

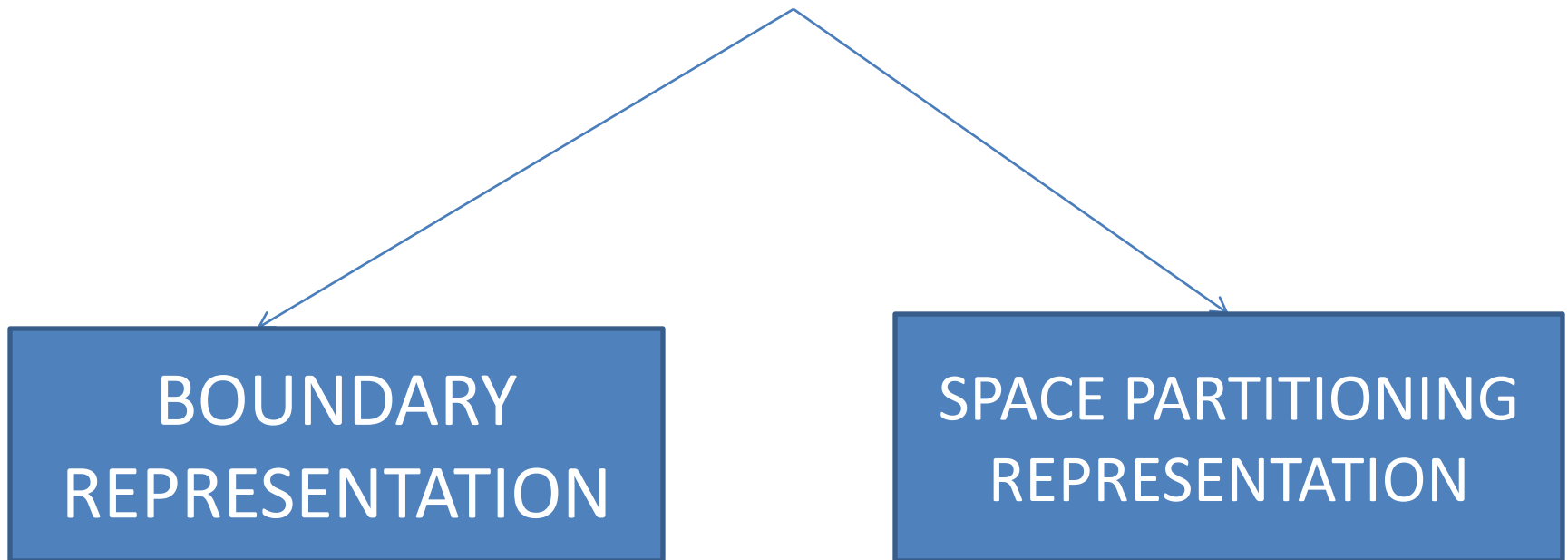
3 D Object Representations

RIDHIMA DUTTA

POONAM DHAND

Solid Object Representation -:

- Representation for solid objects can be divided into two categories.



Boundary representation describe a 3-D object as a set of surfaces that **separate** the object **interior from the environment**.

Eg: Polygon Facets, Spline Patches

Space Partitioning Representations are used to describe interior properties, by partining the Spatial region containing the object into non overlapping ,contiguous solids.

