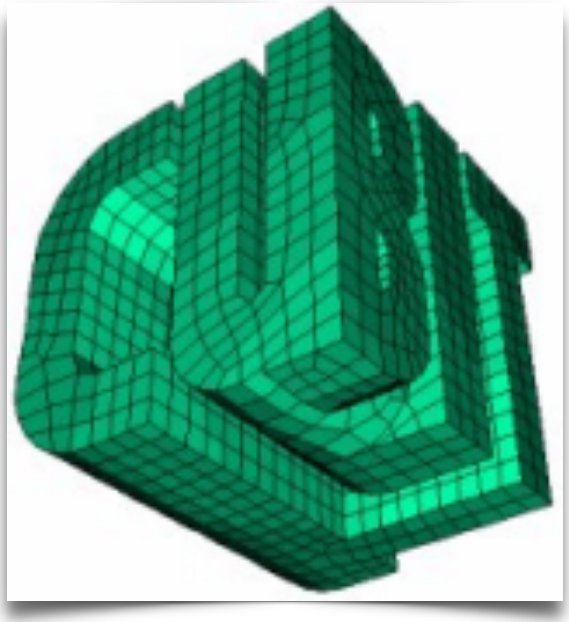
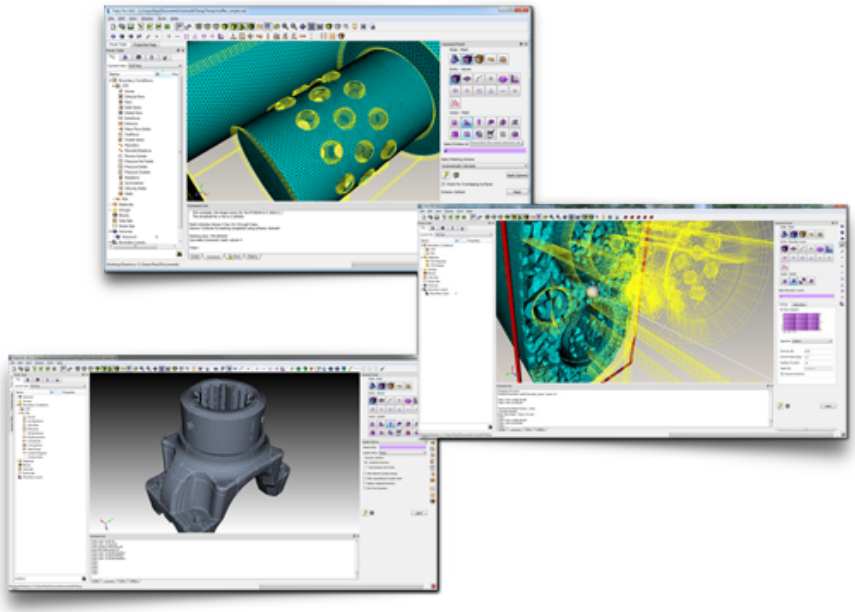
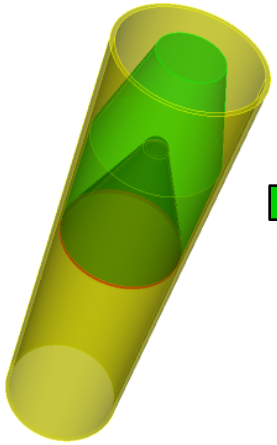
CUBIT/TRELIS

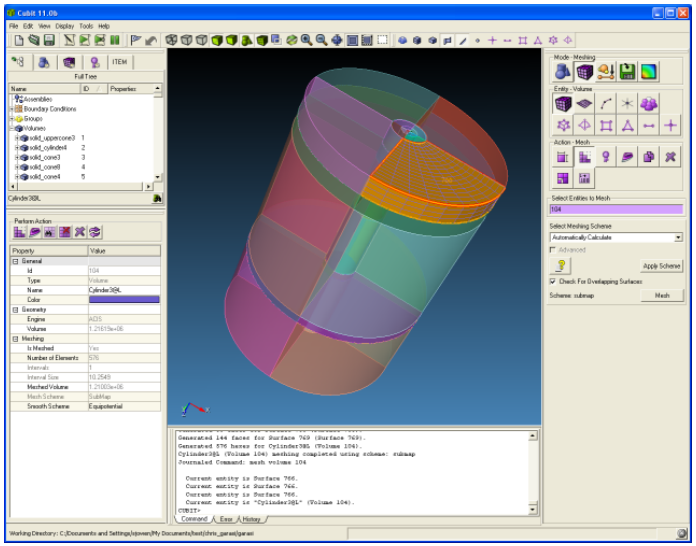
Geometry and Mesh Generation Toolkit

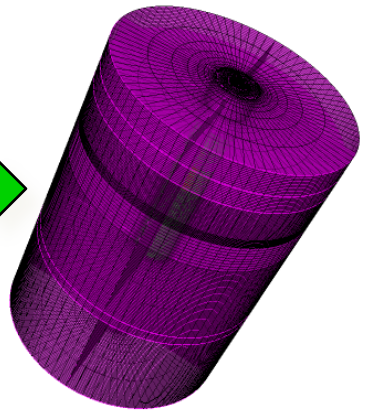




Mesh generation







CAD Model

- ACIS
- STEP
- IGES
- Pro/E
- Facets
- STL
- Exodus II

CUBIT/TRELIS

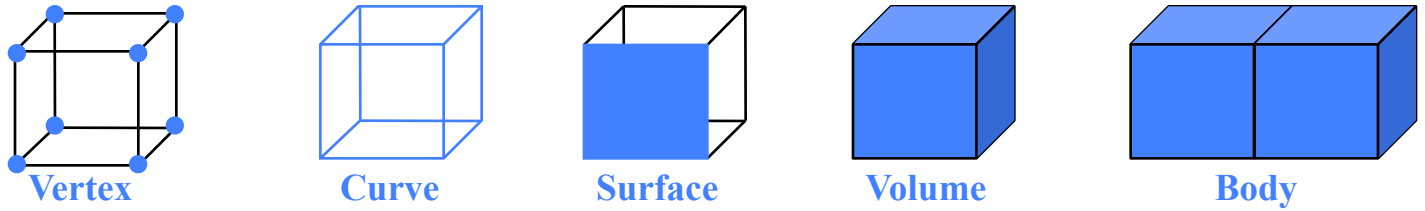
- Meshing Tools
- Geometry Creation
- Geometry Preparation
- Mesh Optimization
- Boundary Conditions
- Scripting
- Automation

Mesh

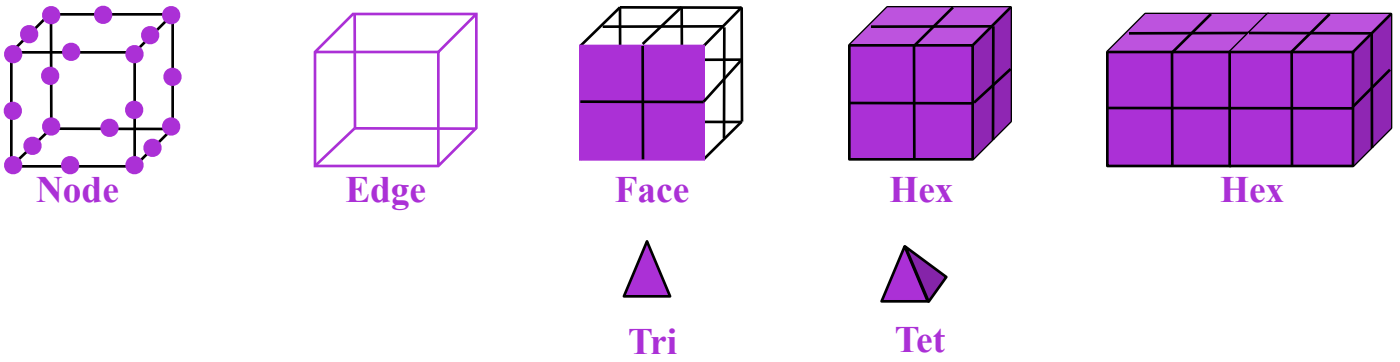
- Exodus II
- Abaqus
- IDEAS-Universal
- NASTRAN-BDF
- Patran
- LS-Dyna

Entity types

Geometry Entities in CUBIT



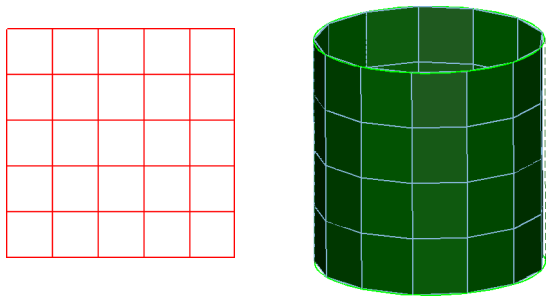
Mesh Entities, which approximate geometry entities of same dimension



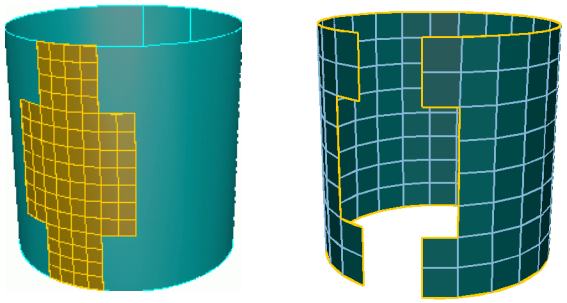
CUBIT Meshes Vertices First, Then Curves, Then Surfaces, Then Volumes (Advancing Front Paradigm)

