Voxelization - Signed Distance Field

FOR EACH brick to produce

- voxelize mesh by computing closest distance from each voxels to mesh

2 pass algorithm :

-- create 3 temporary 3D textures of size 1 brick (+ border) to store distances from mesh to each axis (x,y,z)

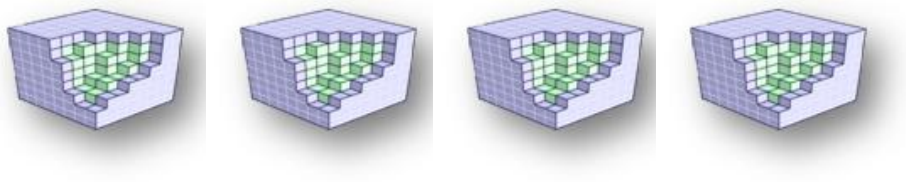
-- [1] on demand, rasterize mesh and store distance to each axis (orthographic projection, camera align to brick, viewport of size of brick)

-- [2] fill « data pool » by storing, at each voxel, shortest distance along the 3 axes (i.e it produces an « approximate » Signed Distance Field)

Normals are then computed from Signed Distance Field with a « gradient » method

Voxelization - Signed Distance Field

Voxel : 4 float channels
[distance, normal.xyz]



1 HOST producer → 2 produce Nodes → do nothing…

3 DEVICE producer → 4 produce Nodes → oracle says => « data everywhere »

Voxelization - Signed Distance Field

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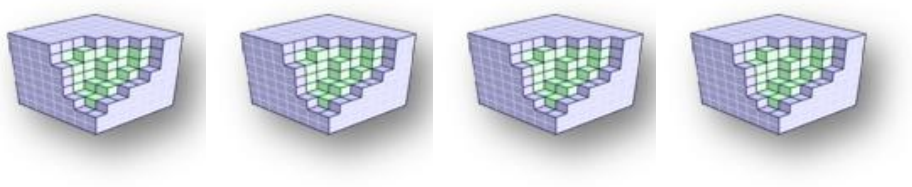
[distance, normal.xyz]



1 HOST producer → 2 produce Bricks → compute Signed Distance Field (in channel 0) with OpenGL interoperability (GLSL shader with image load/store)

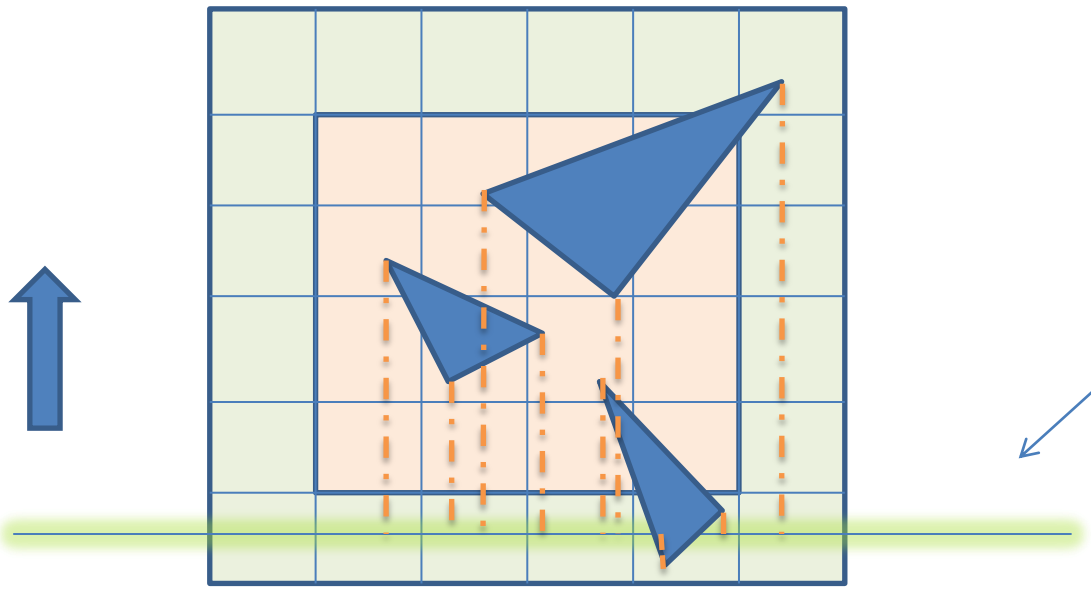
3 DEVICE producer → 4 produce Bricks → compute normals (channels 1,2,3) from Signed Distance Field (channel 0) => « gradient » method

