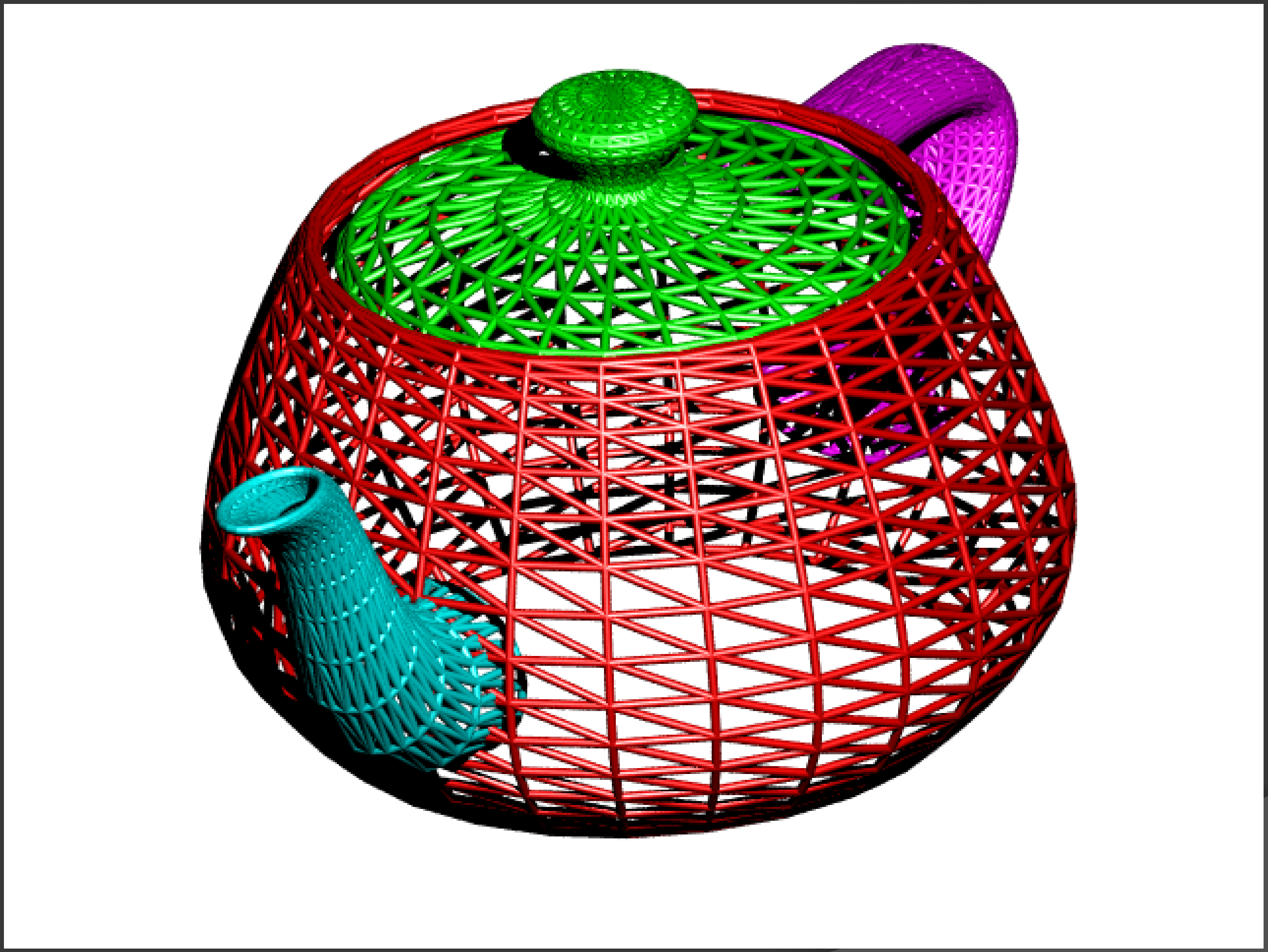
PROGRAMMING ASSIGNMENT #2-2

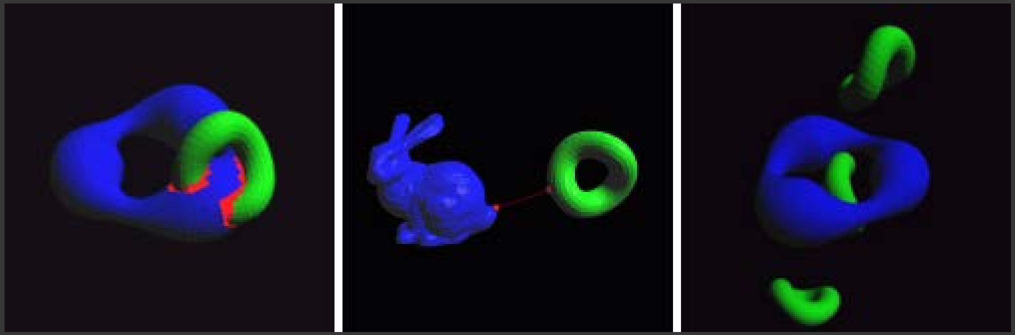
DUE: MAY 2, 2016

BVH for Triangular Mesh Models