Meshing schemes

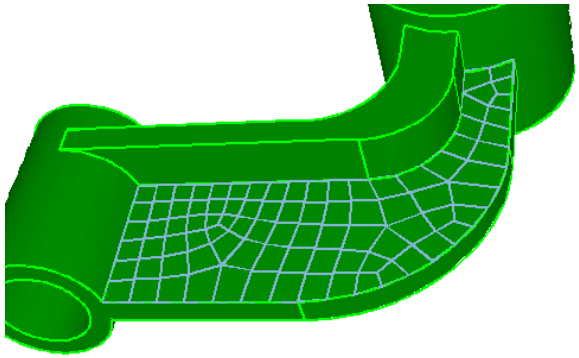
Surface Meshing



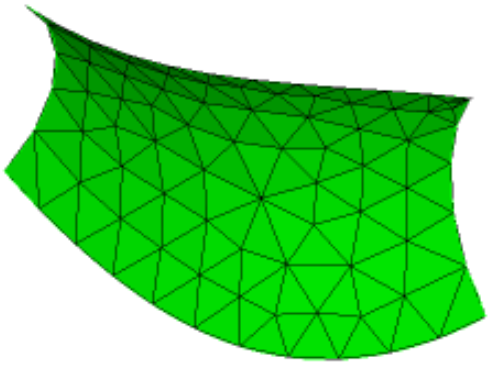
Mapped



Sub-map



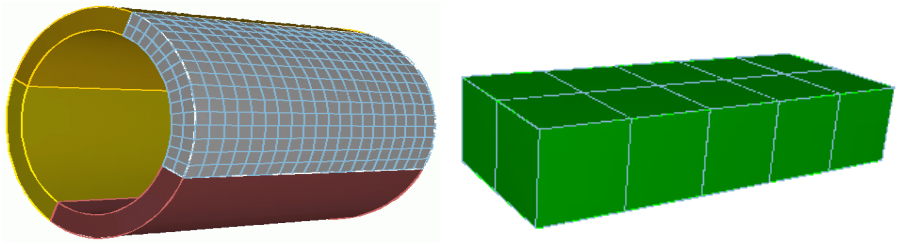
Pave



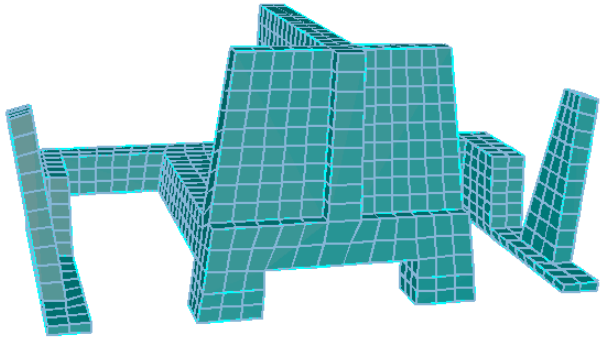
Trimesh

Meshing schemes

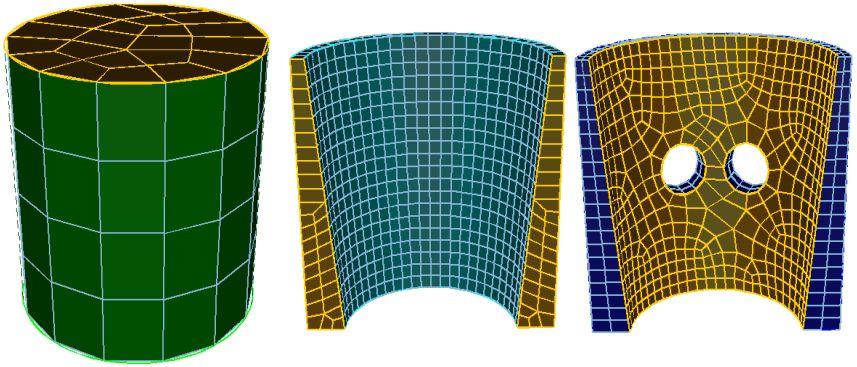
Volume Meshing



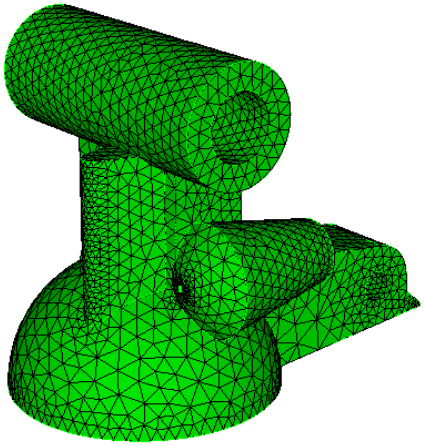
Mapped



Sub-map



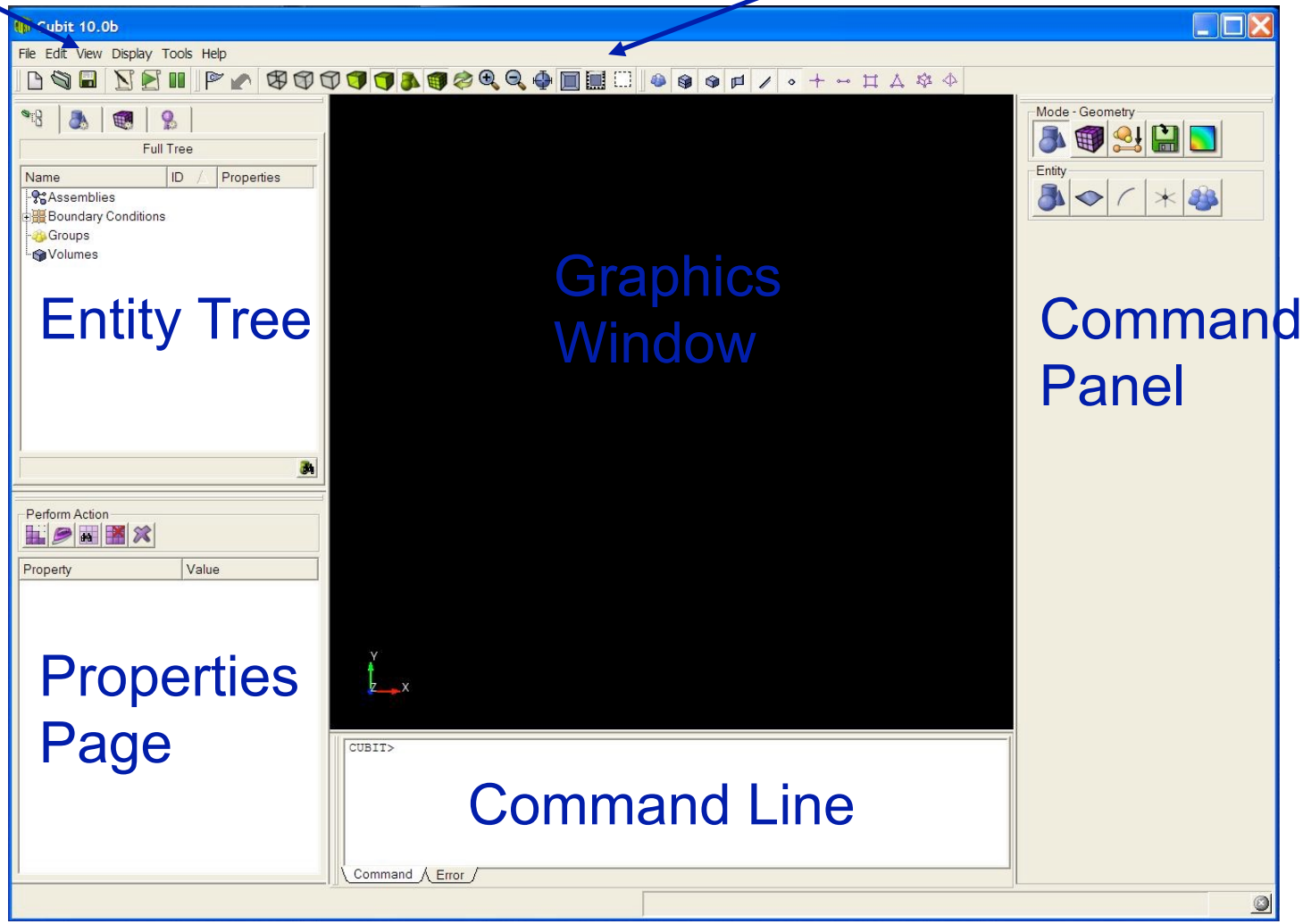
Sweep



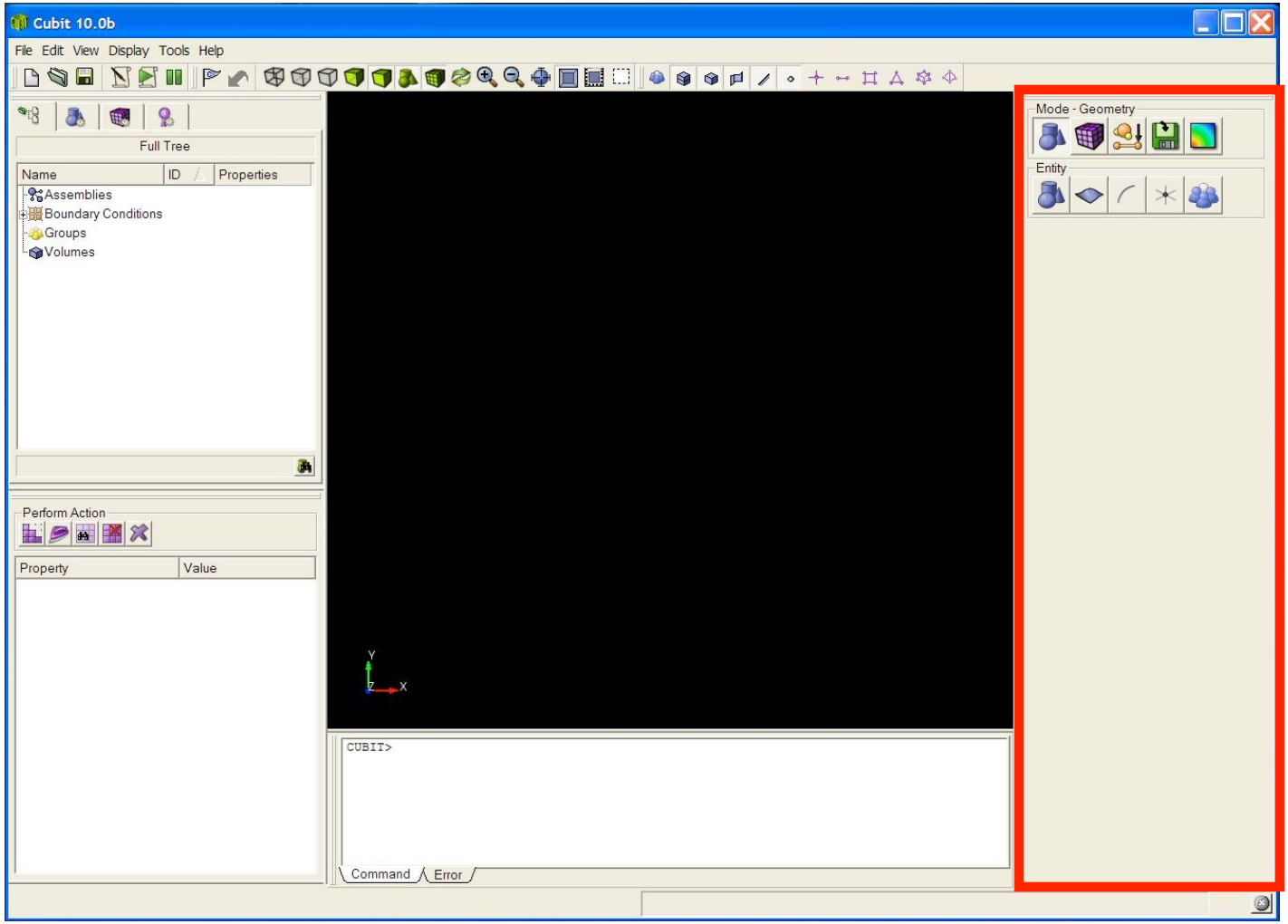
Tetmesh

Drop Down Menu Commands

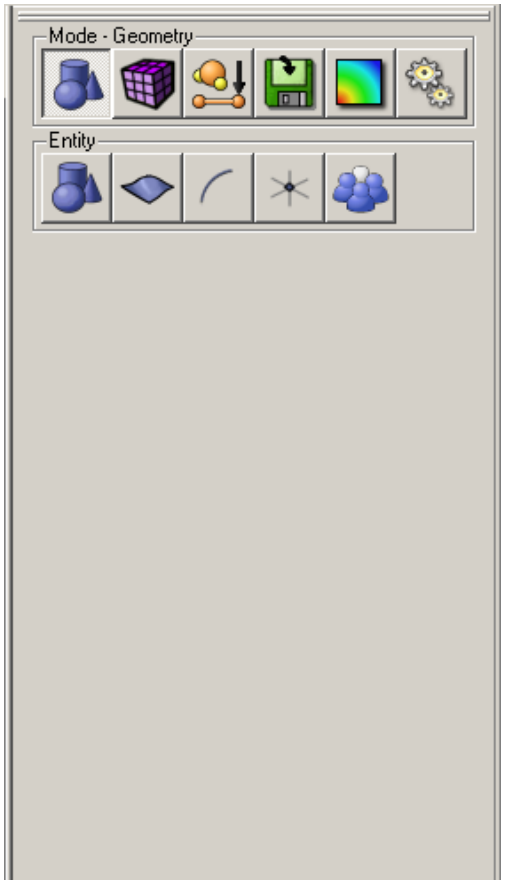
