



Salome platform

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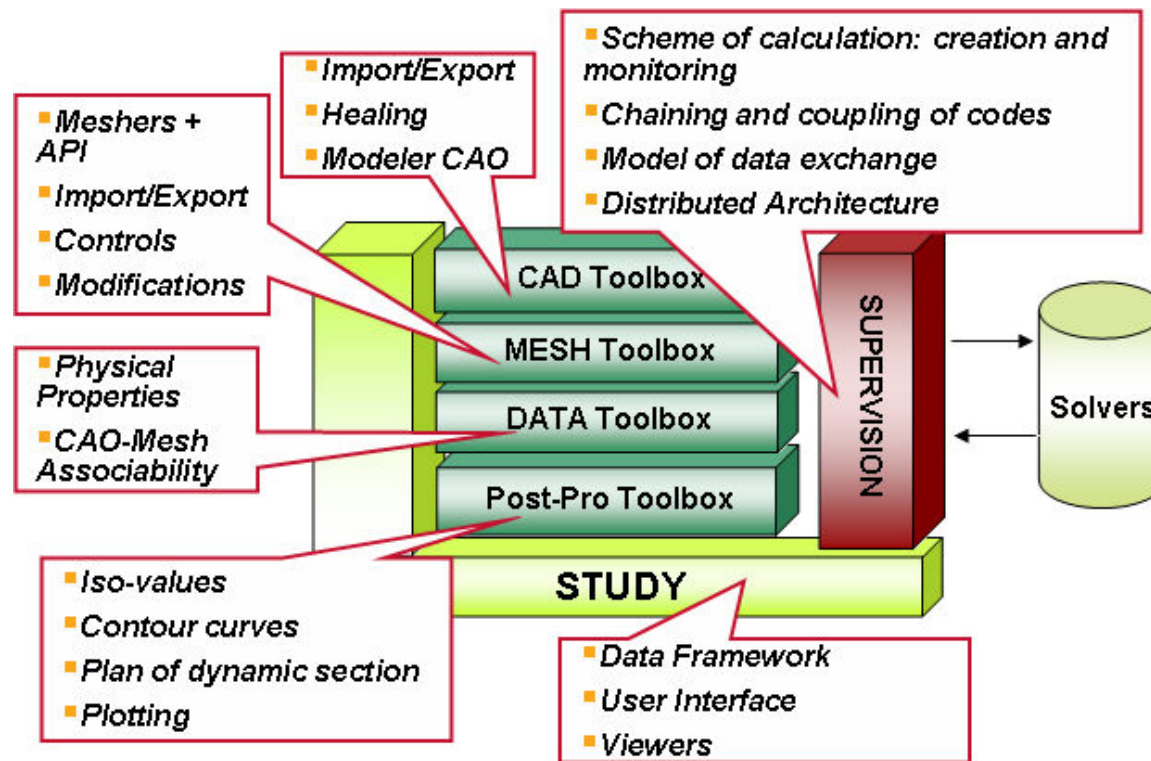
PRACE Summer of HPC 2017 Training Week
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What is **Salome** platform?

- ▶ A platform for **pre**processing and **post**processing.
- ▶ A **G**raphical **U**ser **I**nterface with many pre/post processing tools.
- ▶ A Simulation platform with interfaces to HPC processing and parametric scan and workflow setup possibilities.
- ▶ A Common Object Request Broker Architecture (**CORBA**) based modular platform.

