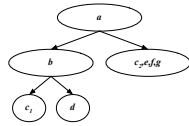
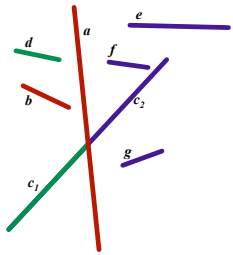
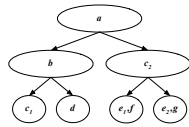
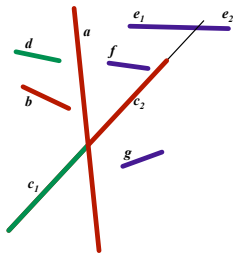


BSP-Trees



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BSP-Trees



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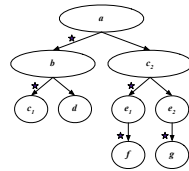
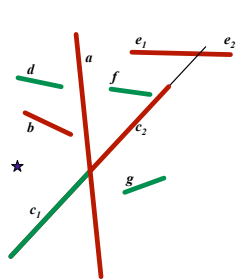
BSP-Trees

• Visibility Traversal

- Variation of in-order-traversal
 - Child one
 - Sub-tree root
 - Child two
- Select "child one" based on location of viewpoint
 - Child one on same side of sub-tree root as viewpoint

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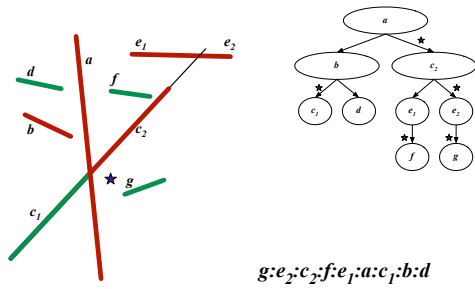
BSP-Trees



$c_1;b:d;a:f:e_1;c_2;g:e_2$

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BSP-Trees



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Your Ray Tracer

```
RayTrace (image)
  For ray in camera
    image[pixel] = Trace(ray)

Trace (ray)
  t_hit = infinity
  For object in scene
    t_hit = min(object.intersect(ray), t_hit)
  shade at t_hit
  possible calls to Trace(new_ray)
```

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Your Ray Tracer

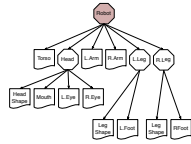
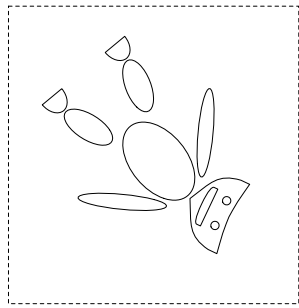
```
RayTrace (image)
  For ray in camera
    image[pixel] = Trace(ray)
Trace (ray)
  t_hit = infinity
  For object in scene
    t_hit = min(object.intersect(ray), t_hit)
  shade at t_hit
  possible calls to Trace(new_ray)
```

Your Ray Tracer

```
RayTrace (image)
  For ray in camera
    image[pixel] = Trace(ray)
Trace (ray)
  t_hit = infinity
  For object in scene
    t_hit = min(object.intersect(ray), t_hit)
  shade at t_hit
  possible calls to Trace(new_ray)
```


AABB Trees

One of many variations



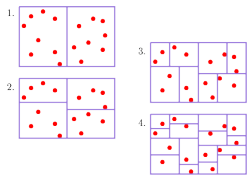
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Ray Test Against Bound Tree

- RayHitSubTree (&ray, node)
 - If RayHitsBB(ray, node.xfBB)
 - $ixfRay = \text{Inverse}(\text{node.xf}) * ray$
 - If RayHitsBB(ixfRay, node.BB)
 - If node is group
 - Foreach child in node.children
 - RayHitSubTree(ixfRay, child)
 - else // node not group
 - RayHitGeometry(ixfRay, node.geom)
 - ray.collisonInfo.update(ixfRay)

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Building the tree



- Sort (or QuickSelect) and split on one axis
- Repeat for the other axis
 - xyz

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Other Schemes

- Uniform Grid/Octrees
- Spatial Hierarchies
- Etc

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