Boundary Representation (B-rep)

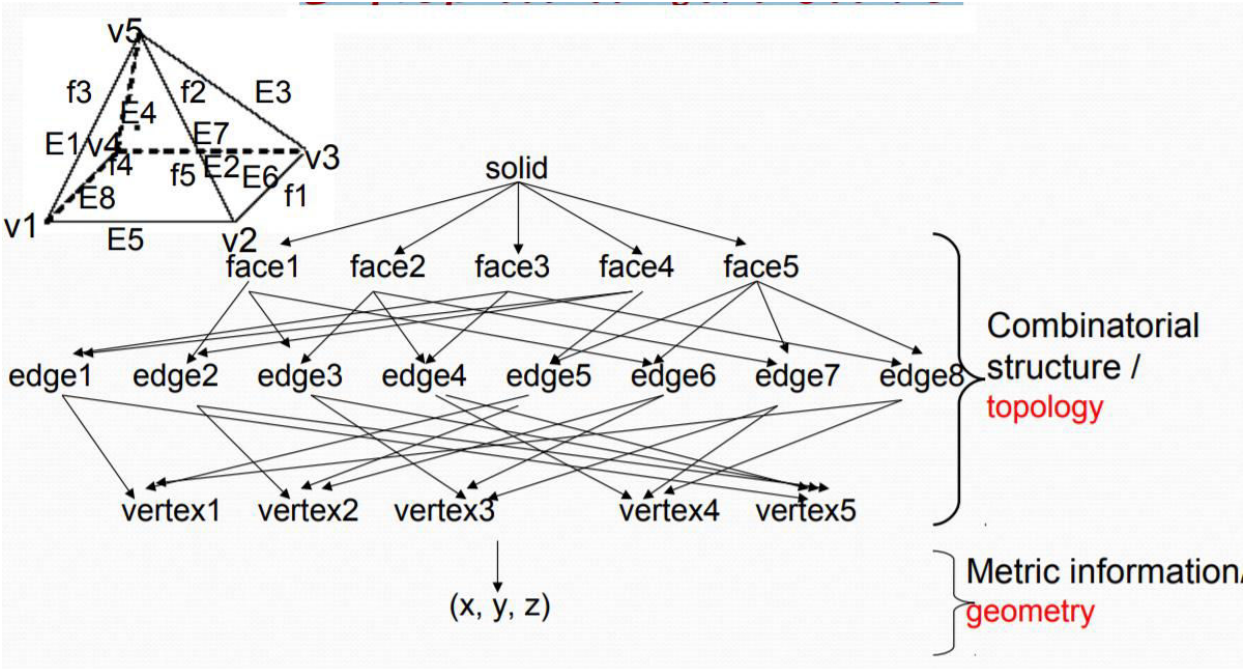
Solid model is defined by their enclosing surfaces or boundaries. This technique consists of the geometric information about the faces, edges and vertices of an object with the topological data on how these are connected.

B-rep model is created using Euler operation

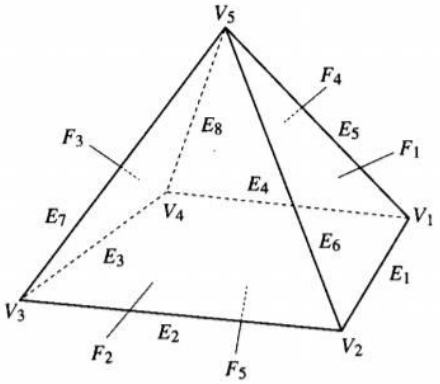
Data structure :

B-Rep graph store face, edge and vertices as nodes, with pointers, or branches between the nodes to indicate connectivity.

B-Rep data structure



B-Rep data structure



Face Table

Face	*Edges*
F_1	E_1, E_5, E_6
F_2	E_2, E_6, E_7
F_3	E_3, E_7, E_8
F_4	E_4, E_8, E_5
F_5	E_1, E_2, E_3, E_4

Edge Table

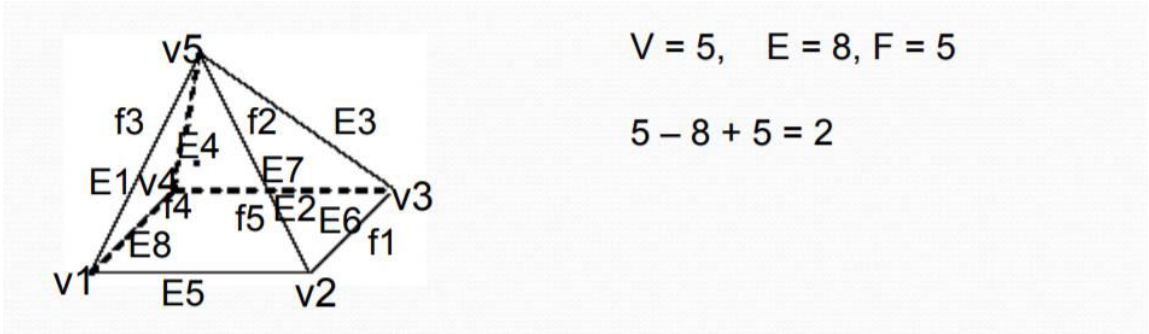
Edge	*Vertices*
E_1	V_1, V_2
E_2	V_2, V_3
E_3	V_3, V_4
E_4	V_4, V_1
E_5	V_1, V_5
E_6	V_2, V_5
E_7	V_3, V_5
E_8	V_4, V_5

Vertex Table

Vertex	*Coordinates*
V_1	x_1, y_1, z_1
V_2	x_2, y_2, z_2
V_3	x_3, y_3, z_3
V_4	x_4, y_4, z_4
V_5	x_5, y_5, z_5
V_6	x_6, y_6, z_6

Lecture No 37 Topic: Boundary representationvalidity

- Validity also checked through mathematical evaluation
- Evaluation is based upon Euler's Law (valid for simple solid – no hole)
- V – E + F = 2 V- number of vertices E- number of edges F- number of faces



Boundary representation validity

- Expanded Euler's law for complex polyhedrons (with holes)
- Euler-Poincare Law:
- V-E+F-H+2P=2B
- H – number of holes in face, P- number of passages or through holes, B- number of separate bodies.