Salome architecture



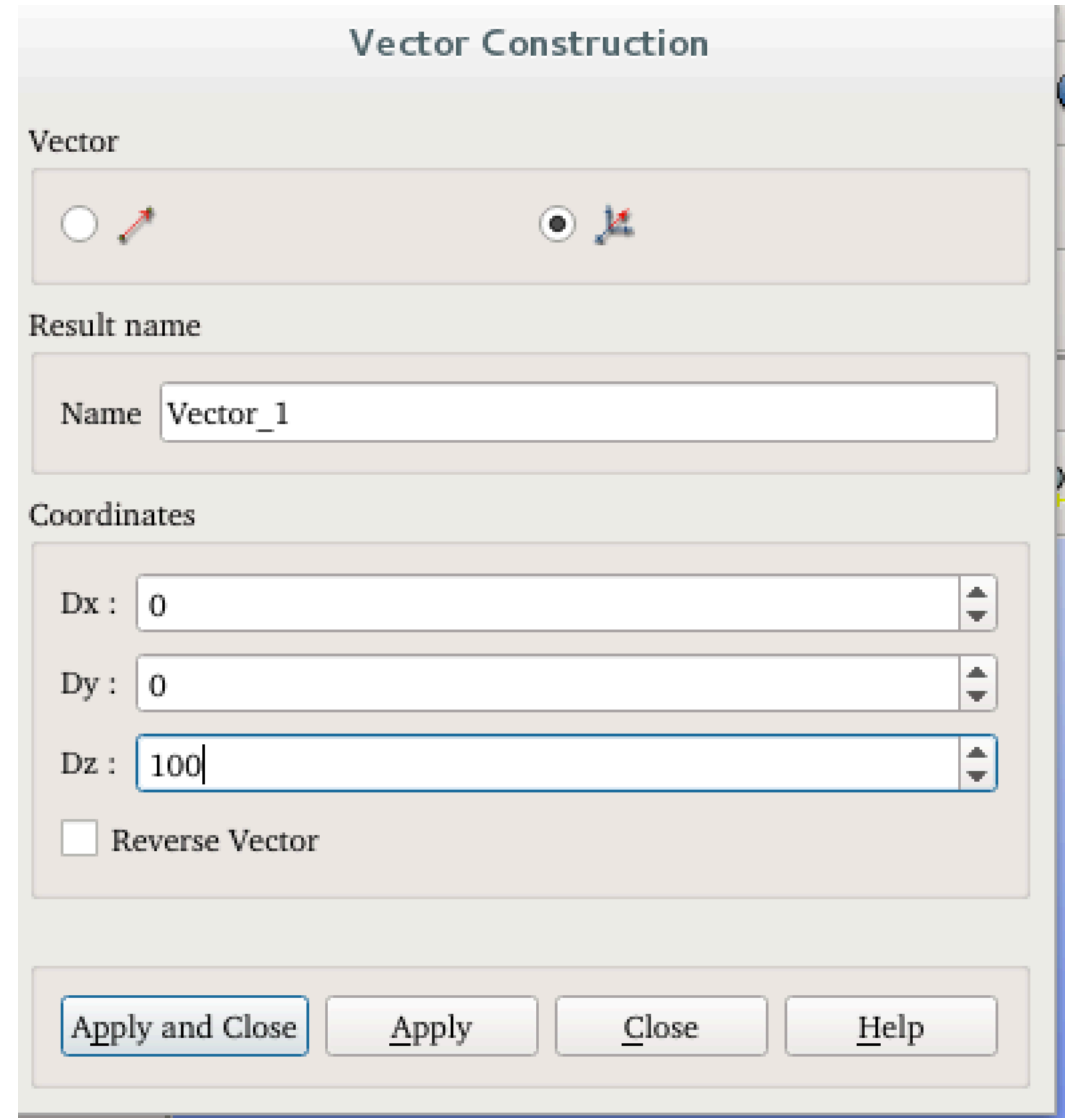


Starting Salome with prebuilt image

- ▶ `[osboxes@osboxes ~]$ cd sohpc`
- ▶ `[osboxes@osboxes sohpc]$ source setupenv.sh`
- ▶ `[osboxes@osboxes sohpc]$ salome`
- ▶ It can also be run as
 - ▶ `[osboxes@osboxes ~]$ ~/sohpc/build/SALOME/salome`

Tutorial exercise 2

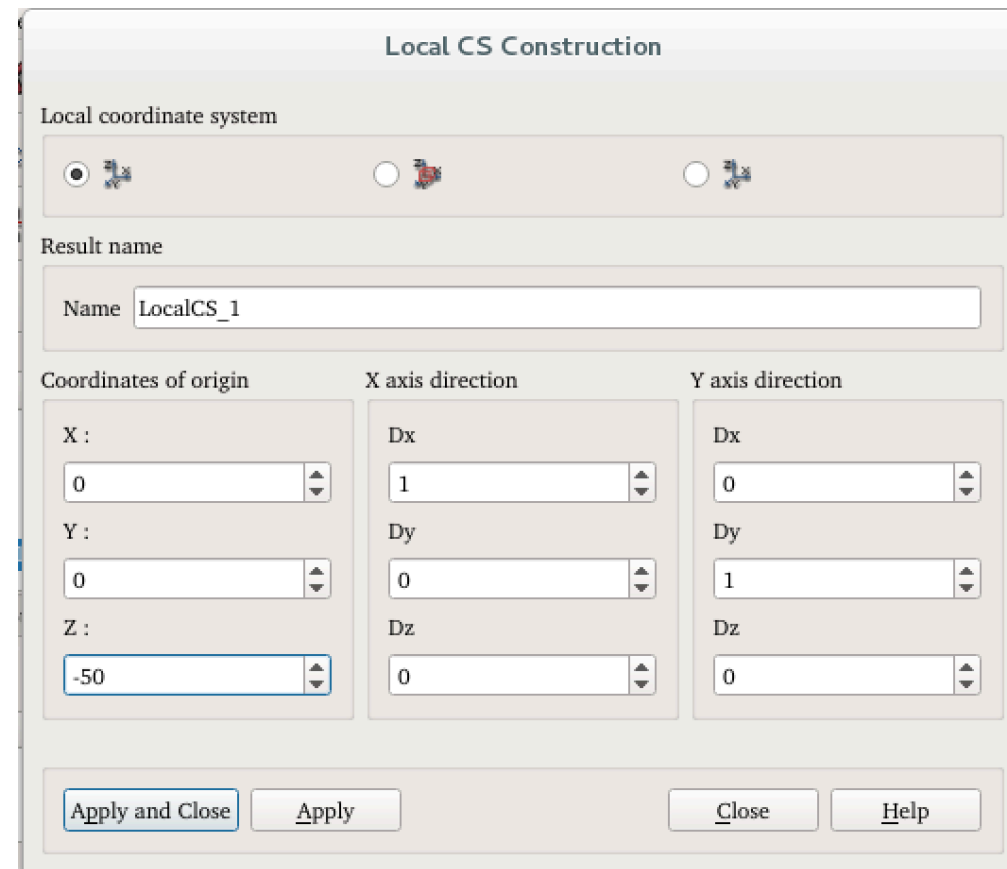
1. File → New
2. Select Geometry module
3. Create reference vector with
New Entity → Basic → Vector
 1. 0; 0; 100
 2. Name: Vector_1
 3. Apply and Close



The screenshot shows the 'Vector Construction' dialog box. It has a title bar 'Vector Construction'. Under the 'Vector' section, there are two radio buttons: the first is unselected and has a pencil icon, the second is selected and has a red arrow icon. The 'Result name' section has a text box with 'Vector_1'. The 'Coordinates' section has three spinners: 'Dx' is 0, 'Dy' is 0, and 'Dz' is 100. There is a checkbox for 'Reverse Vector' which is unchecked. At the bottom, there are four buttons: 'Apply and Close', 'Apply', 'Close', and 'Help'.

Creation of a LCS (Local Coordinate System)

- ▶ menu *New Entity* → *Basic* → *LCS*
(1st constructor):
- ▶ Origin : 0 ; 0 ; -50.
- ▶ X axis : 1 ; 0 ; 0.
- ▶ Y axis : 0 ; 1 ; 0.
- ▶ Validation => **LocalCS_1**.