Toolbar Commands



The Command Panel



Operation Mode Buttons



Press an Icon to enter a new mode

 - Geometry: Create, modify, cleanup…

 - Mesh: Intervals, schemes, smoothing…

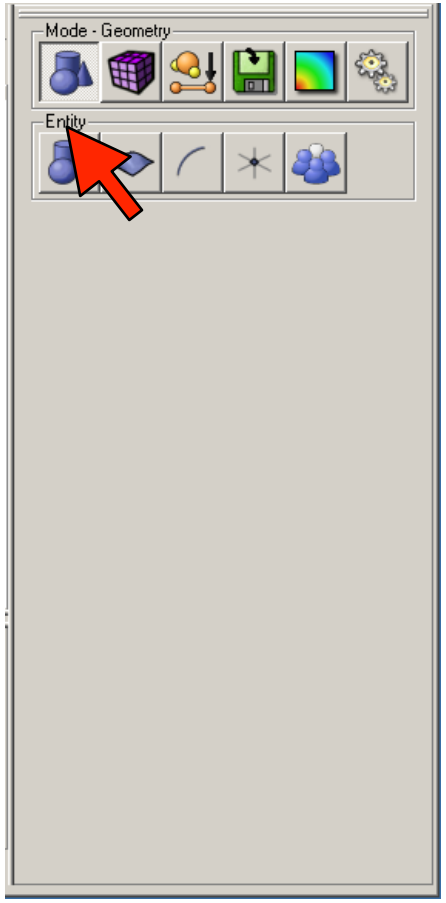
 - Properties: Nodesets, sidesets, blocks

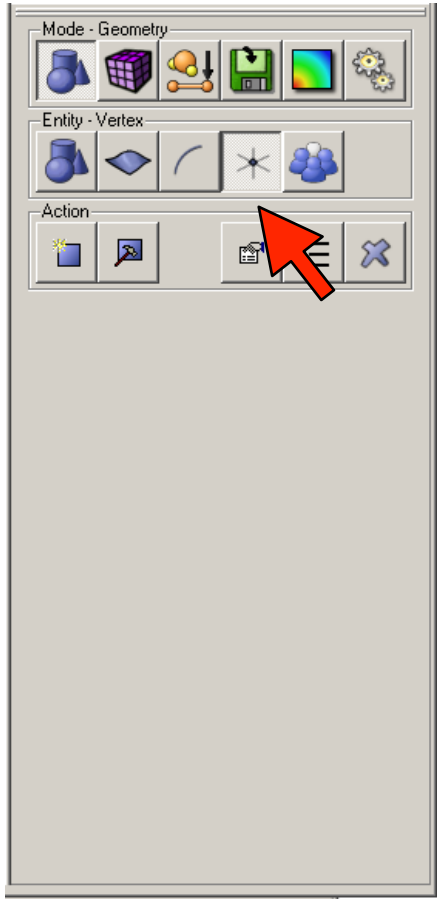
 - Analysis Setup: Export mesh

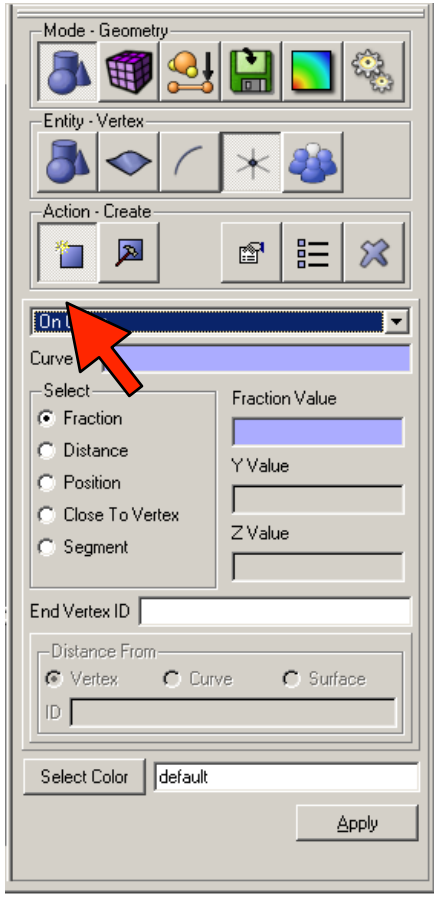
 - Post Processing: Customizable shortcut

Operation Mode Buttons

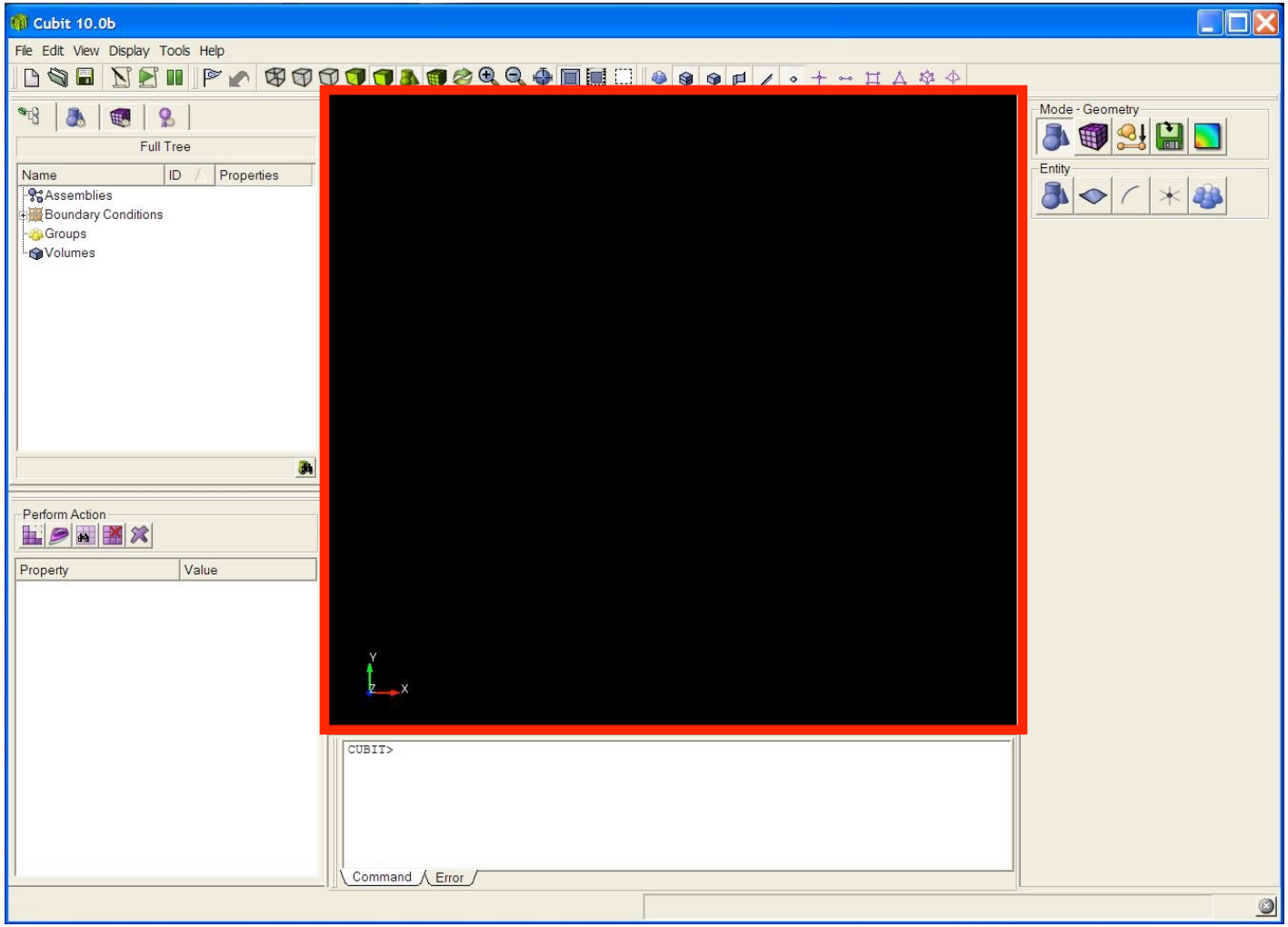
Each Button press takes you to a lower level