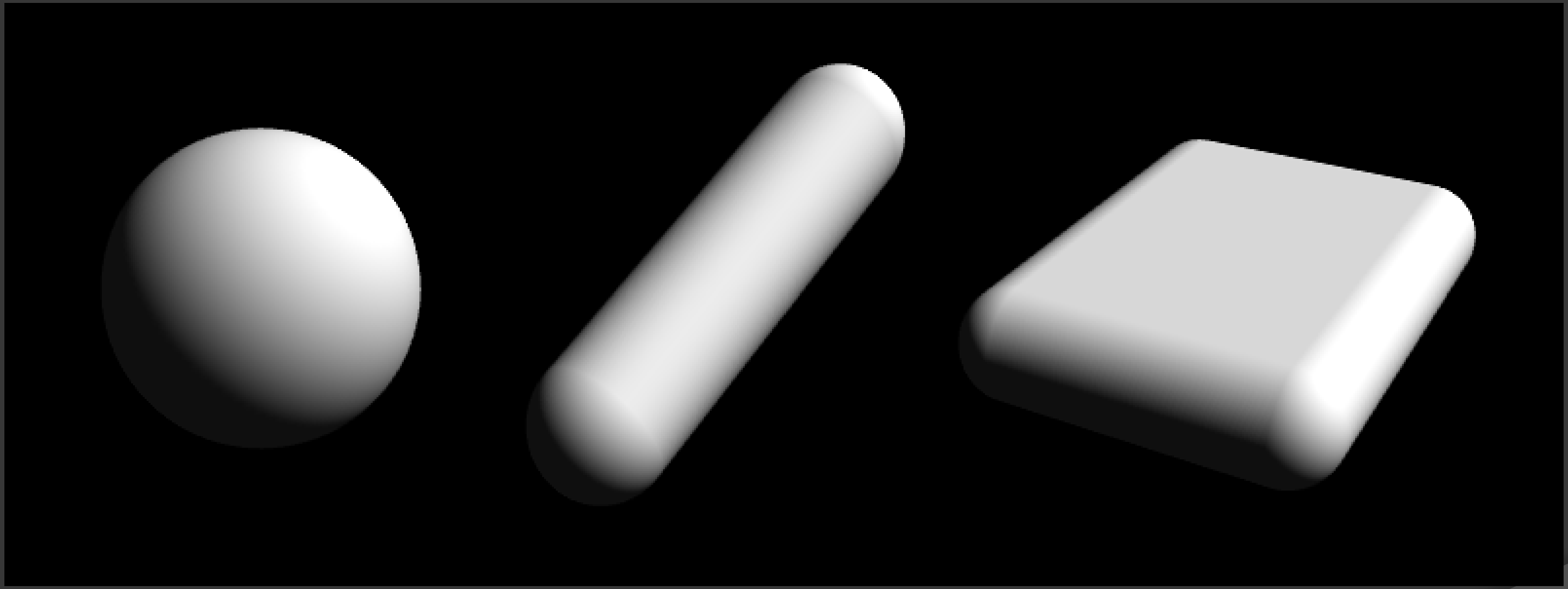
PQP Library

- A Proximity Query Package
  - Collision Detection
  - Distance Computation
  - Tolerance Verification