Local CS Construction

Local coordinate system

Result name

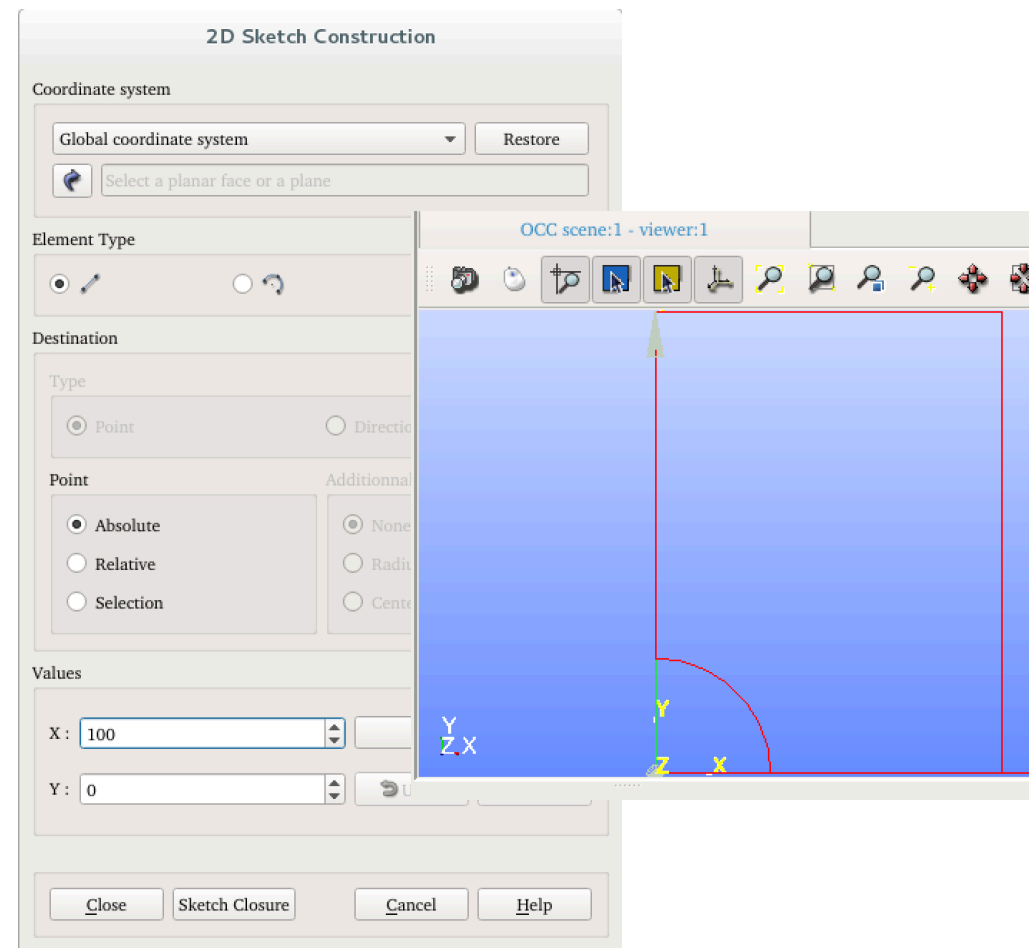
Name: LocalCS_1

Coordinates of origin	X axis direction	Y axis direction
X: 0	Dx: 1	Dx: 0
Y: 0	Dy: 0	Dy: 1
Z: -50	Dz: 0	Dz: 0

Buttons: Apply and Close, Apply, Close, Help

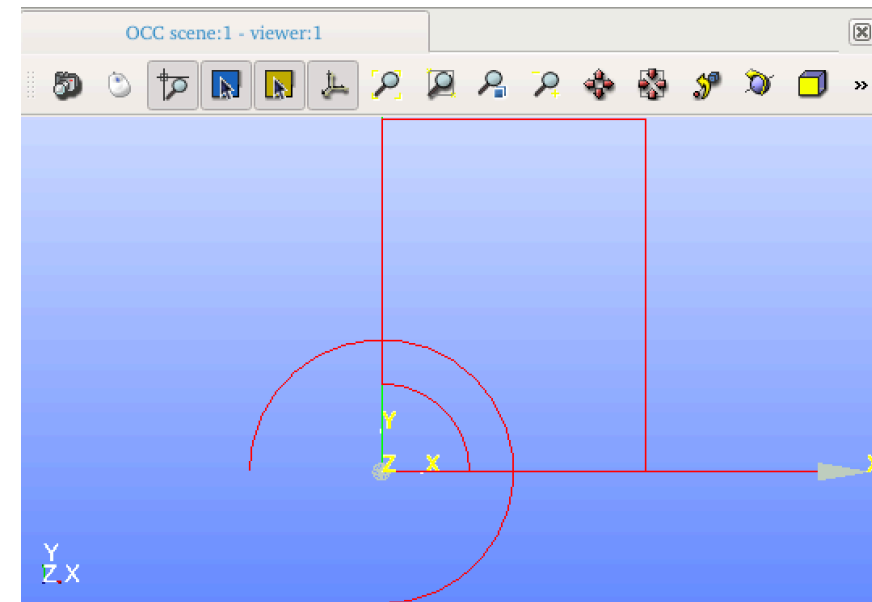
Creation of a wire using the sketcher

- ▶ Menu *New Entity* → *Basic* → *2D Sketch*.
Validate using *Apply* after each line except for the last one
- ▶ First Point: 100 ; 0.
- ▶ Segment (Point - absolute): 300 ; 0.
- ▶ Segment (Point - absolute): 300 ; 400.
- ▶ Segment (Point - absolute): 0 ; 400.
- ▶ Segment (Point - absolute): 0 ; 100.
- ▶ Arc (Direction-Perpendicular): -100 ; 90°
- ▶ Close => **Sketch_1**



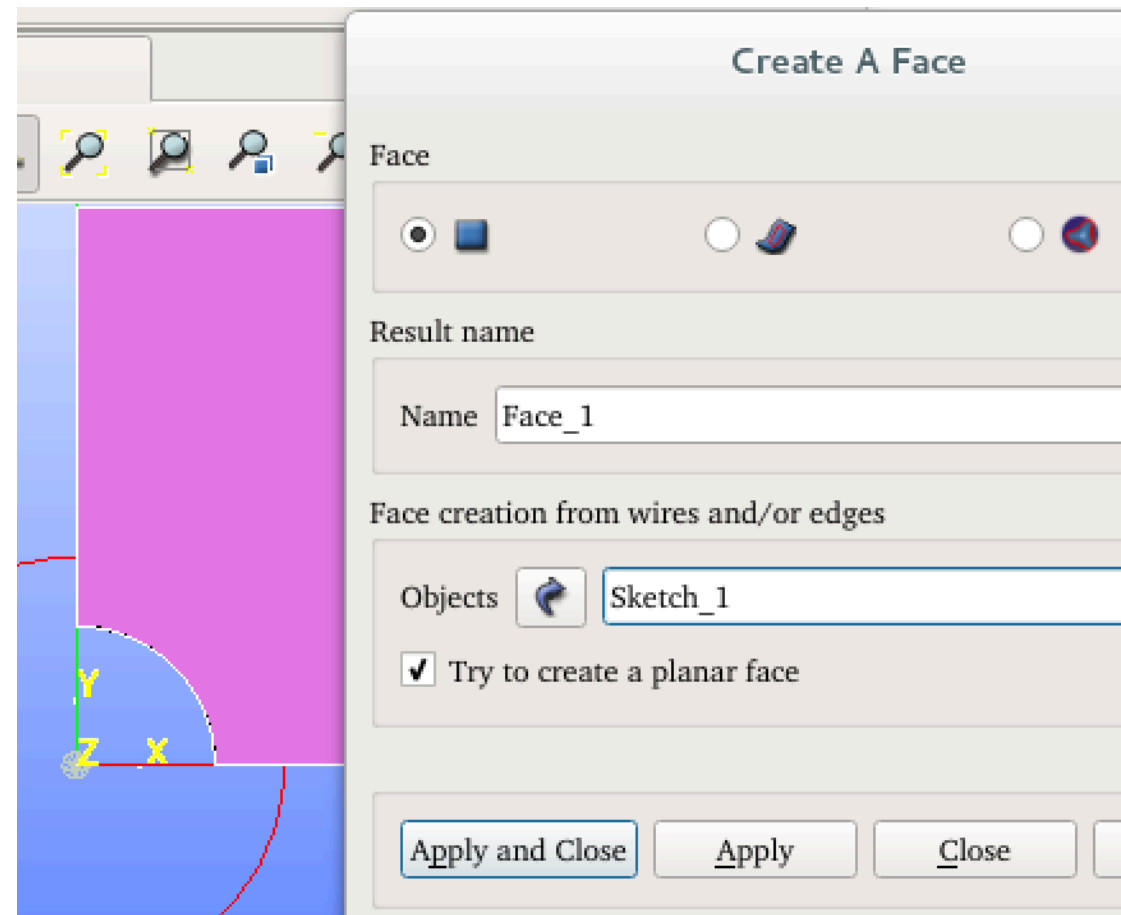
Creation of **2nd wire** in the local working plane

