsterFiles
LinearStatics_3DMesh_1(OK)
Post-Pro
LinearStatics_3DMesh_1.resu.med
MAIL
Families
Groups
Fields
RESU____DEPL_____
* onNodes
0, INCONNUE
Def.Shape
RESU____EQUI_NOEU_SIGM_____, -
* onNodes
0, INCONNUE
ScalarMap
RESU____SIGM_NOEU_DEPL_____, -
* onNodes
0, INCONNUE
ScalarMap:1
OCC scene:2 - viewer:1
VTK scene:1 - viewer:1
Select the third group and right click over 0, Inconnue. This group contains stresses. Right click and select ScalarMap.
Scalar Bar Properties
Build presentation on groups
BaseFix
LoadFace
Scalar range
Scalar Mode
[3] SIZZ, -
Logarithmic scaling
Use field range
Use imposed range
Min:
-400
Max:
100
Colors and labels
Nb. of colors:
10
Nb. of labels:
6
Orientation
Vertical
Horizontal
Origin
X:
0.01
Y:
0.01
Dimensions
Width:
0.05
Height:
0.5
Save as default values
Text properties...
Show preview