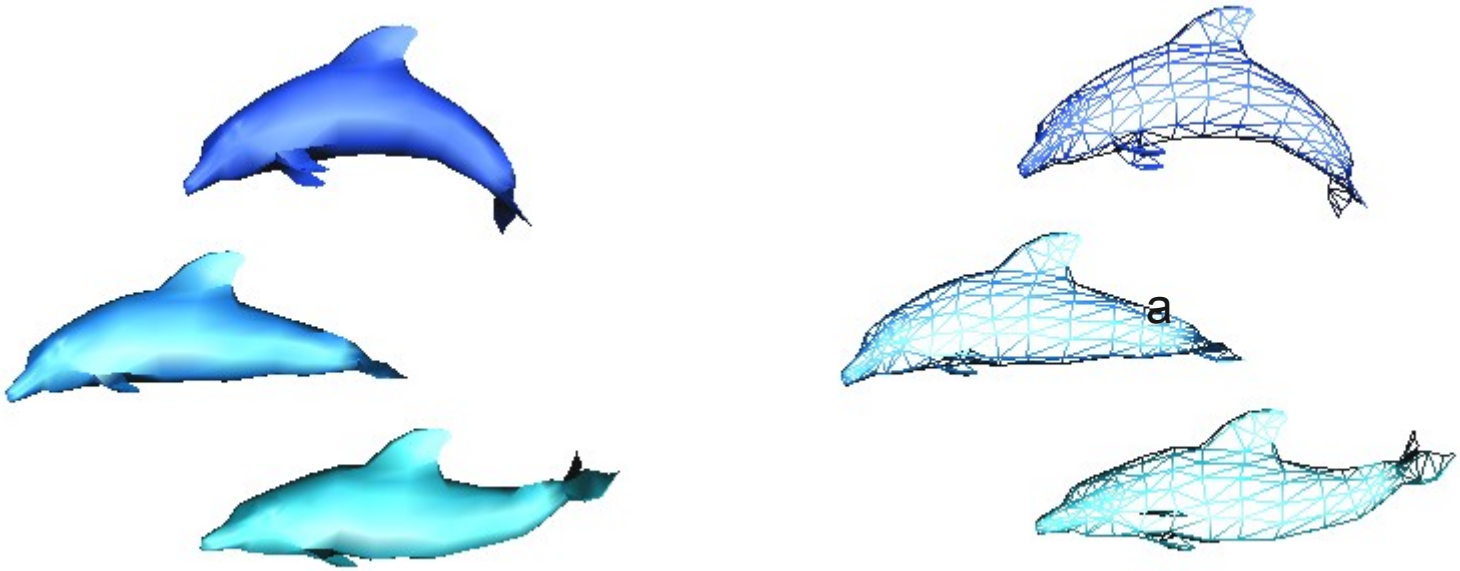
Assignment 2

Objectives

- Read in .obj file
- Display .obj file
  - Point
  - Wireframe
  - Surface
- Rotation
  - Virtual Trackball


a

Object Structure

-number of vertices

-vertices

-number of normals

-normals

-number of triangles

-triangles

Parser

- `char buf[128]`
- `while(fscanf(file, "%s", buf) != EOF)`
- `fgets(buf, sizeof(buf), file)`
- `fscanf(file, "%f %f %f", … )`

```
v -1.000000 -1.000000 1.000000
v -1.000000 1.000000 1.000000
v 1.000000 1.000000 1.000000
v 1.000000 -1.000000 1.000000
v -1.000000 -1.000000 -1.000000
v -1.000000 1.000000 -1.000000
v 1.000000 1.000000 -1.000000
v 1.000000 -1.000000 -1.000000
```

.obj Structure

-number of vertices

-vertices

-number of normals

-normals

-number of triangles

-triangles

Vertices - .obj file

```
v -1.000000 -1.000000 1.000000
v -1.000000 1.000000 1.000000
v 1.000000 1.000000 1.000000
v 1.000000 -1.000000 1.000000
v -1.000000 -1.000000 -1.000000
v -1.000000 1.000000 -1.000000
v 1.000000 1.000000 -1.000000
v 1.000000 -1.000000 -1.000000
```

Vertices - Parser

```
v -1.000000 -1.000000 1.000000
```

```
numVertices = 0;
fscanf(file, "%f %f %f",
    &vertices[3 * numVertices + 0],
    &vertices[3 * numVertices + 1],
    &vertices[3 * numVertices + 2]);
 numVertices++;
```

.obj Structure

-number of vertices

-vertices

-number of normals

-normals

-number of triangles

-triangles

Normals - .obj File

```
vn 0.577350 0.577350 -0.577350
vn 0.577350 -0.577350 -0.577350
vn -0.577350 -0.577350 -0.577350
vn -0.577350 0.577350 -0.577350
vn 0.577350 0.577350 0.577350
vn 0.577350 -0.577350 0.577350
vn -0.577350 -0.577350 0.577350
vn -0.577350 0.577350 0.577350
```