- ▶ Menu *New Entity* → *Basic* → *2D Sketch*.
- ▶ Select "Coordinate System" - LocalCS_1.
- ▶ First Point: 0 ; -150.
- ▶ Arc (Direction-Tangent): 150 ; 270°.
- ▶ Close => **Sketch_2**.
- ▶ Save the study in a file.



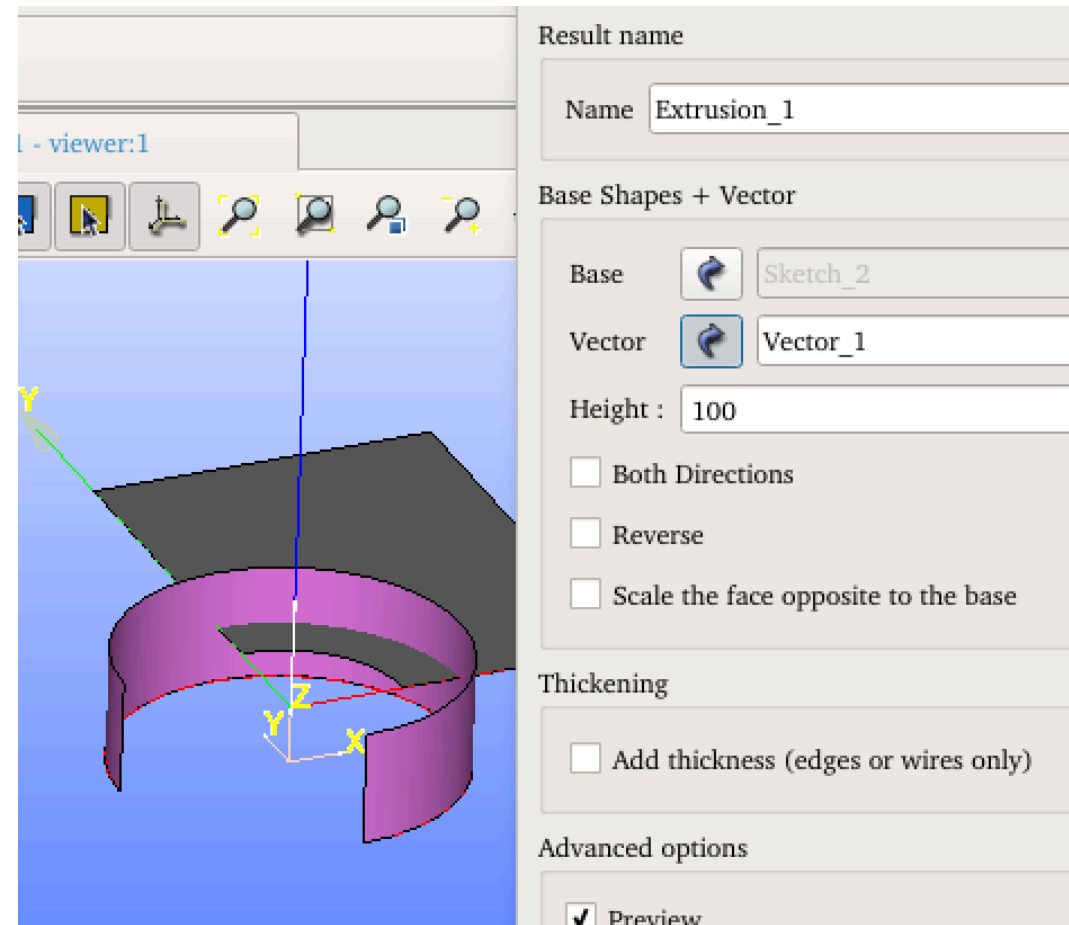
Creation of a face to be meshed

- ▶ Select **Sketch_1** => **Face_1**.
- ▶ **Apply** and **Close**



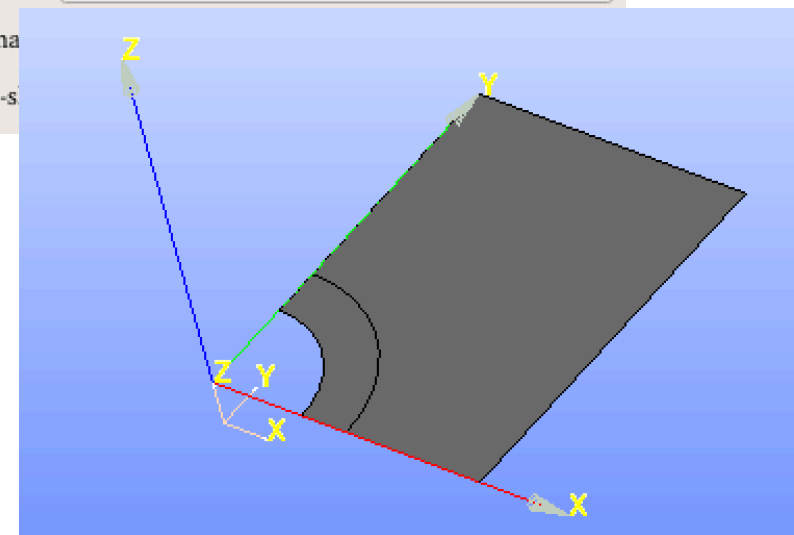
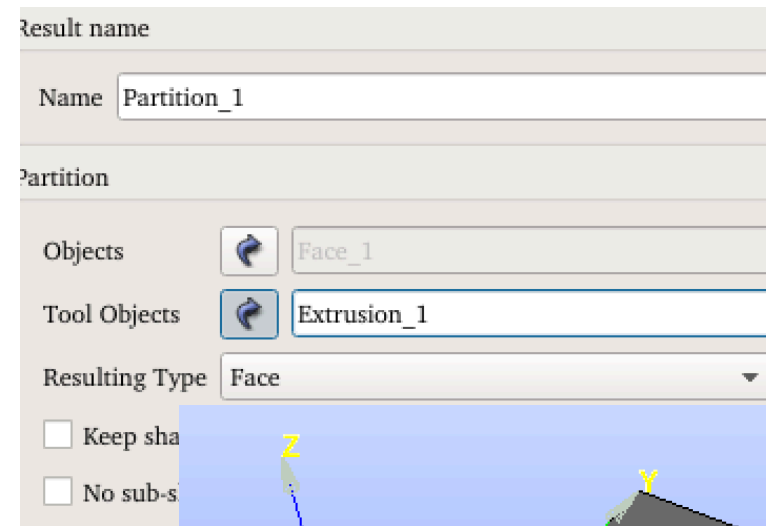
Creation of a face by **extrusion**