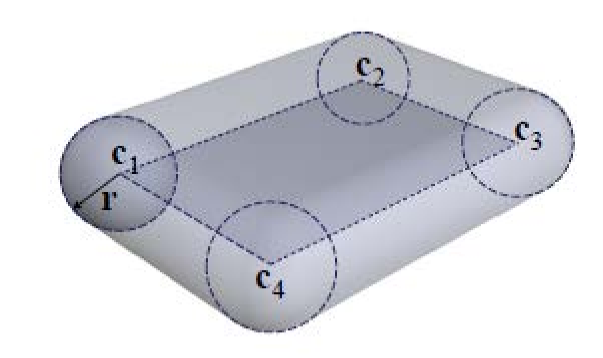
PQP Bounding Volume

- SSV (Swept Sphere Volume)



PQP Bounding Volume

- RSS (Rectangle Swept Sphere)



- Distance Bound

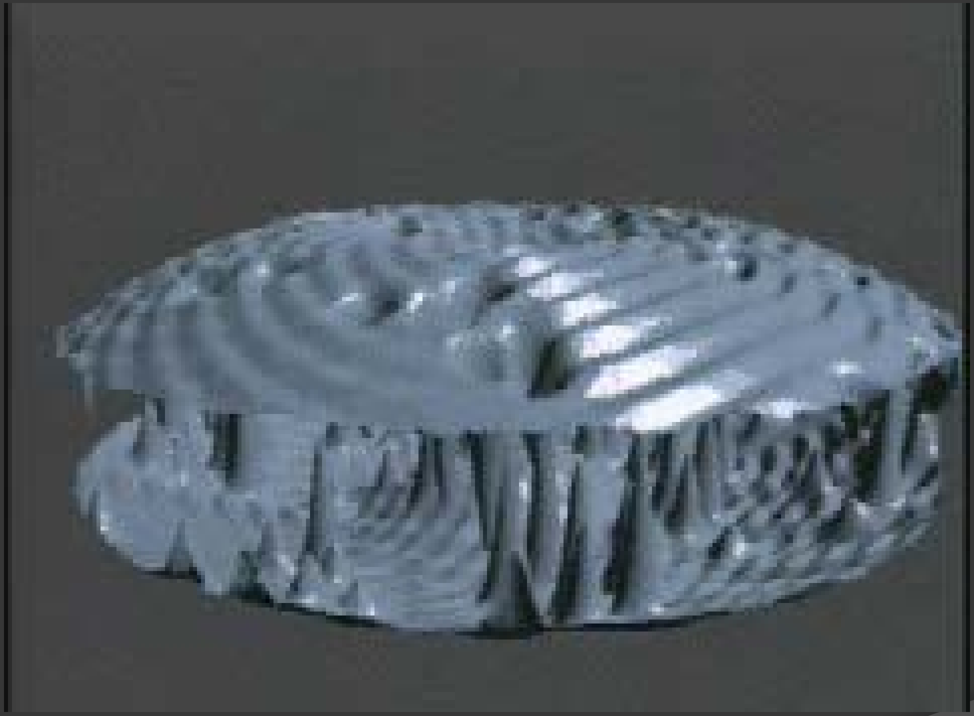
dist(rect1, rect2)-r1-r2<= Exact Dist <= dist(rect1, rect2)+r1+r2

PQP Applications

- Dynamic Simulation

PQP Applications

- Path Planning



How to Get PQP

- You can download it from http://gamma.cs.unc.edu/SSV
- PQP can be compiled on Win32 and UNIX
- It also includes intuitive examples

Step 1: Build BVH

```
PQP_Model* bunny = new PQP_Model();
bunny.BeginModel();

for (int i = 0; i < ntris; i++)
    bunny->AddTri(t1.p1, t1.p2, t1.p3, i);

bunny.EndModel();
```

Step 2: Collision Detection

PQP_Model bunny, torus;

Build BVH…(step1)

PQP_CollideResult cres;

PQP_Collide(&cres, R1, T1, b1, R2, T2, b2,
    PQP_ALL_CONTACTS);

Drawing Model

```
// drawing bunny
glBegin(GL_POLYGON);
glVertex3fv(bunny->tris[i].p1);
glVertex3fv(bunny->tris[i].p2);
glVertex3fv(bunny->tris[i].p3);
glEnd();
```

PQP_CollideResult

- Variable “cres” has collision result.
- cres.id1(i) and cres.id2(i) are the ids of triangles.
- However, you cannot use

  bunny->tris[cres.id1(i)]

  because index of the array and id can be different.
- You may want to store triangles in another array.

Assignment #2-2

- Build BVH for 3D triangular mesh models.
- Collision detection and visualization
- Draw colliding triangles