- Repeat vertex parsing process

.obj Structure

-number of vertices

-vertices

-number of normals

-normals

-number of triangles

-triangles

Triangles - .obj File

```
f  1  2  3
f  3  4  1
f  6  5  7
f  5  8  7
   (Or)
f 4//4 3//3 2//2 1//1
```

Triangle - Parser

- F 1//1 2//2 3//3
- numTriangle = 1

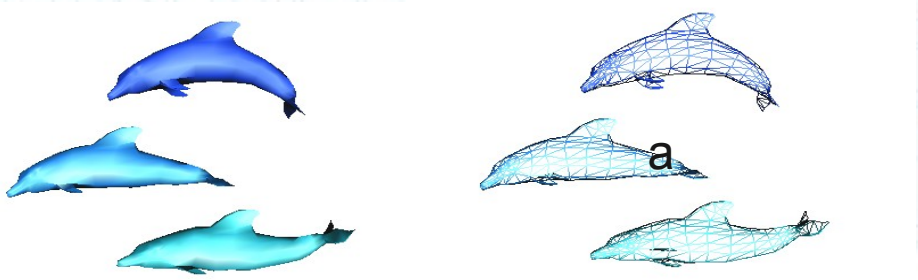
```
T(numTriangles).vindices[0] = v;
        T(numTriangles).nindices[0] = n;


T(numTriangles).vindices[1] = v;
        T(numTriangles).nindices[1] = n;


T(numTriangles).vindices[2] = v;
        T(numTriangles).nindices[2] = n;
```

Display .obj File

- Traverse each triangle
  - Get 3 vertex indices
  - Draw 3 vertices of triangle
    - Access three indices in vertex list
  - If applicable:
    - Same for vertex normals

Display .obj File

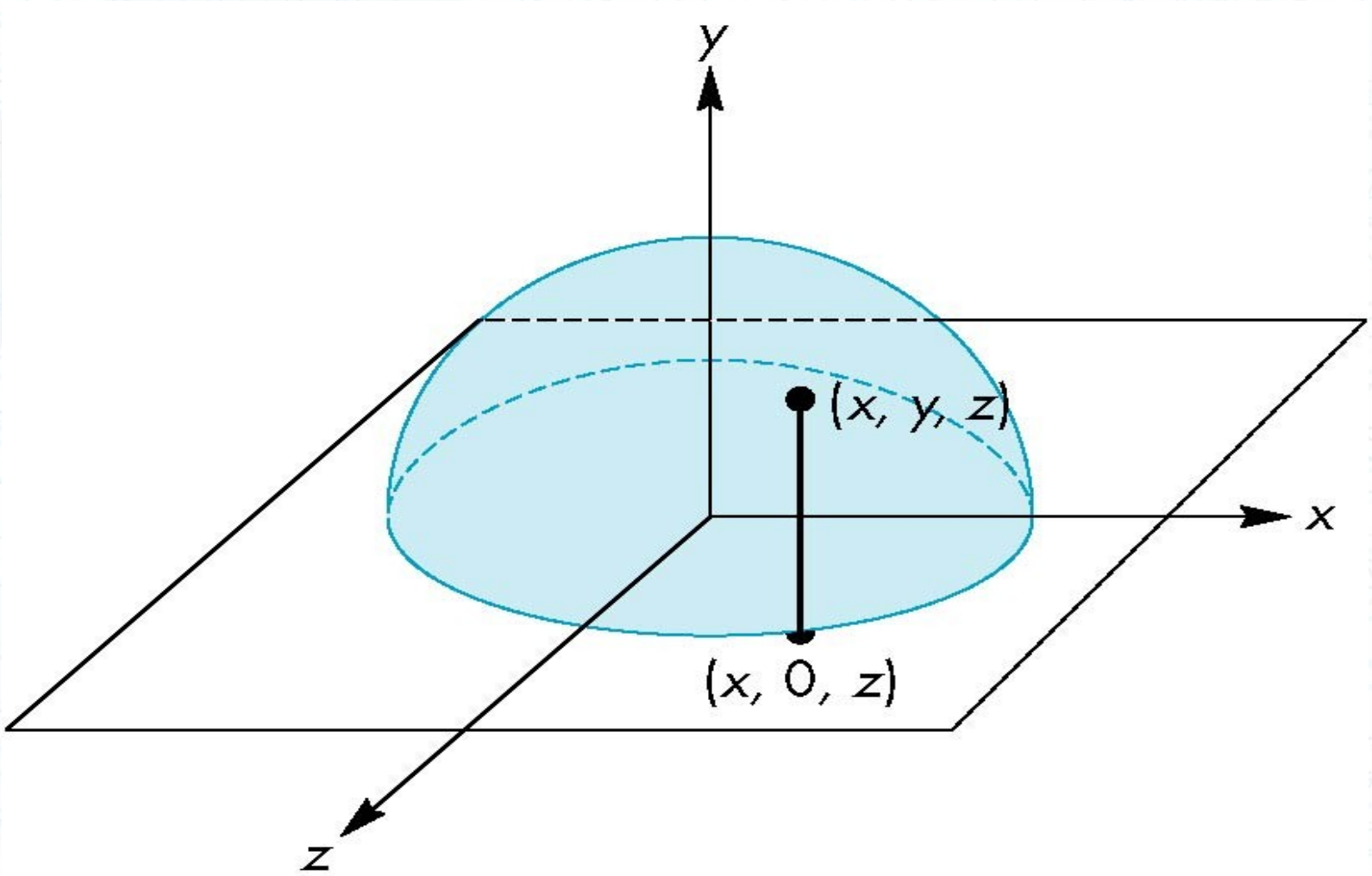
- Representation:
  - Point: glBegin(GL_POINTS)
  - Wireframe: glBegin(GL_LINE_STRIP)
  - Surface: glBegin(GL_TRIANGLES)