- ▶ Menu *New Entity* → *Generation*
→ *Extrusion*.
- ▶ Base: Sketch_2
- ▶ Vector: Vector_1
- ▶ Height: 100
- ▶ Validation => **Extrusion_1**.



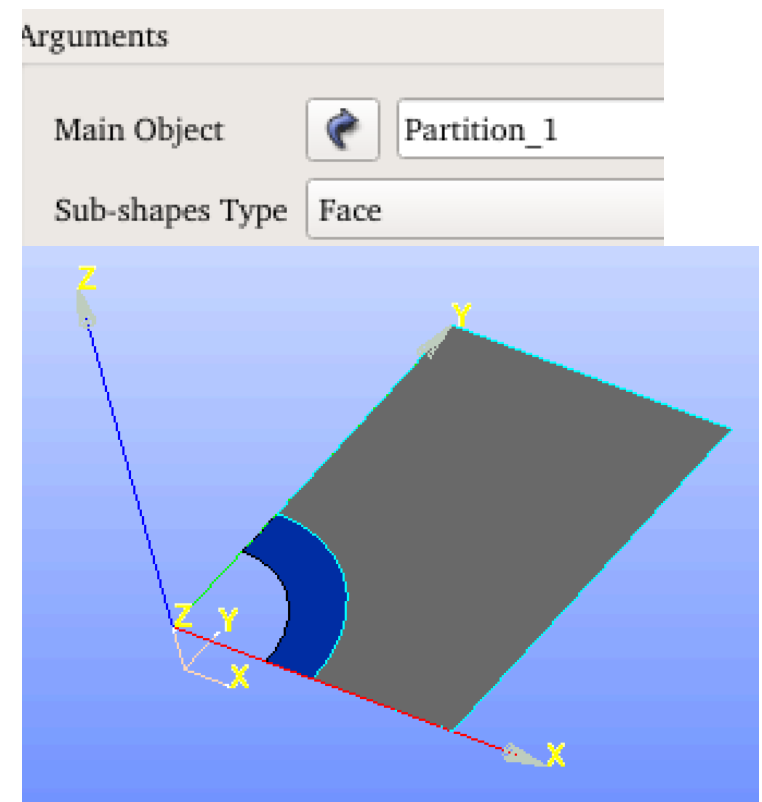
Partition of the face to be meshed

- ▶ Menu *Operations* → *Partition*
- ▶ Objects: Face_1.
- ▶ Tool Object: Extrusion_1.
- ▶ Resulting Type: Face
- ▶ Validation => **Partition_1**.
- ▶ Show *Only* face Partition_1.



