

# Unstructured grid format

Two files are read by a solver.

## **1. Grid file:**

Nodal coordinates, element connectivity, and boundary grid information.

3D unstructured grids: .ugrid, .vkt, .su2, etc.....

2D unstructured grids: a custom format, .grid...

## **2. Boundary condition file:**

It contains a boundary condition name for each boundary part.



# **.ugrid for 3D Unstructured Grid**

# of nodes, # of triangles, # of quads, # of tetra, # of pyramids, # of prisms, # of hex

(xi, yi, zi), for  $i=1, nnodes$

List of triangles (ordered to direct inwards)

List of quadrilaterals (ordered to direct inwards)

Boundary tags for triangles

Boundary tags for quadrilaterals

List of tetrahedra

List of pyramids

List of prisms

List of hexahedra

This format has been widely used in unstructured grid codes.

Many codes accept .ugrid, and format conversion is available if necessary.

# .ugrid example

12 12 4 6 0 2 0 <- nnodes, tria, quad, tet, pyr, prism, hex

```

0.0000000000000000E+00 0.0000000000000000E+00 0.0000000000000000E+00
0.0000000000000000E+00 0.0000000000000000E+00 1.0000000000000000E-01
0.0000000000000000E+00 0.0000000000000000E+00 1.0000000000000000E+00
0.0000000000000000E+00 1.0000000000000000E+00 0.0000000000000000E+00
0.0000000000000000E+00 1.0000000000000000E+00 1.0000000000000000E-01
0.0000000000000000E+00 1.0000000000000000E+00 1.0000000000000000E+00
1.0000000000000000E+00 0.0000000000000000E+00 0.0000000000000000E+00
1.0000000000000000E+00 0.0000000000000000E+00 1.0000000000000000E-01
1.0000000000000000E+00 0.0000000000000000E+00 1.0000000000000000E+00
1.0000000000000000E+00 1.0000000000000000E+00 0.0000000000000000E+00
1.0000000000000000E+00 1.0000000000000000E+00 1.0000000000000000E-01
1.0000000000000000E+00 1.0000000000000000E+00 1.0000000000000000E+00

```

(x,y,z) of nodes

```

4 1 7
4 7 10
5 6 3
5 3 2
11 8 9
11 9 12
2 3 9
2 9 8
5 11 12
5 12 6
6 12 9
6 9 3
1 4 5 2
10 7 8 11
7 1 2 8
4 10 11 5

```

Boundary Triangles (ordered to direct inward)

