SQL is a Programming Language

Visibility in 3D Terrain

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The Problem
Which parts of the map can I see?
The Problem

Which points of a hilly terrain are visible from a given viewer position using a max-scan?
Visibility in 2D Terrain
Visibility in 2D Terrain

For every point $x$:

$$\tan(\alpha) = \frac{\text{Opposite}}{\text{Adjacent}}$$

$$\alpha = \arctan\left(\frac{\text{Opposite}}{\text{Adjacent}}\right)$$
Visibility in 2D Terrain

For every point $x$:

$$\tan(\alpha) = \frac{\text{Opposite}}{\text{Adjacent}}$$

$$\alpha = \arctan\left(\frac{\text{Opposite}}{\text{Adjacent}}\right)$$
Visibility in 2D Terrain

For every point from viewing point:

If the current $\alpha \leq \text{MAX(previous } \alpha)$

$\rightarrow$ Point is not visible
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Just like 2D, but:

We must find all the boxes that our ‘line of sight’ hits
Visibility in 3D Terrain

![Diagram showing visibility in 3D terrain with grid and points]

- Grid with points at (x1, y1), (x2, y1), (x3, y1), (x4, y1), (x5, y1), (x2, y2), (x3, y2), and (x3, y3).
- Green line representing visibility from one point to another.
- Blue line indicating another path of visibility.

Visibility 3D
Visibility in 3D Terrain

Big thanks to Geometric Data-Types!
They include:

• Boxes = ( (x₁, y₁),(x₂, y₂) )

• Line Segments ( (x₁, y₁),(x₂, y₂) )
Visibility in 3D Terrain

- `geometric_type` → Boolean

Do these objects intersect?
Visibility in 3D Terrain

Visibility 3D

Visibility 3D
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→ Point not visible
Visual- and Code Presentation

Code implemented using PostgreSQL

Visuals made in Blender

[Insert live demo here]