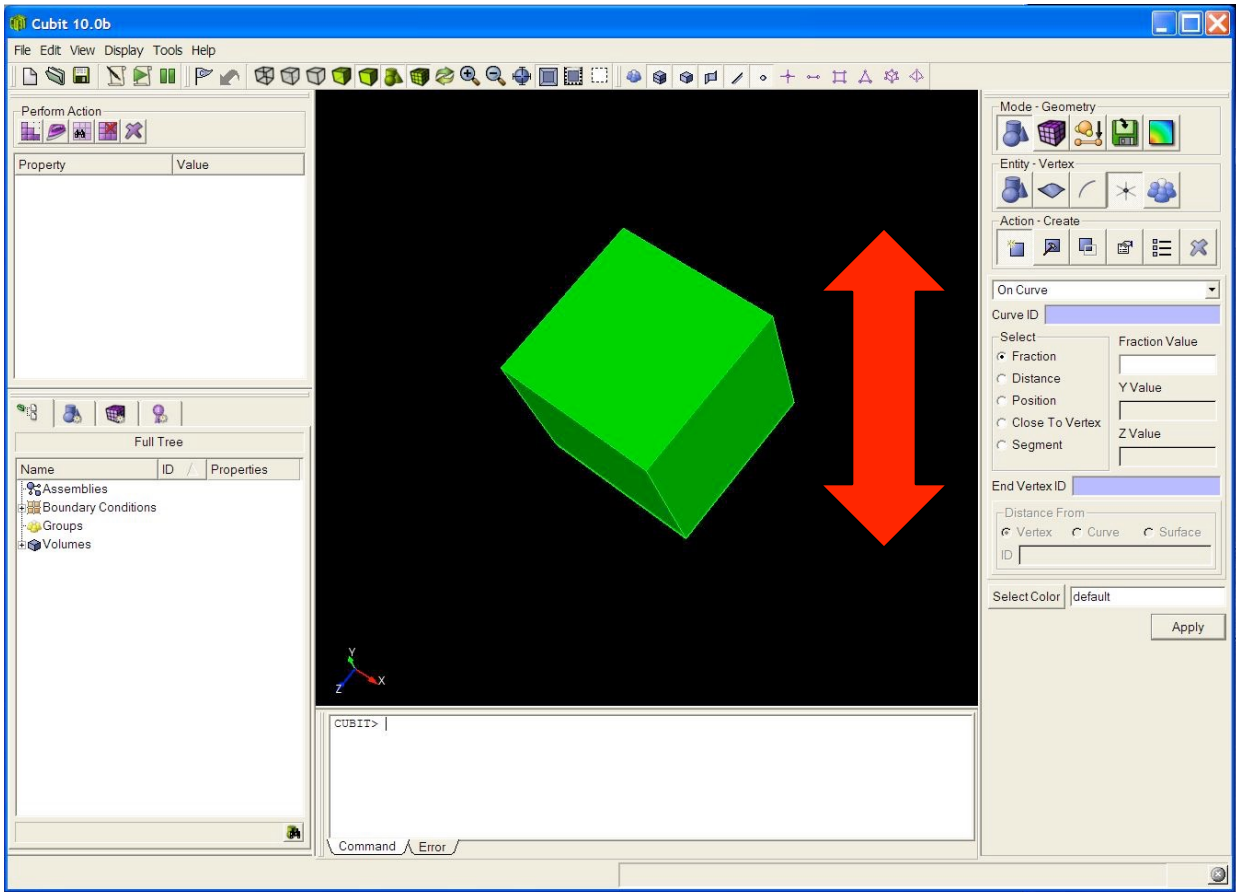




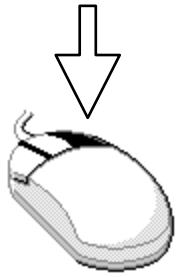
The Graphics Window



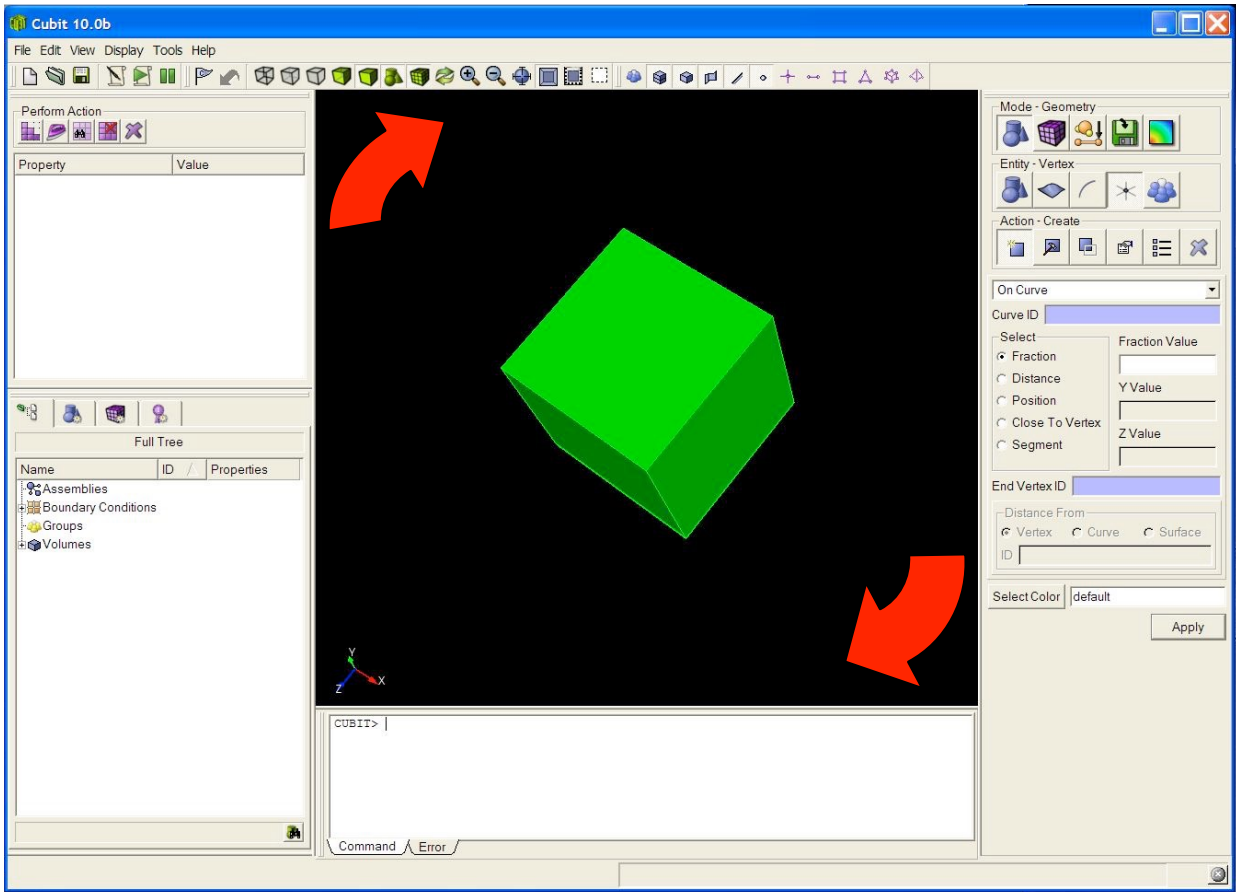
Zooming



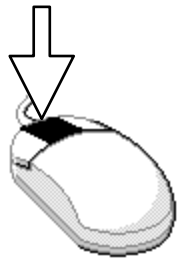
To zoom in and out, move the mouse into the graphics window, hold the right mouse button down, and move the mouse pointer vertically.