Example : voxelization on X axis

Voxelization

- rasterization with orthographic projection and viewport of size 1 brick (+border)
- camera plan align with brick
- centered at half voxel (texel)
- 1 voxel corresponds to 1 pixel (but many fragments inside)
- store shortest distance to camera plane

Brick
- 4x4 voxels
- 1 border



camera plane

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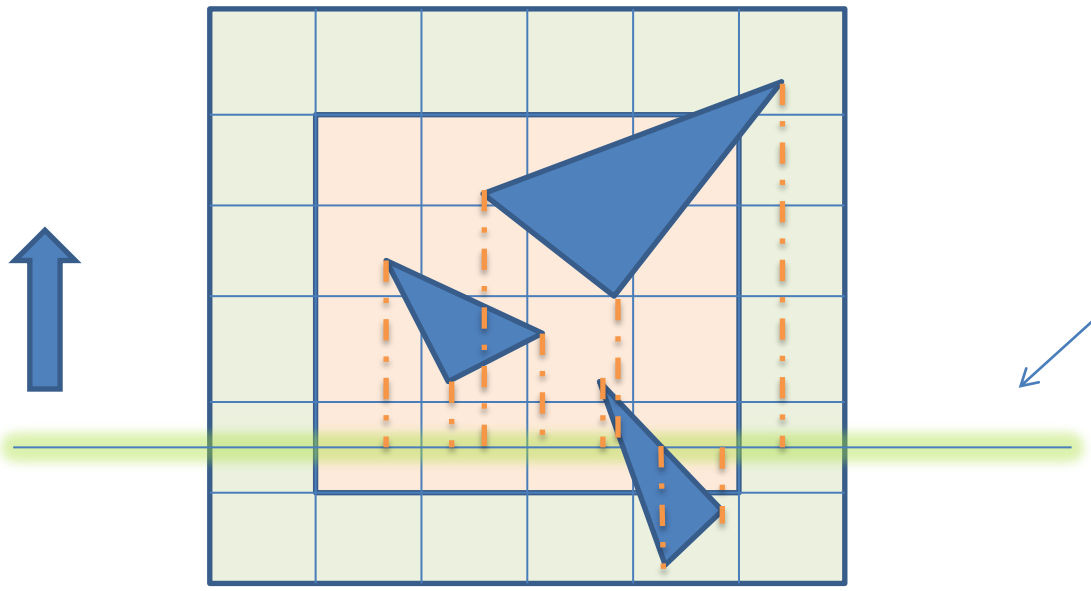

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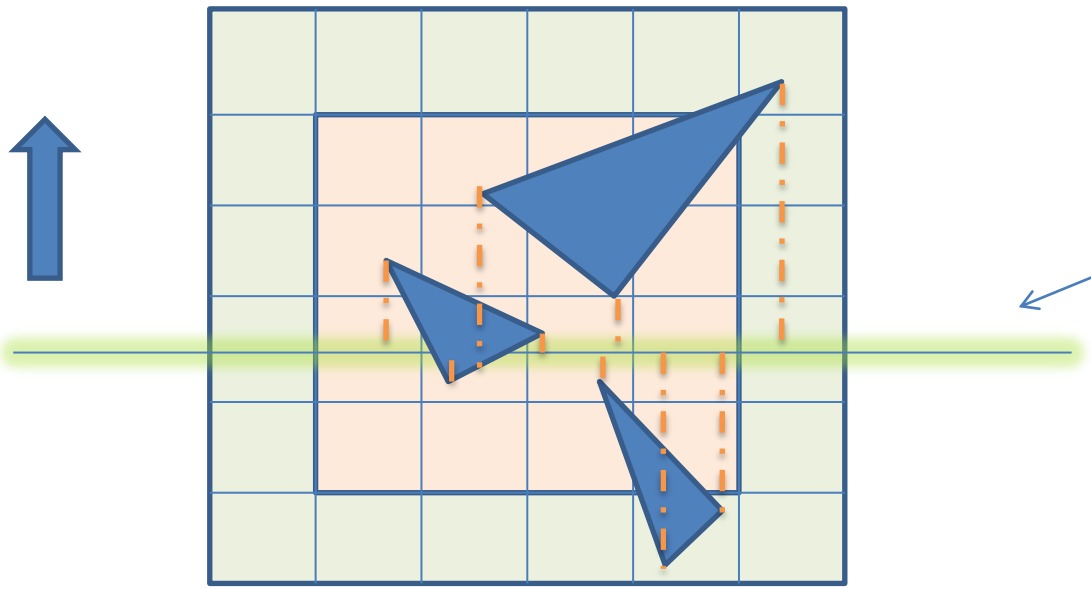