Boundary Quads (ordered to direct inward)

```

5
5
1
1
2
2
3
3
4
4
6
6
1
2
3
4

```

Boundary tags for triangles

Boundary tags for quads

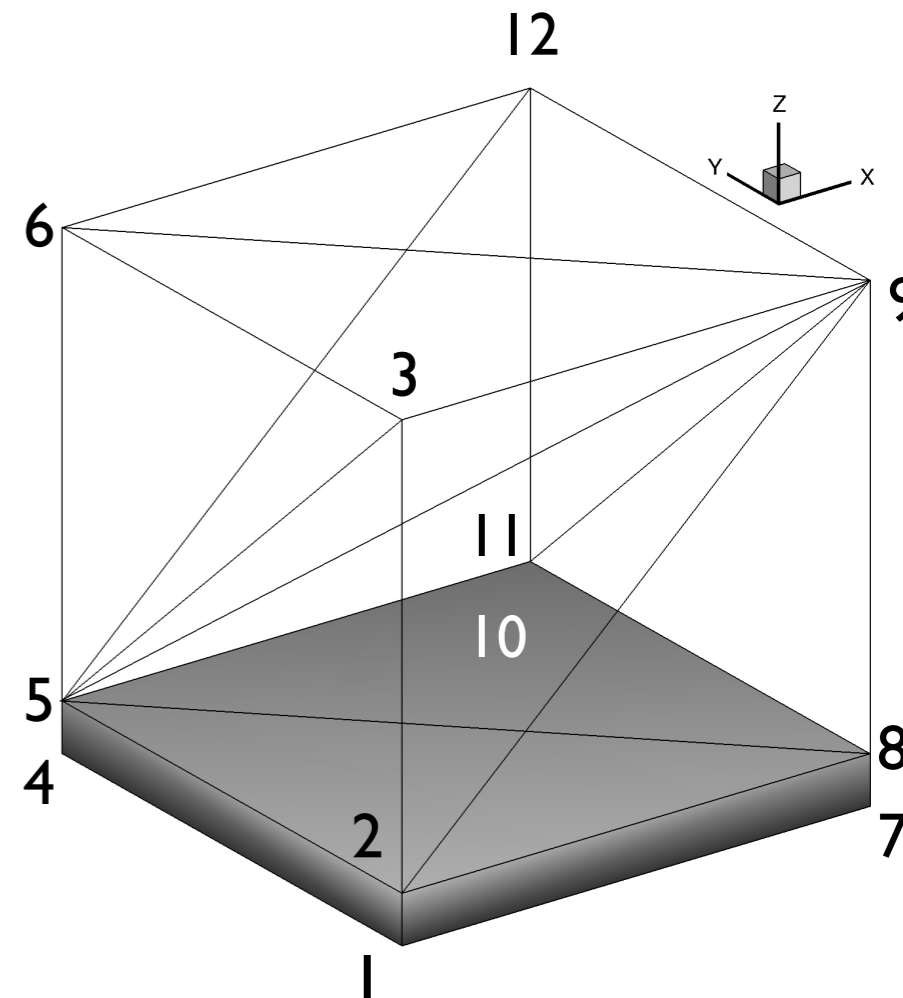
```

2 5 3 9
5 6 3 9
11 8 9 5
11 9 12 5
2 8 5 9
5 12 6 9
1 7 4 2 8 5
4 7 10 5 8 11

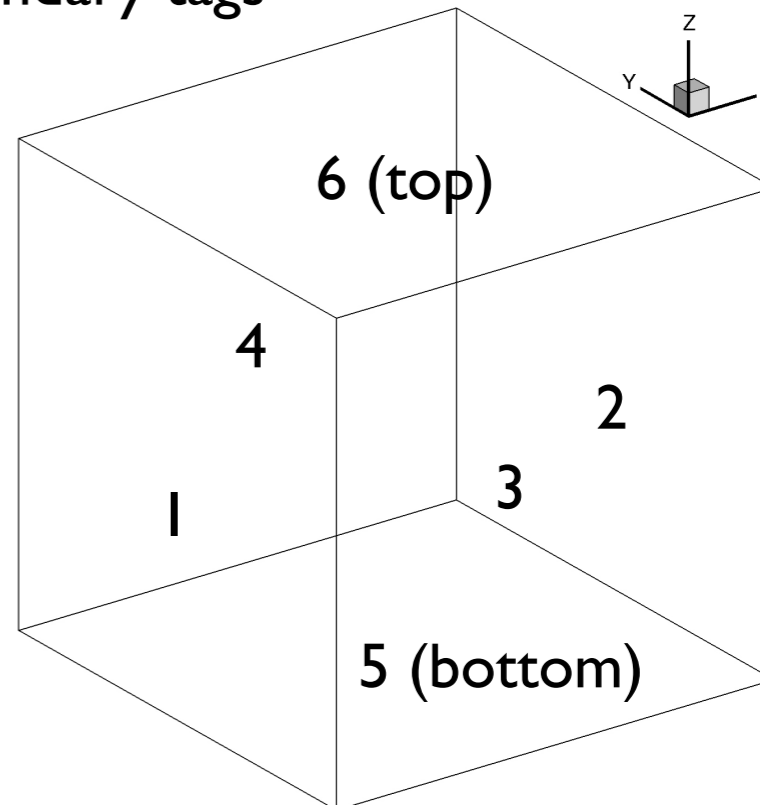
```

Tetrahedra

Prims



Boundary tags



# Boundary Condition File for Solver

```
Boundary tag  boundary condition name/number  
tag1 #      [boundary condition 1]  
tag2 #      [boundary condition 2]  
  .          .  
  .          .  
  .          .  
  .          .
```

## Example

EDU2D/3D Codes: .bcmmap

```
! Boundary tag  BC name  
1 freestream  
2 subsonic_outflow  
3 viscous_wall
```

## Example

FUN3D: .mapbc

```
! Boundary tag  BC #  
1 5050  
2 5051  
3 4000
```