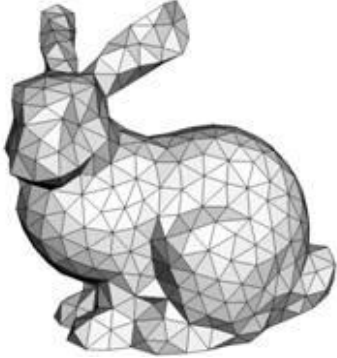


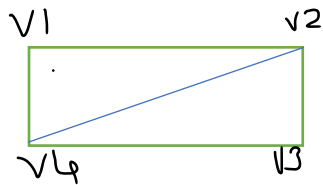
Masterclass in Data Structure and Algorithms

Exercise 1

1. Project: Mesh loading: Under Real Time Rendering, the objects are made up of wired mesh as show in the diagram below.



To be able to render such a 3D object on screen, programmer requires 3D coordinate data. Such data is available to him in a text file known as mesh file. To understand the contents of mesh file it is important to its format and its data interpretation. Under Real Time Rendering all real-life looking objects are made up of triangles also known as 'faces.' Each face has three 'vertices', every vertex being a 3D point in cartesian coordinate system having x, y, z coordinates. As a vertex may be shared multiple faces, knowing only coordinate data of all vertices is not sufficient for rendering. We must know which vertices come together to form a face. This information is represented in mesh file in the following format.



There are two faces viz. v1 v2 v4 and v2 v3 v4
The data in the mesh file would look like below,

v	x1	y1	z1
v	x2	y2	z2
v	x3	y3	z3
v	x4	y4	z4
f	1	2	4
f	2	3	4

The 'v' entries will enumerate all vertices along with their coordinate data. And the 'f' entries will specify the index of their three vertices in the 'v' entries (please note that under mesh file the indexing starts from 1)

With reference to above diagram, there are four 'v' entries enumerating all vertices in diagram along with their coordinate data and two 'f' entries which specify 'index' of vertices in the 'v' entries of which they are made of.

More simply, the mesh is made of two faces, face one is made of vertex indexed as 1, 2, and 4 in 'v' entries and face two is made of vertex indexed as

2, 3, and 4 in 'v' entries, and the 'v' entries contain the coordinate data for vertex 1, 2, 3, and 4.

You have been given a mesh-mesh file, monkey_head.txt containing the mesh data of the monkey head mesh. Your task is to parse the file as follows.

[1] Choose appropriate data structure to store all 'v' entries together.

[2] Choose appropriate data structure to store all 'f' entries. If programmer reads the first 'f' entry then based on numbers in the entry and data structure built in [1], programmer should have access to coordinate data of all three vertices which make up the face in the current entry.