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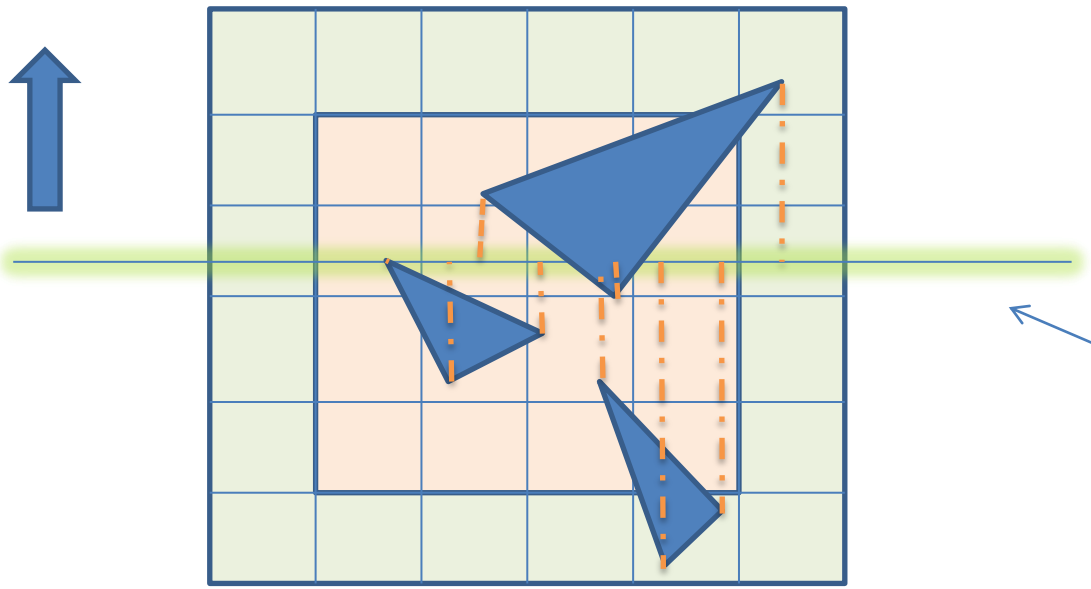

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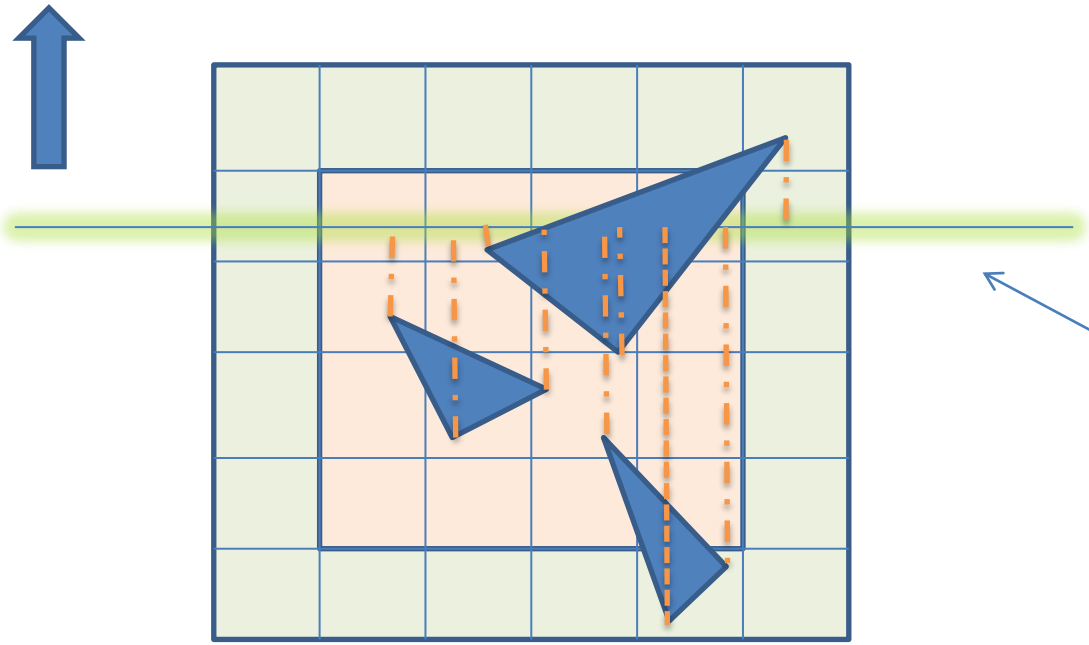