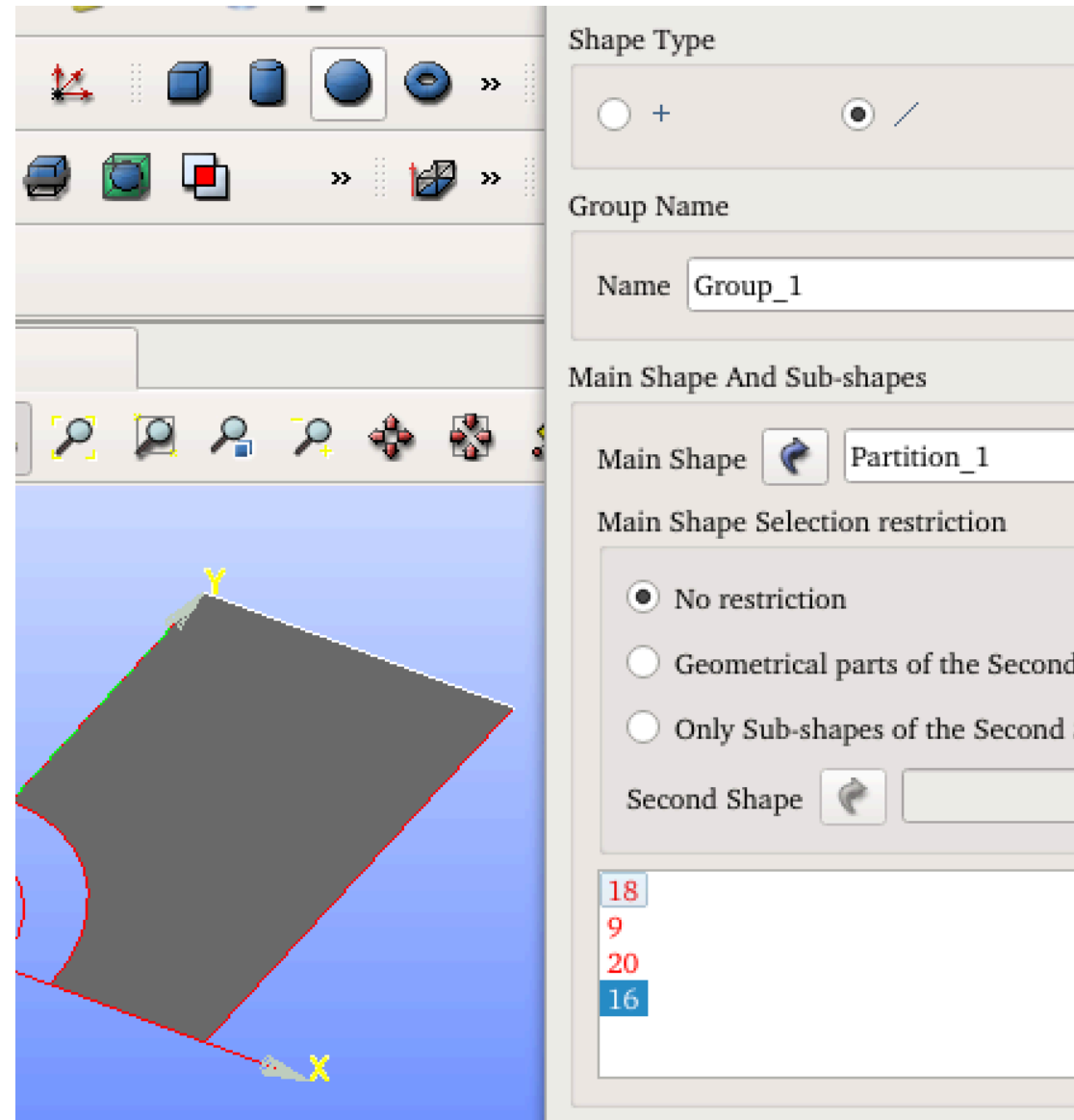
Explode into basic elements

- ▶ menu *New Entity* → *Explode*
- ▶ **Explode** Partition_1 into Faces.
- ▶ Validation => **Face_2** and **Face_3**.
- ▶ Modify the properties of the object
(**Color**, transparency, isos...).



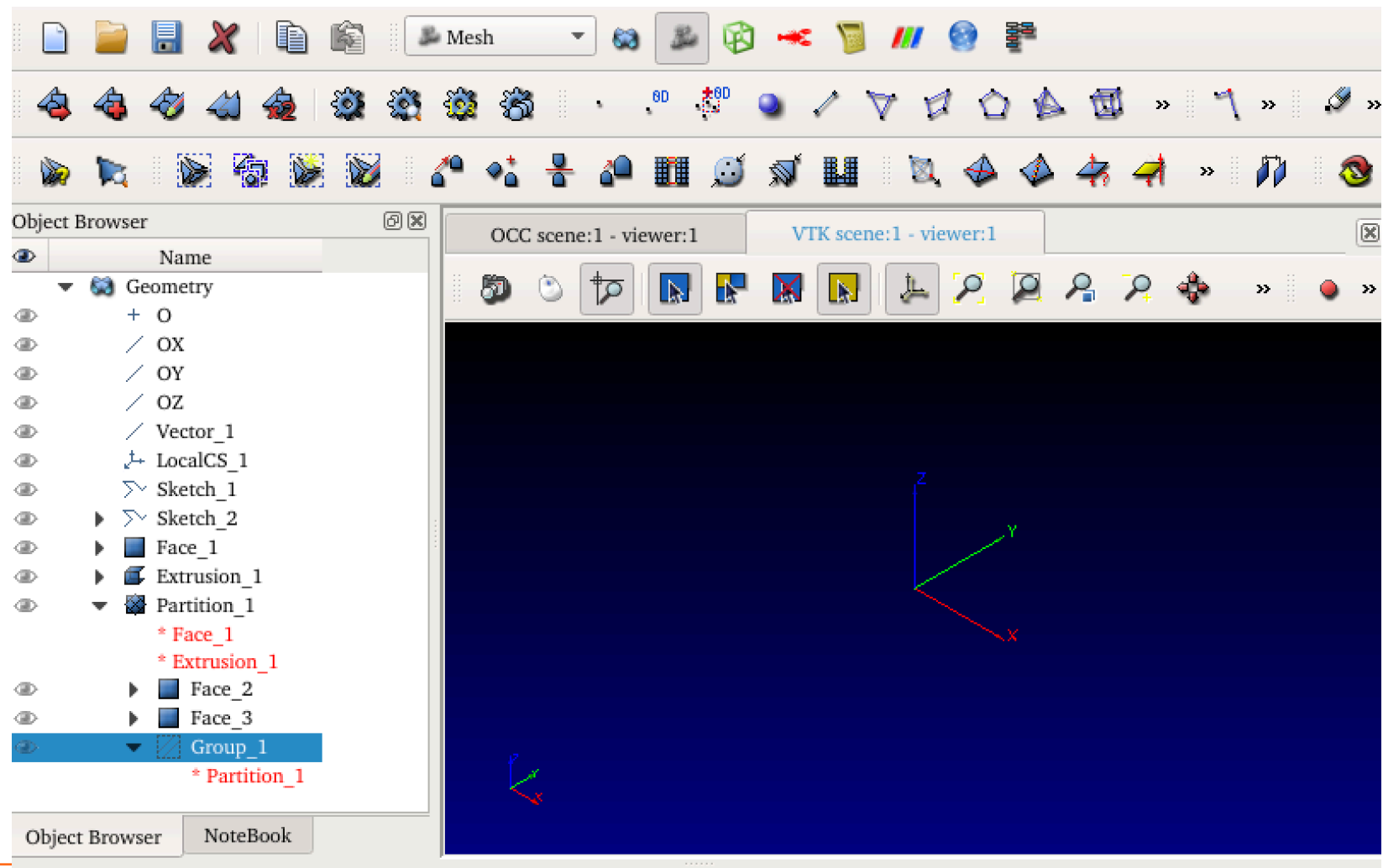
Create a group

- ▶ Menu *New Entity* → *Group* → *Create Group*
- ▶ Select shape type → *Edge*.
- ▶ Main Shape: *Partition_1*
- ▶ Select in the viewer 4 outer edges of *Face_3* and click *Add* before validation.
- ▶ Validation => **Group_1**.