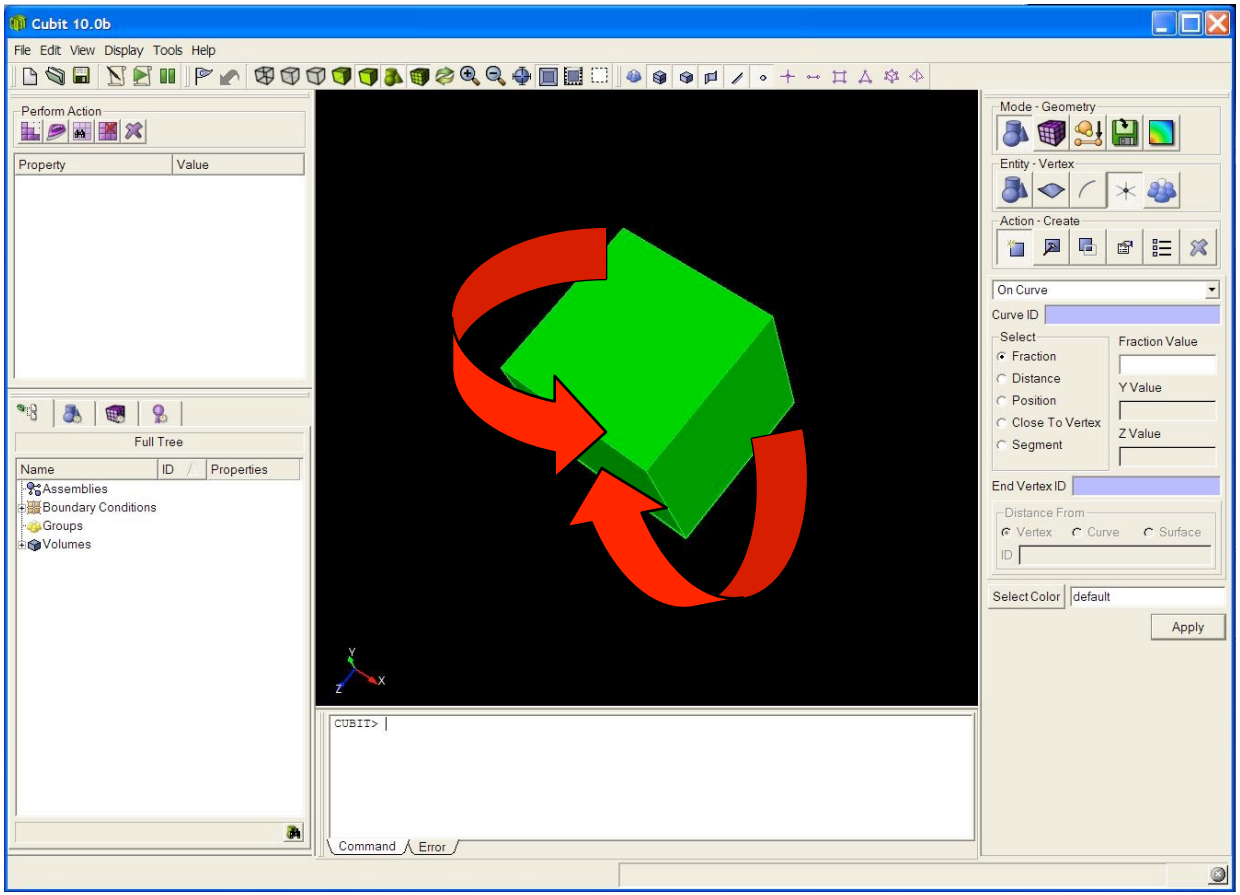
Rotate



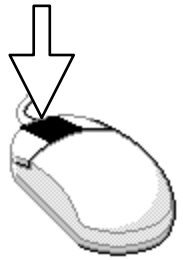
To rotate the model about an axis normal to the screen, move the mouse near the edge of the graphics window, hold the middle mouse button down, and move the mouse pointer along the edge of the window



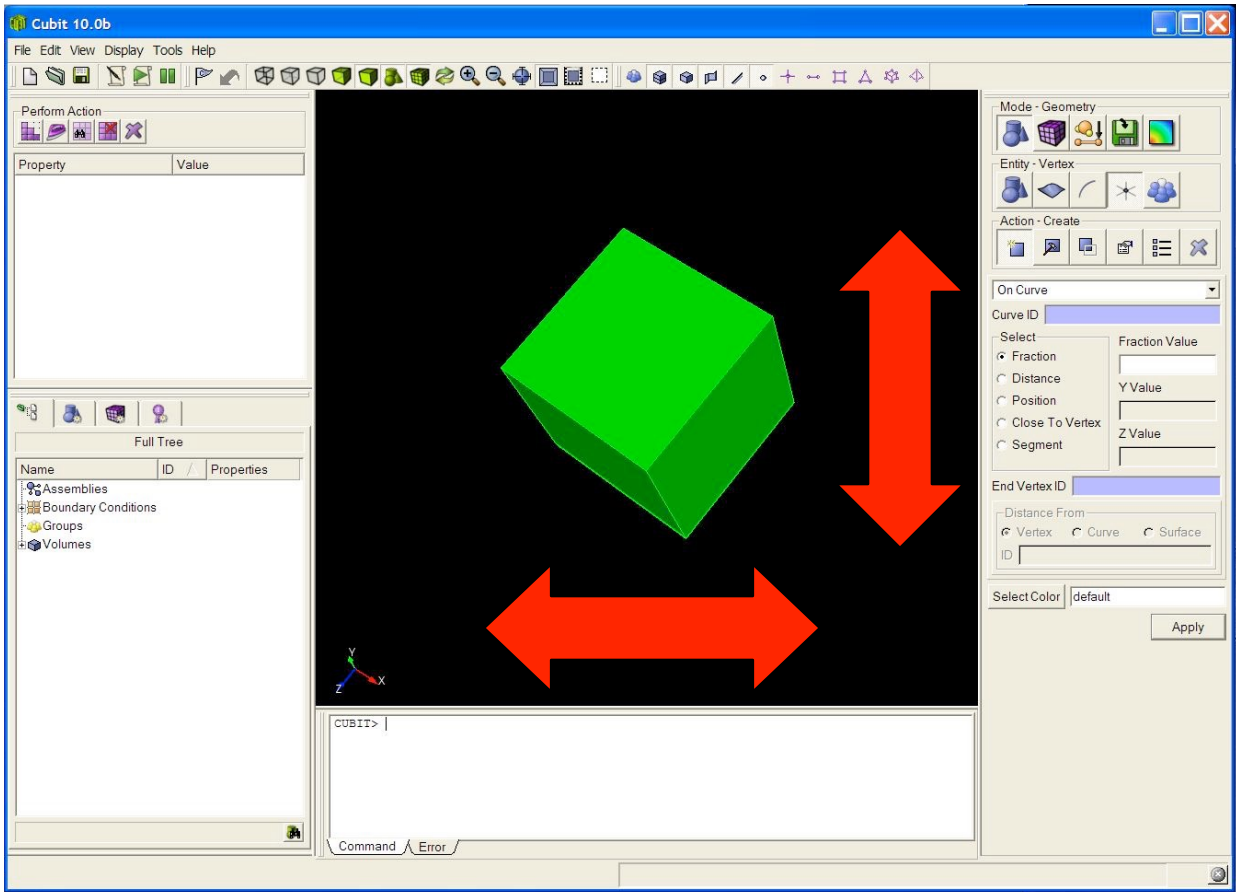
Spin



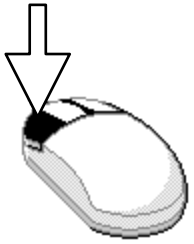
To rotate the model about the spin center, move the mouse near the center of the graphics window, hold the middle mouse button down, and move the mouse pointer.



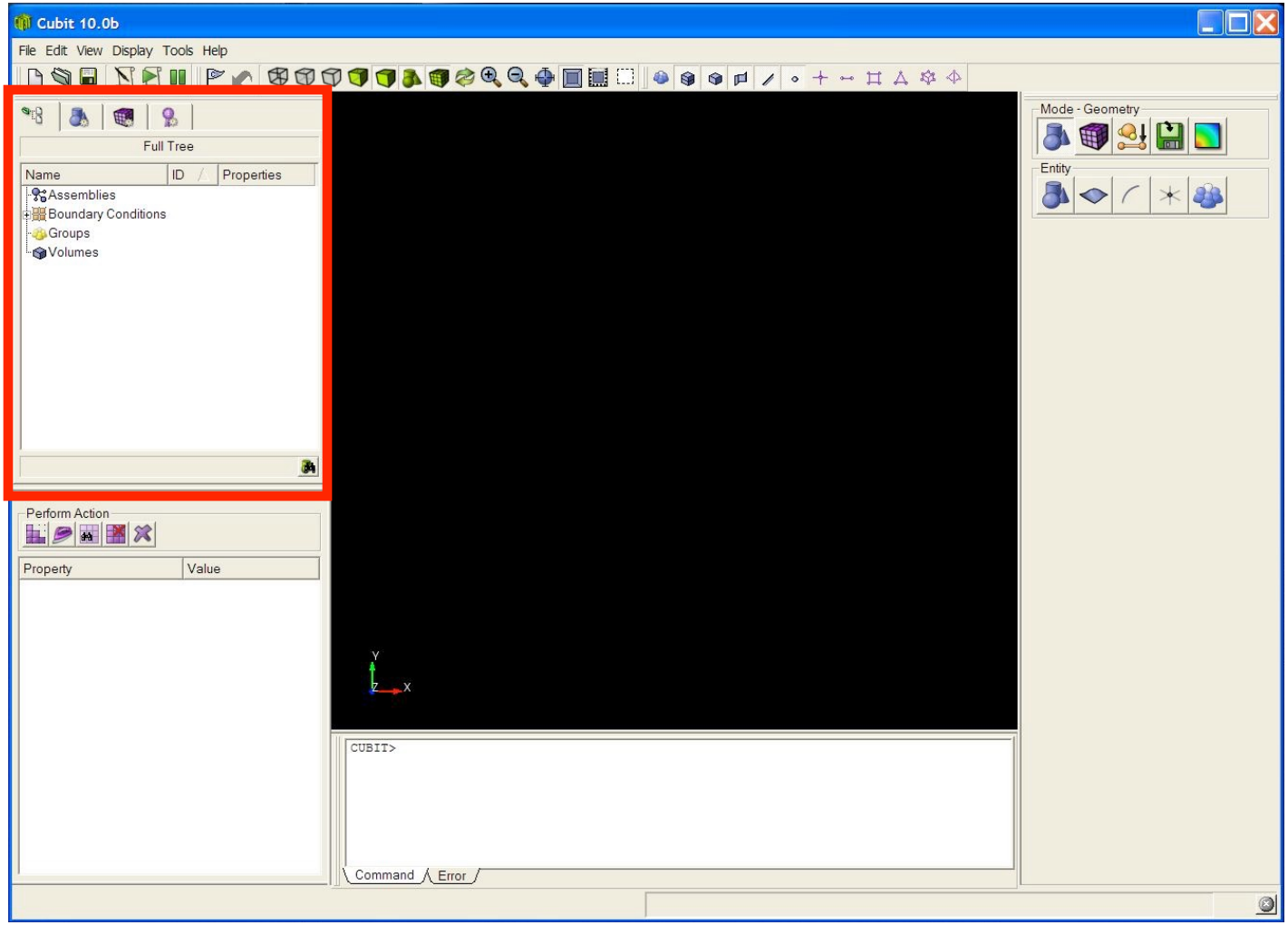
Panning



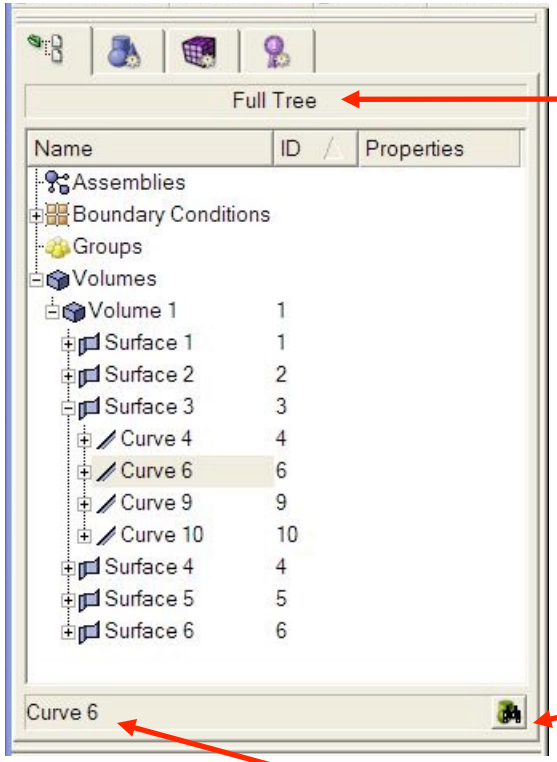
To pan, move the mouse into the graphics window, hold the left mouse button down, and move the mouse pointer horizontally or vertically.