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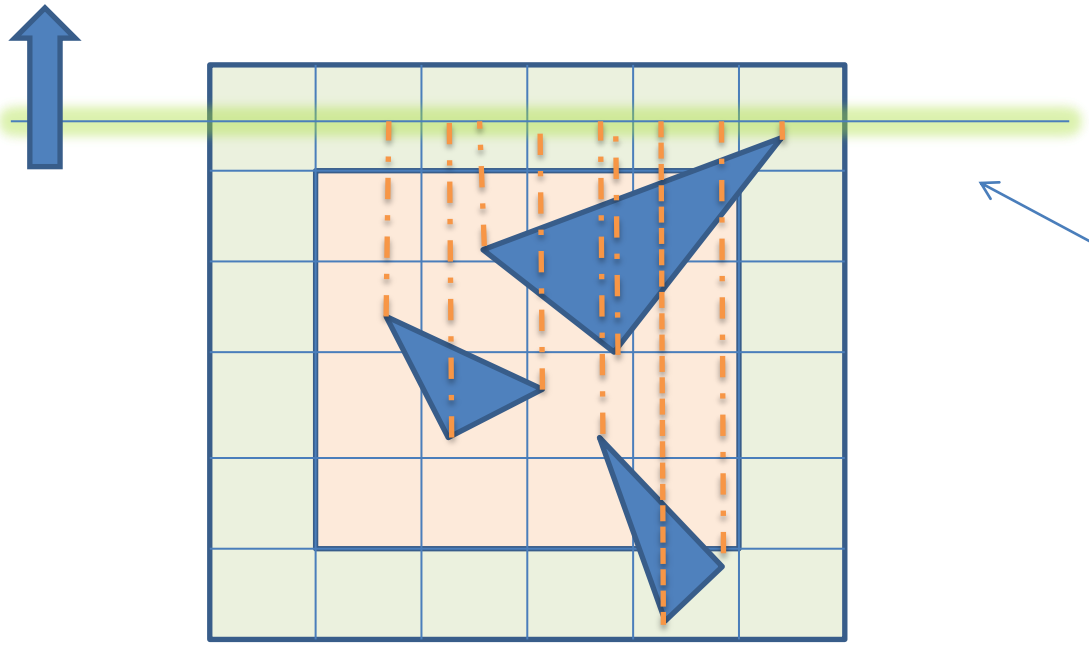

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THEN : do the same on Y and Z axis by rotation

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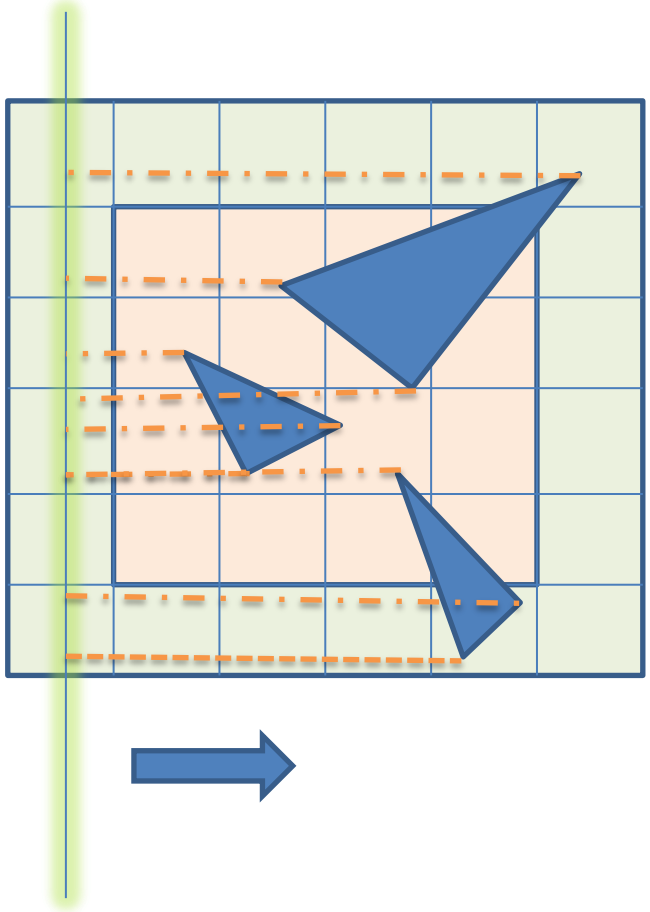

camera plane

Finally : fill « data pool » with shortest distances on 3 axis

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