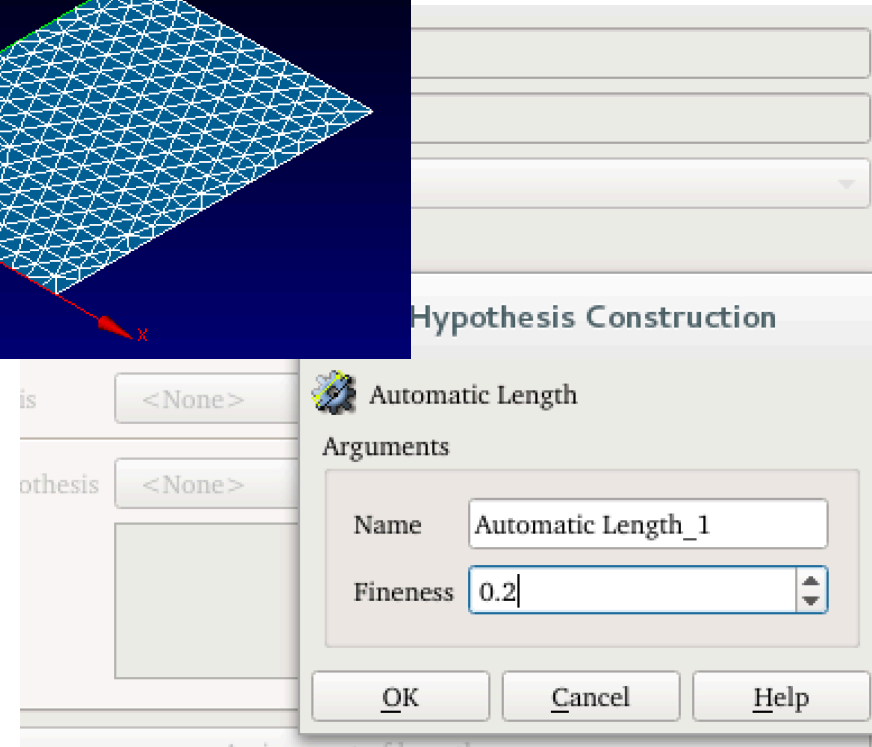
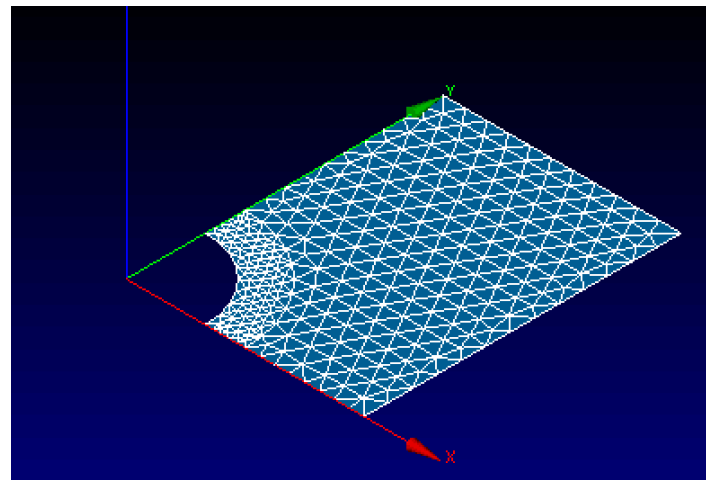
Meshing

- ▶ Launch module MESH



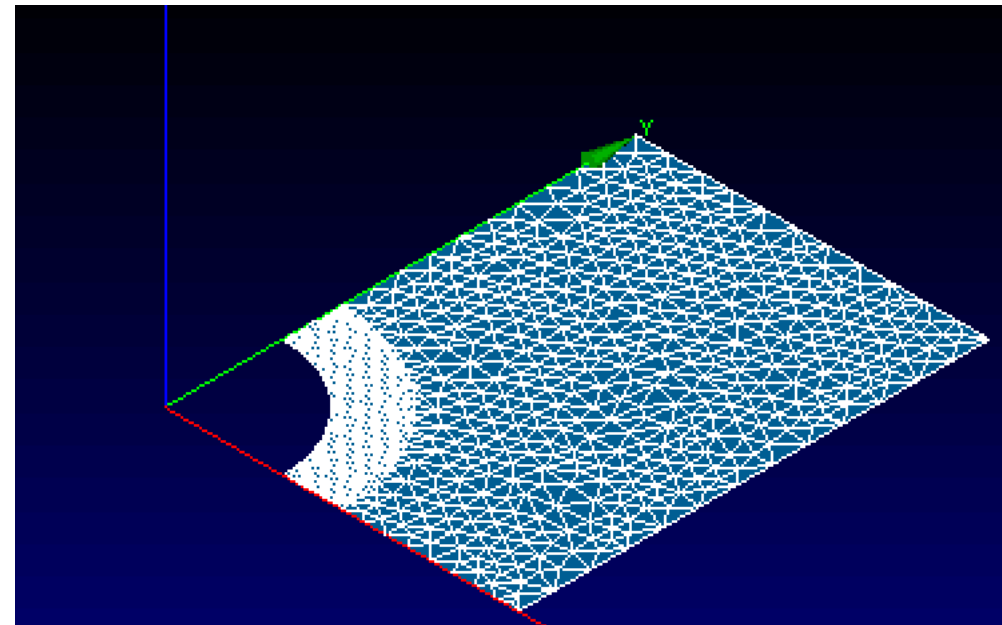
Creation of **Mesh_1**

- ▶ menu *Mesh* → *Create Mesh*
- ▶ Geometry: **Partition_1**
- ▶ 2D Algorithm -> Triangle (Mefisto)
- ▶ 1D Algorithm -> Wire Discretisation
- ▶ Create 1D Hypothesis "Automatic length", Fitness: 0.2
- ▶ Right click on Mesh_1 and **Compute**



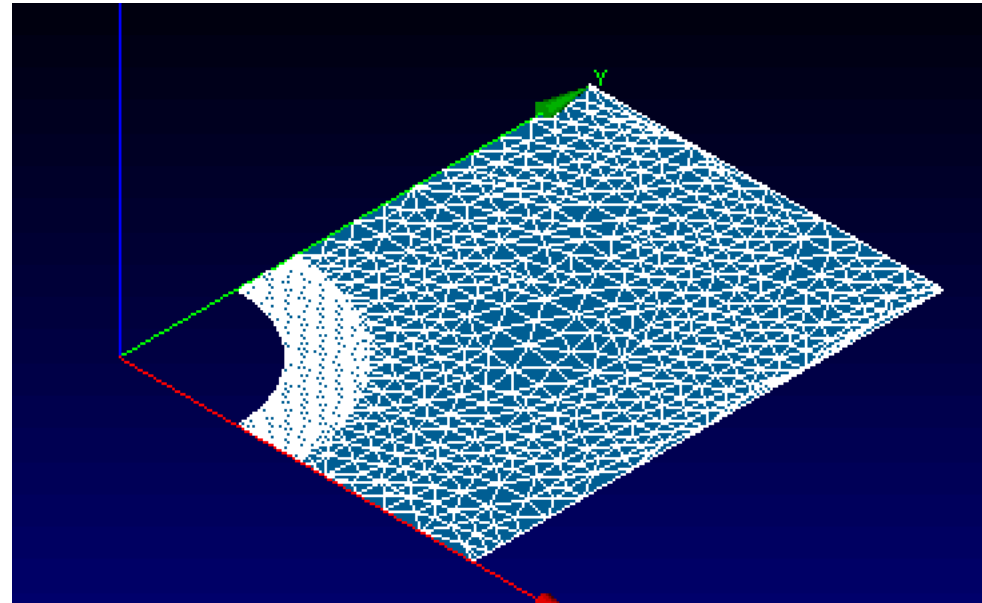
Creation of a **SubMesh**

- ▶ Menu *Mesh* → *Create Sub-Mesh*
- ▶ Mesh: **Mesh_1**
- ▶ Geometry: **Face_2**
- ▶ 2D Algorithm -> **Triangle (Mefisto)**
- ▶ 1D Algorithm -> **Wire Discretisation**
- ▶ Create 1D Hypothesis "**Automatic length**", Fitness: **0.8**
- ▶ Compute **Mesh_1**.