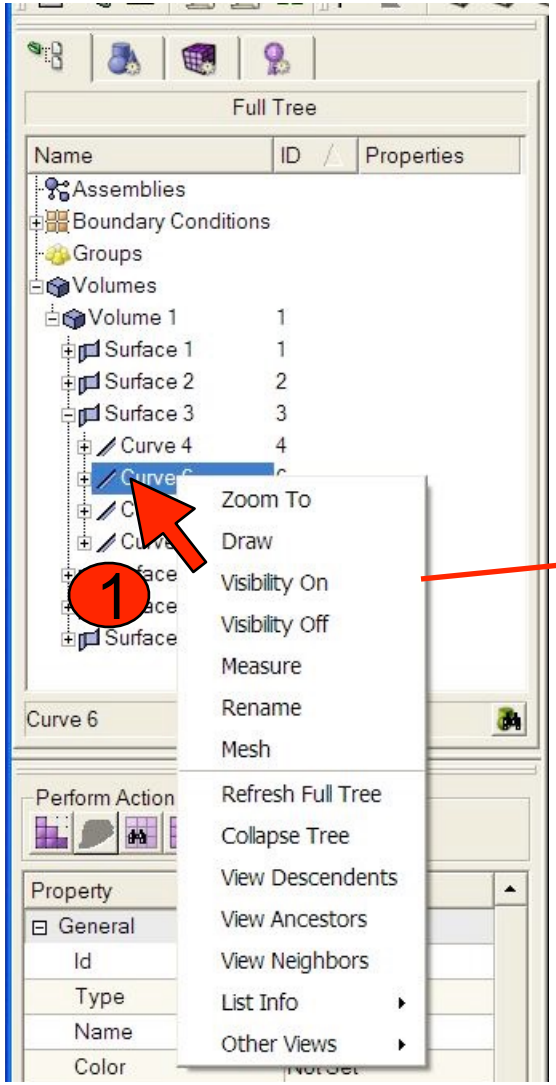
The Tree View



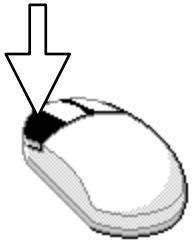
Using the Tree View



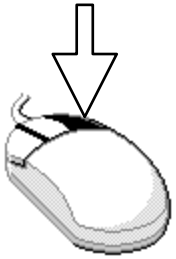
Tree View Options



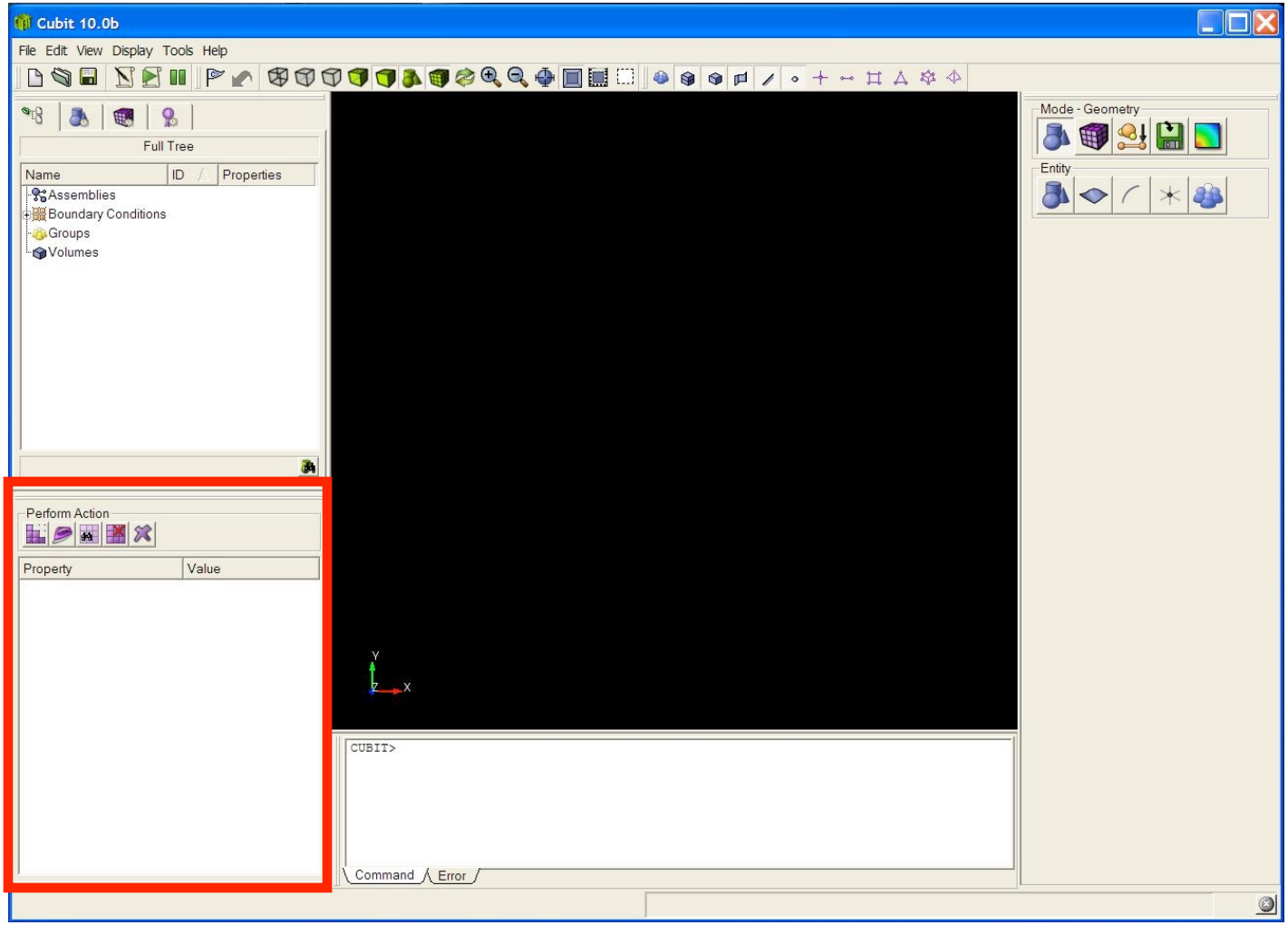
① Select an entity in the tree



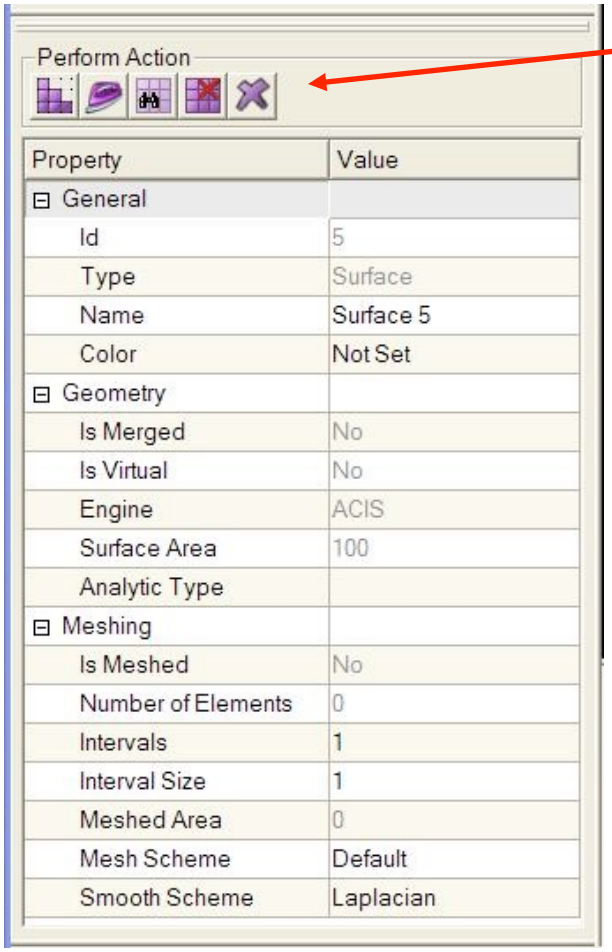
② Right Click



The Properties Page



Using the Properties Page

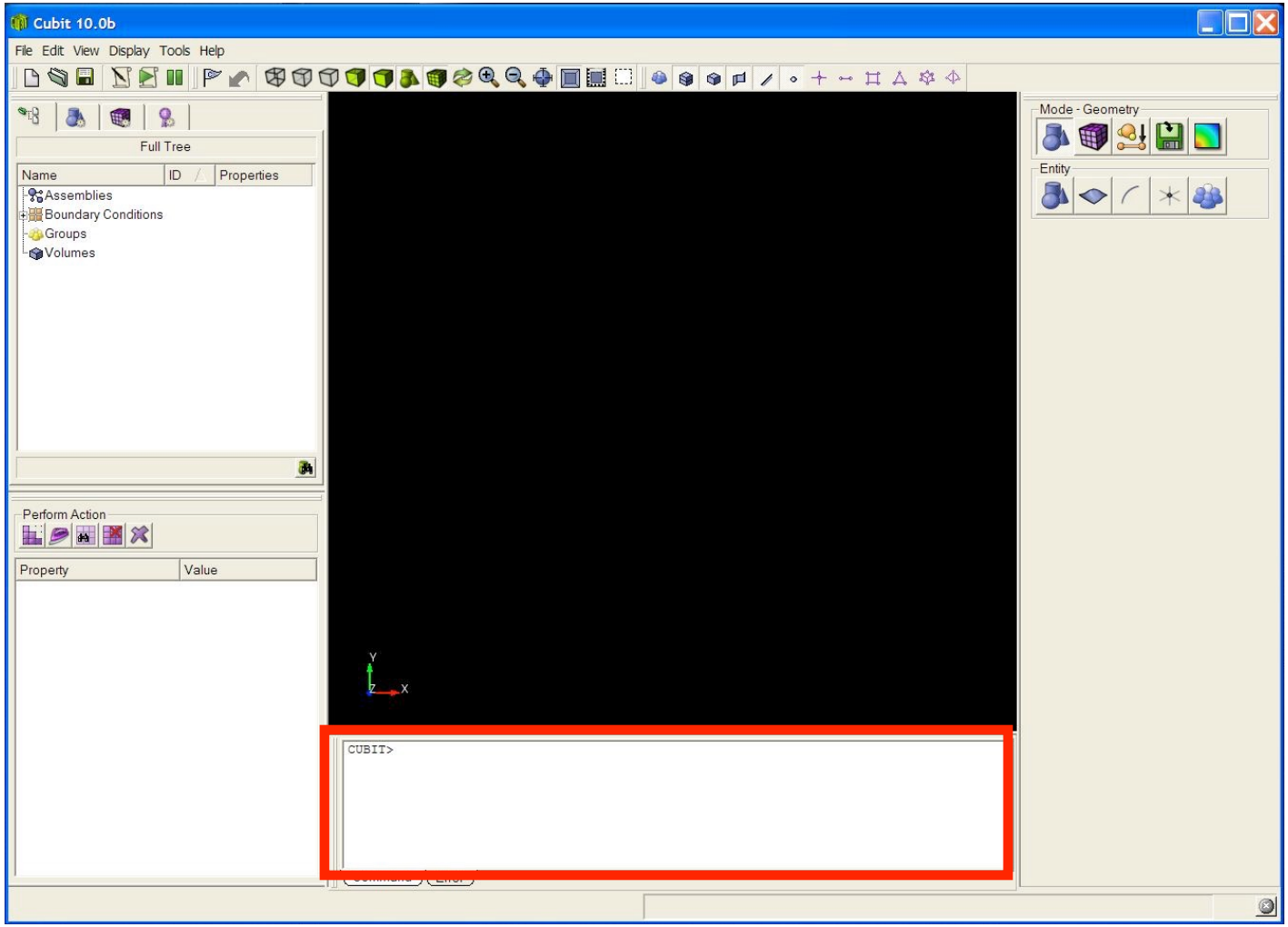


Action Buttons

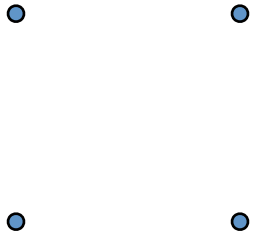
- Mesh
- Smooth
- Preview
- Delete Mesh
- Delete Entity