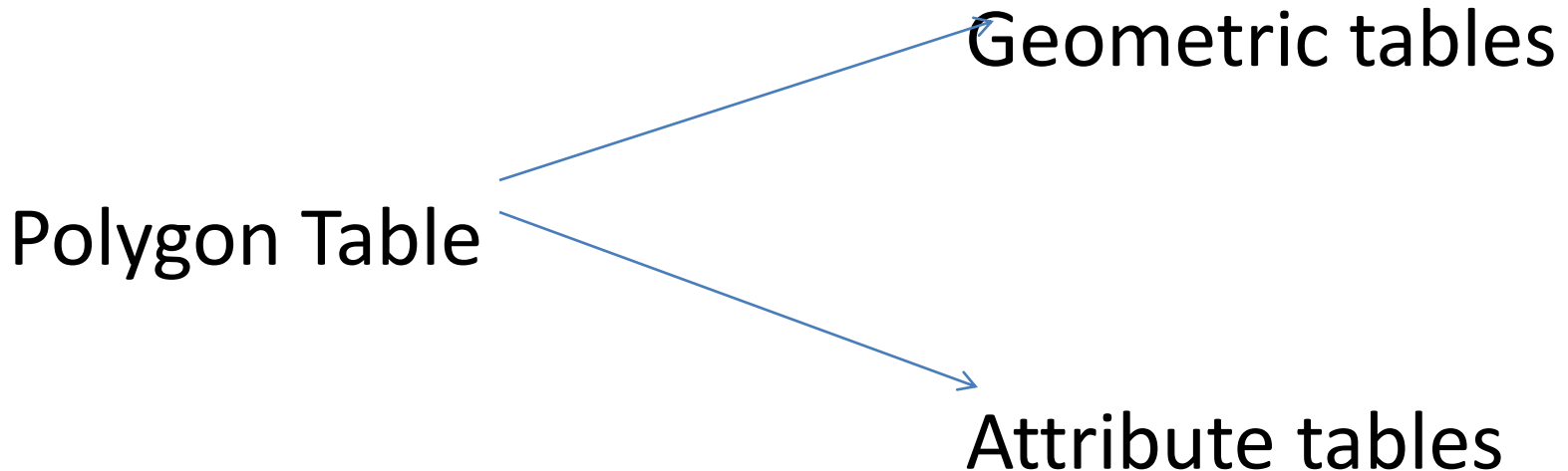
Eg: Octree Representation.

1. Polygon surfaces:

- Many graphics system stores all the object description as a set of surface polygons.
- Speeds up **surface rendering** and display of objects, since all surfaces are described with linear equations.

Polygon tables

- We can specify a polygon surface with a set of vertex coordinates and associated attribute parameters



Geometric tables consists of:

- VERTEX TABLE
- EDGE TABLE
- POLYGON SURFACE TABLE

	VERTEX TABLE
V1	X1,Y1,Z1
V2	X2,Y2,Z2
V3	X3,Y3,Z3
V4	X4,Y4,Z4
V5	X5,Y5,Z5

	EDGE TABLE
E1	V1,V2
E2	V2,V3
E3	V3,V1
E4	V3,V4
E5	V4,V5
E6	V5,V1

POLYGON-SURFACE TABLE
S1:E1,E2,E3
S2:E3,E4,E5,E6

SOME OF THE TEST THAT GRAPHIC PACKAGES SHOULD PERFORM ARE:

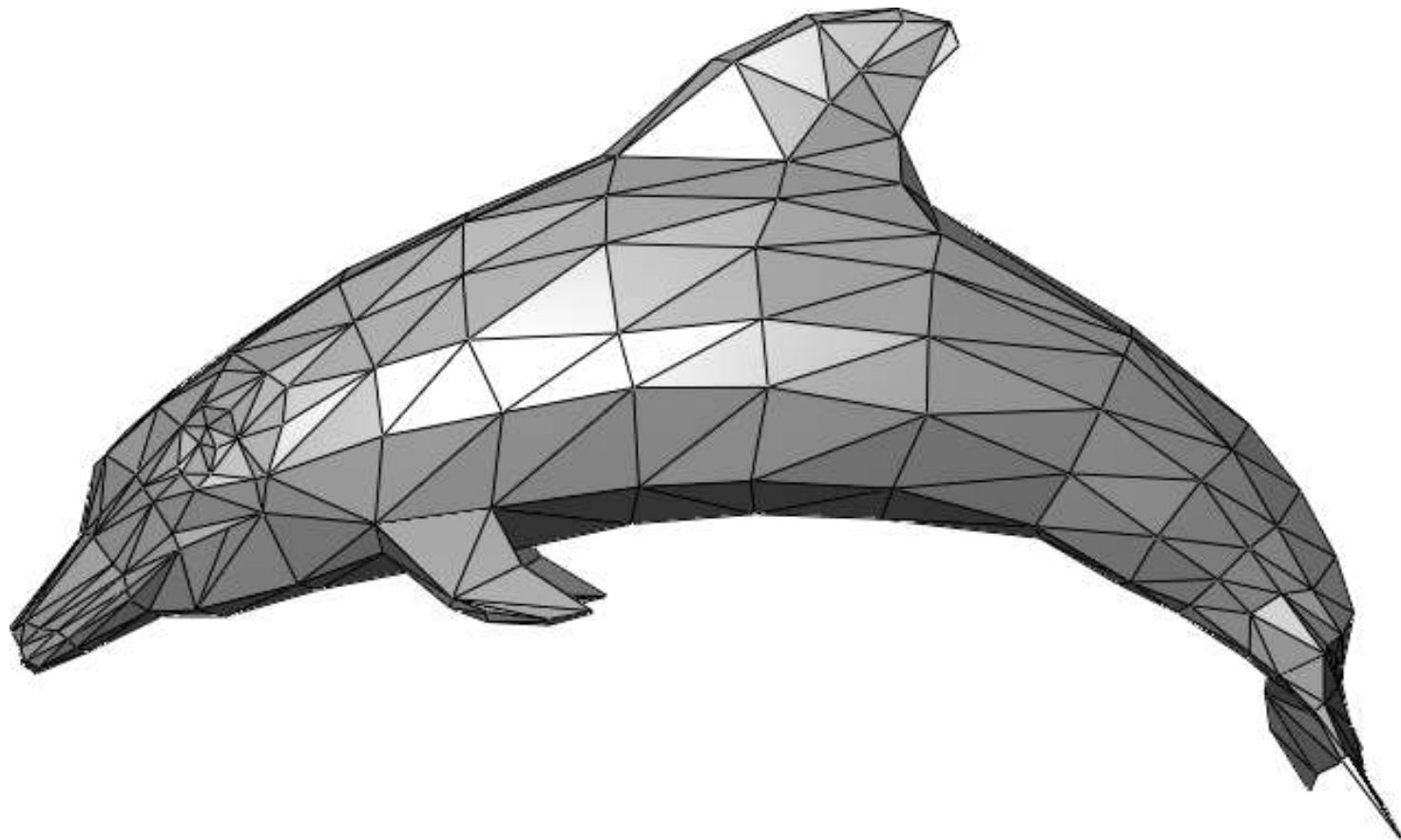
- THAT EVERY VERTEX LISTED AS END POINT OF AT LEAST TWO EDGES.
- THAT EVERY EDGE IS PART OF ATLEAST ONE POLYGON
- THAT EVERY POLYGON IS CLOSED
- THAT EACH POLYGON HAS ATLEAST ONE SHARED EDGE

PLANE EQUATIONS

- THE EQUATION FOR A PLANE SURFACE CAN BE EXPRESSED IN FORM

$$Ax+By+Cz+D=0$$

Polygon meshes



- A **polygon mesh** is a collection of vertices, edges and faces that defines the shape of a object in [3D computer graphics](#) and [solid modeling](#). The faces usually consist of [triangles](#), [quadrilaterals](#) or other simple [convex polygons](#).
- For a triangle mesh $n-2$ triangles may be needed

2...Curved Lines and Surfaces

- Displays of 3-D curved lines and surfaces can be generated from an input set of mathematical functions defining the object or from set of user specified data points.
- When a set of co-ordinate points used to design a new object shape ,a function is obtained that fits best according to the constraint of application.eg spline curves