Creation of **another** Sub-Mesh

- ▶ menu *Mesh* → *Create Sub-Mesh*
- ▶ Mesh: **Mesh_1**
- ▶ Geometry: **Group_1**
- ▶ Algorithm: **Wire Discretisation.**
- ▶ Create hypothesis **Nb. Segments** (10,
Scale distribution, factor : 20)
- ▶ Compute **Mesh_1.**





Use functionalities of menu *Modification*

- ▶ *Diagonal Inversion* (choose an edge of the element)
- ▶ *Union of two triangles* (choose the edge between 2 triangles)
- ▶ *Union of triangles* (Apply to all, Area, 160)
- ▶ *Cutting of quadrangles* (Apply to all, Use numeric functor: Aspect ratio)
- ▶ *Transformation* → *Merge Node* (Manual, tolerance 10.0, detect, select all, apply...)
- ▶ *Smoothing*...



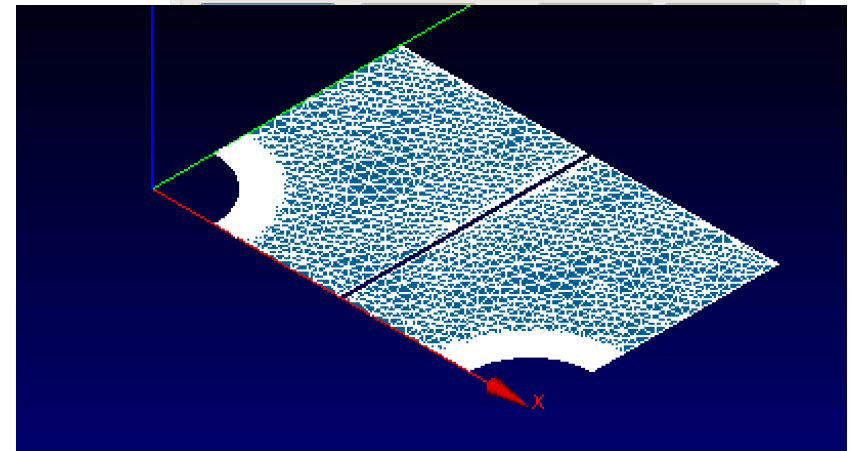
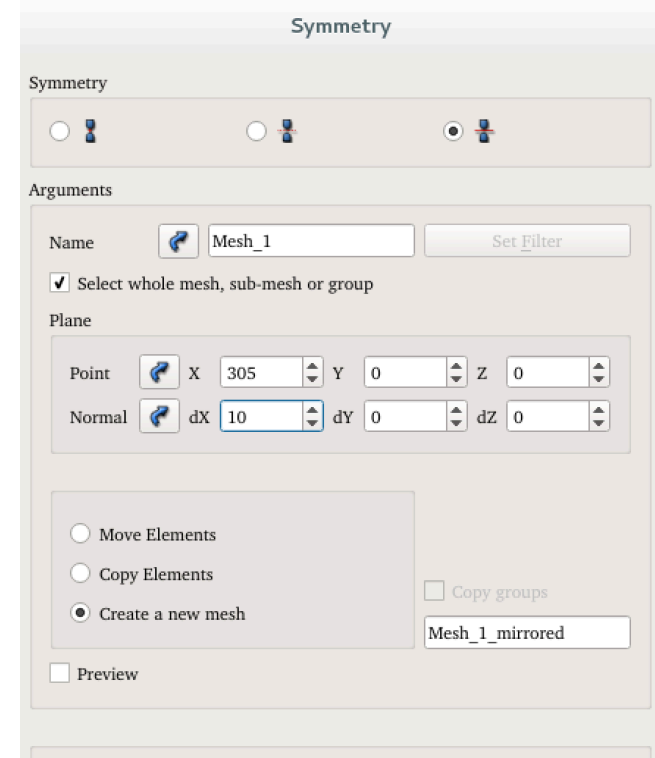
Further mesh operations

- ▶ Remove a mesh:
Menu *Modification* → *Remove* →
Clear Mesh Data
- ▶ Control the mesh via Mesh
Information (right-click or
menu *Mesh*).

Mesh Information				
Base Info	Element Info	Additional Info	Quality Info	
Name:	Mesh_1			
Object:	Mesh			
Nodes:	935			
Elements:	Total	Linear	Quadratic	Bi-Quadratic
	1895	1895	0	0
0D:	0			
Balls:	0			
1D (edges):	118	118	0	
2D (faces):	1777	1777	0	0
Triangles:	1777	1777	0	0
Quadrangles:	0	0	0	0
Polygons:	0	0	0	
3D (volumes):	0	0	0	0
Tetrahedrons:	0	0	0	
Hexahedrons:	0	0	0	0
Pyramids:	0	0	0	
Prisms:	0	0	0	
Hexagonal Prisms:	0			
Polyhedrons:	0			

Creation of a **symmetrical mesh**

- ▶ **Select the entire** mesh Mesh_1 and use the 3rd constructor.
- Point: 305 ; 0 ; 0.
- ▶ Normal: 10 ; 0 ; 0.
- ▶ Create a new mesh Mesh_1_Mirrored.
- ▶ Compute





Create a compound

- ▶ Compound_Mesh_1 of two meshes (Mesh_1 and Mesh_1_Mirrored)
- ▶ *Menu Mesh → Build Compound*
- ▶ Select both meshes with default parameters.
- ▶ Compute "Compound_Mesh_1"

The screenshot shows the 'Create a Compound' dialog box with the following fields and options:

- Compound:** A radio button and a blue arrow icon.
- result name:** A text field containing 'Compound_Mesh_1'.
- arguments:** A text field containing '2_objects' with a blue arrow icon.
- Processing identical groups:** A button labeled 'Unite'.
- Create groups from input objects
- Merge coincident nodes and elements
- Tolerance:** A text field containing '1e-05'.



Sew mesh Coumpound_Mesh_1

- ▶ *Menu Modification → Transformation → Sewing*
- ▶ (1st constructor : Sew Free Borders)
- ▶ Border 1: 1st, 2nd and last node of border 1
- ▶ Border 2: 1st, 2nd and last node of border 2
- ▶ Select “Merge equal elements” and “Create polygons instead of splitting”.



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THANK YOU FOR YOUR ATTENTION

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