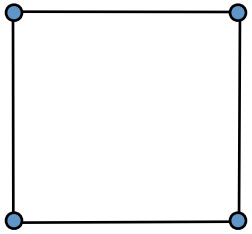
Entity properties. Grayed properties cannot be edited. Others can be changed from this page.

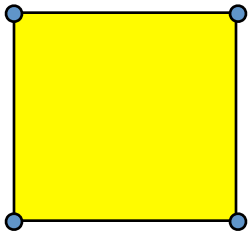
The Command Window

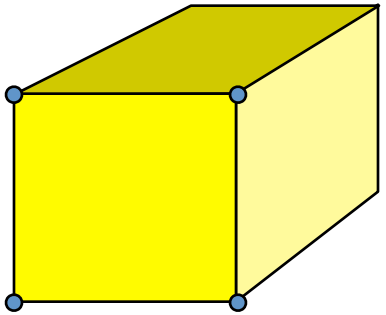


Bottom-Up Geometry Creation







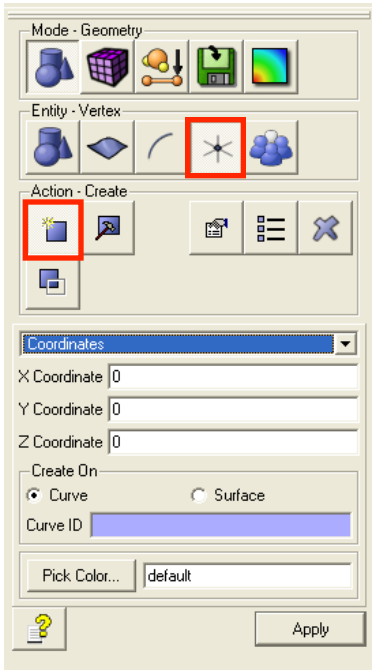


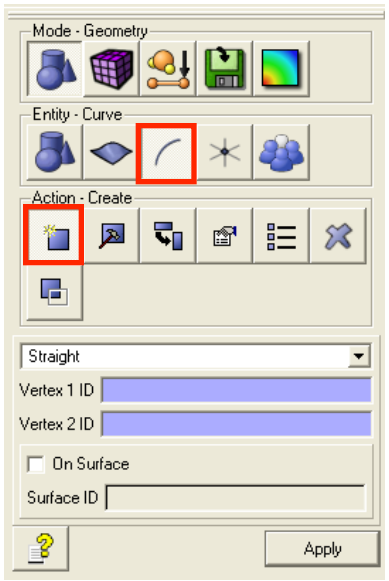
1. Start by defining vertices

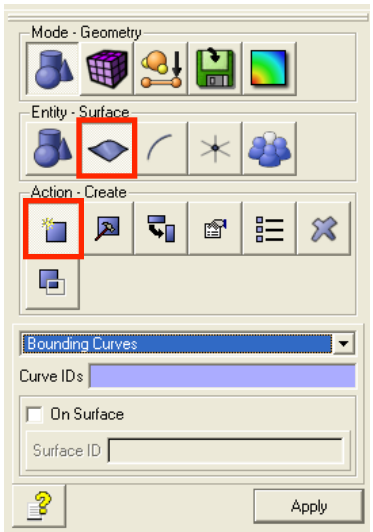
2. Connect them with curves

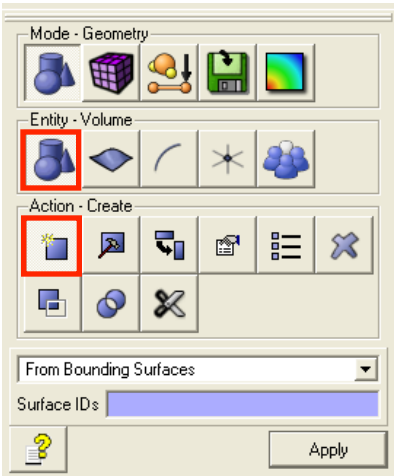
3. Create a surface from a loop of curves