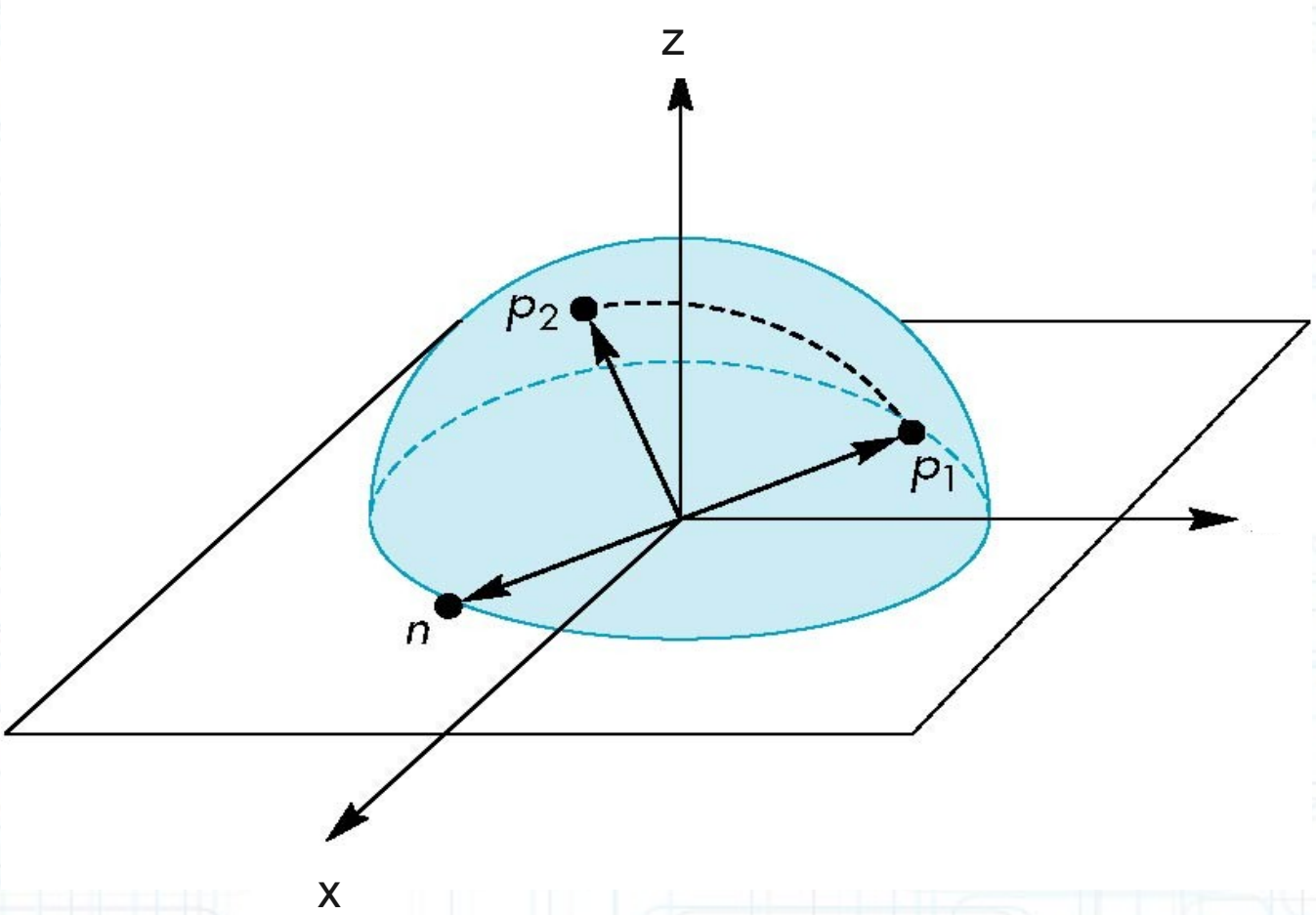
Virtual Trackball

ALSO AVAILABLE
The Spaceball 2003 FLX

Projection



Plane of Rotation



$$|\sin\theta| = \frac{|\mathbf{n}|}{|\mathbf{p}_1||\mathbf{p}_2|}$$