4. Create a volume from a closed set of surfaces

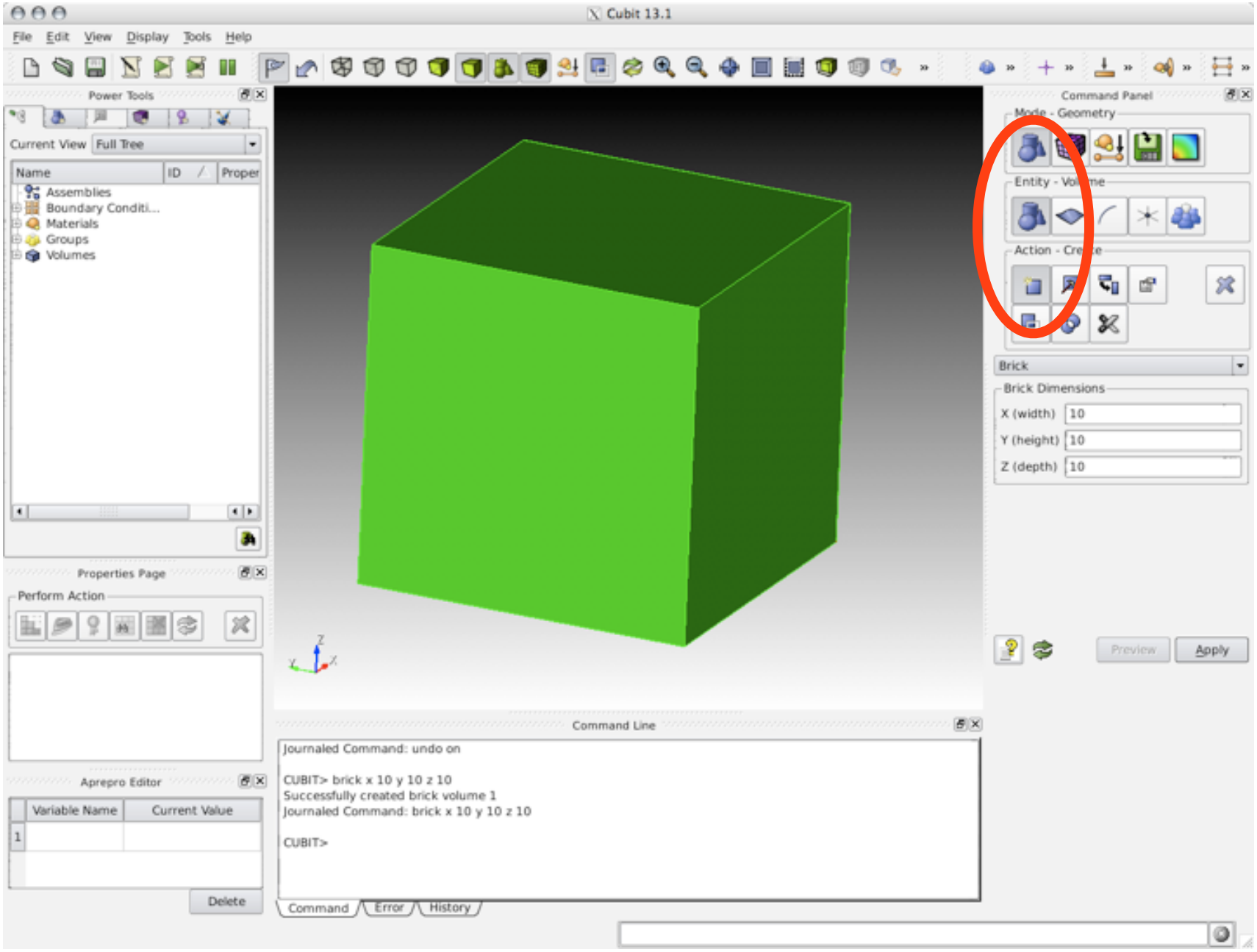


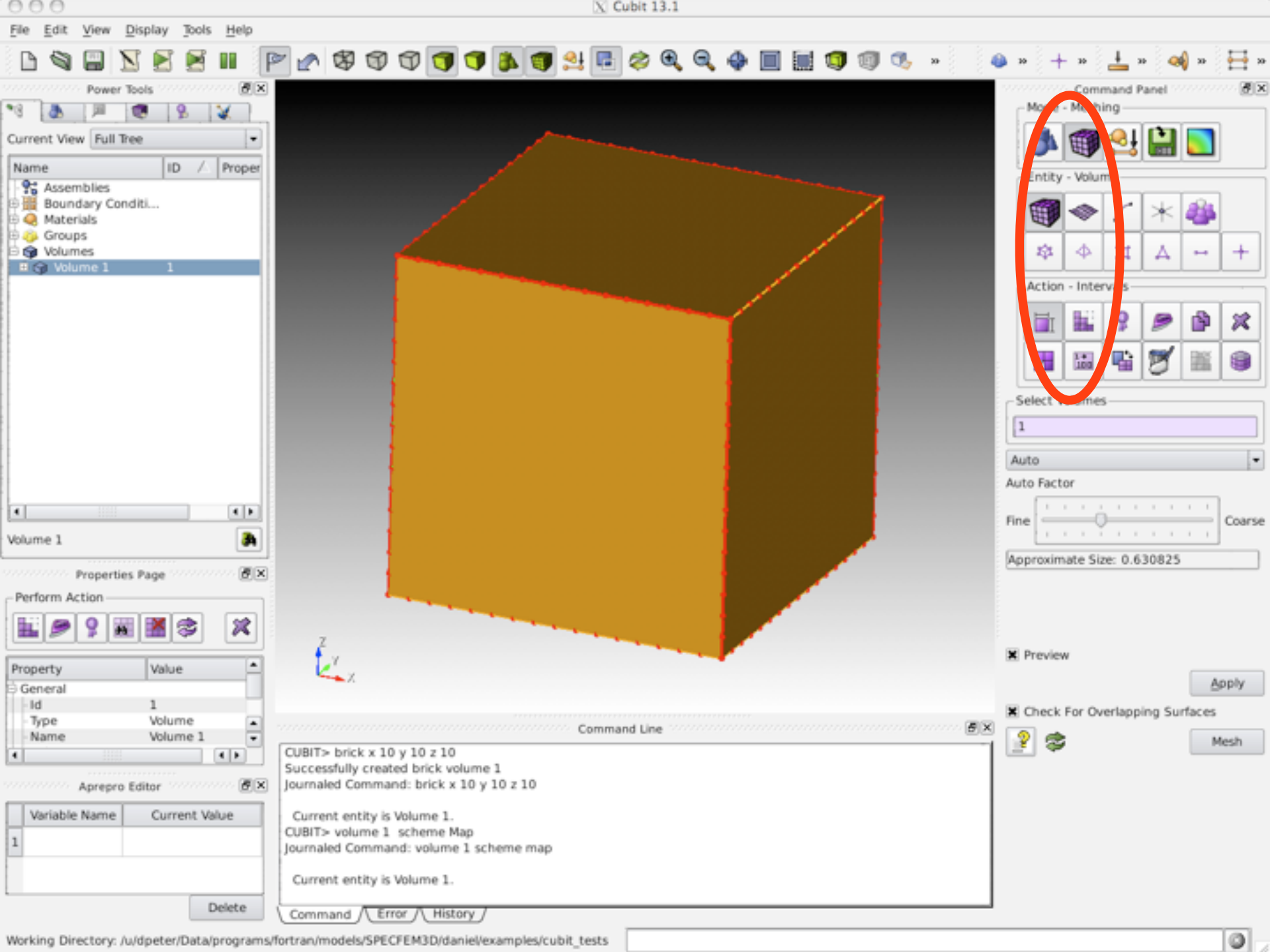


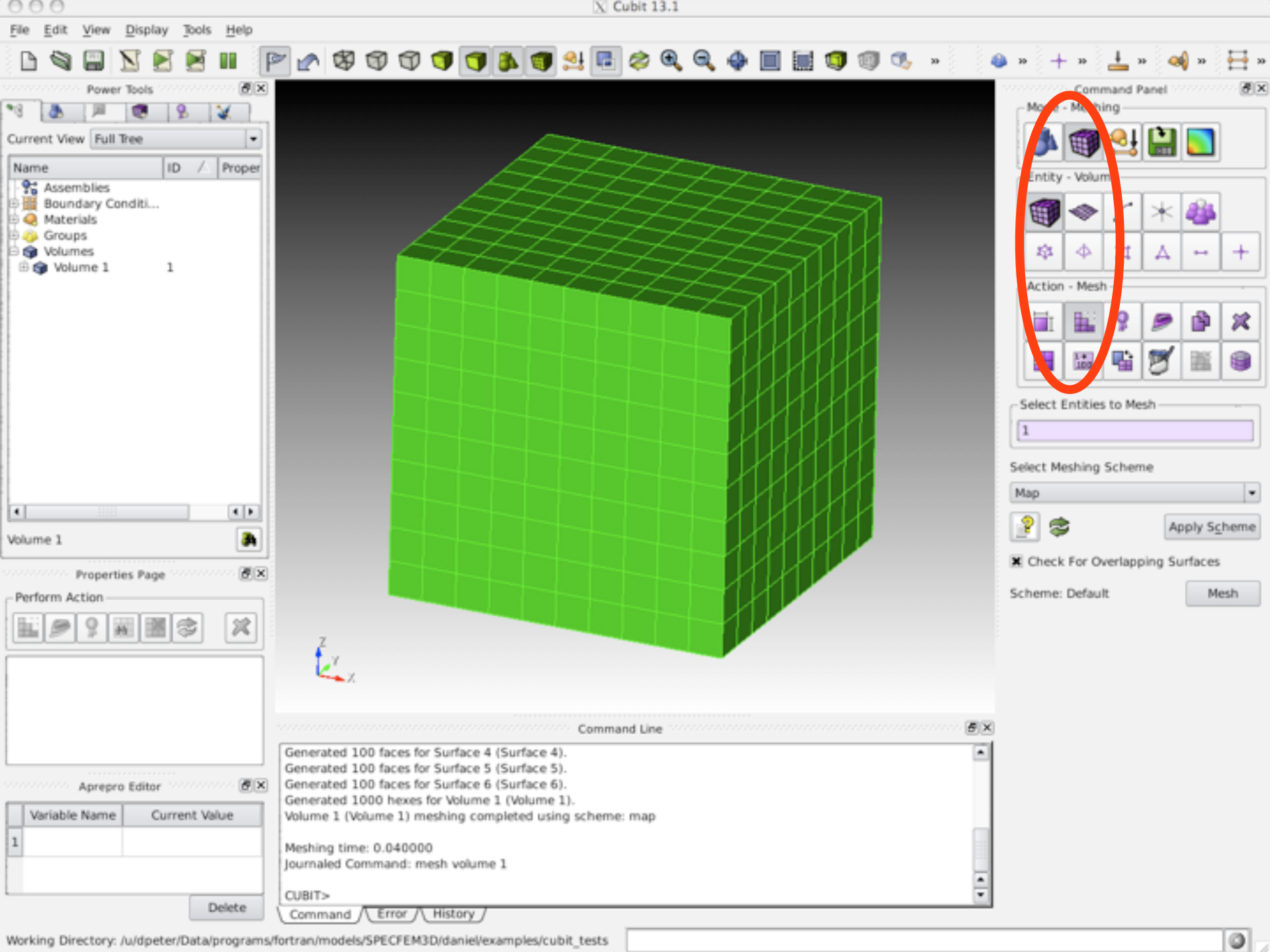




Simple example (3D)




Cubit 13.1
File Edit View Display Tools Help
Power Tools
Current View Full Tree
Name ID Proper
Assemblies
Boundary Conditi...
Materials
Groups
Volumes
Volume 1 1
Volume 1
Properties Page
Perform Action
Property Value
General
Id 1
Type Volume
Name Volume 1
Aprepro Editor
Variable Name Current Value
Delete
Command Panel
Entity - Volum
Action - Interv
Select Volumes
1
Auto
Auto Factor
Fine Coarse
Approximate Size: 0.630825
Preview
Apply
Check For Overlapping Surfaces
Mesh
Command Line
CUBIT> brick x 10 y 10 z 10
Successfully created brick volume 1
Journaled Command: brick x 10 y 10 z 10
Current entity is Volume 1.
CUBIT> volume 1 scheme Map
Journaled Command: volume 1 scheme map
Current entity is Volume 1.
Command Error History
Working Directory: /u/dpeter/Data/programs/fortran/models/SPECFEM3D/daniel/examples/cubit_tests


Cubit 13.1
File Edit View Display Tools Help
Power Tools
Current View Full Tree
Name ID Proper
Assemblies
Boundary Conditi...
Materials
Groups
Volumes
Volume 1 1
Volume 1
Properties Page
Perform Action
Aprepro Editor
Variable Name Current Value
1
Delete
Command Line
Generated 100 faces for Surface 4 (Surface 4).
Generated 100 faces for Surface 5 (Surface 5).
Generated 100 faces for Surface 6 (Surface 6).
Generated 1000 hexes for Volume 1 (Volume 1).
Volume 1 (Volume 1) meshing completed using scheme: map
Meshing time: 0.040000
Journaled Command: mesh volume 1
CUBIT>
Command Error History
Command Panel
Entity - Volum
Action - Mesh
Select Entities to Mesh
1
Select Meshing Scheme
Map
Apply Scheme
Check For Overlapping Surfaces
Scheme: Default
Mesh
Working Directory: /u/dpeter/Data/programs/fortran/models/SPECFEM3D/daniel/examples/cubit_tests

Downloads

STL surfaces

- google: STL download
- https://www.thingiverse.com
- https://grabcad.com/library
- https://nasa3d.arc.nasa.gov