Computergrafik

Universität Bern
Herbst 2012

Assignment 2: user interaction

- Turn-in as usual in 2 weeks at noon on ilias (**october 18**)

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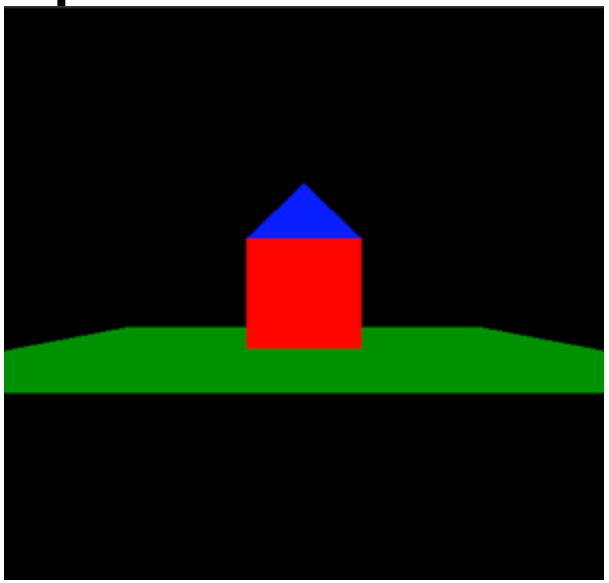
- One additional assistant
  - => 3 persons per time slot!

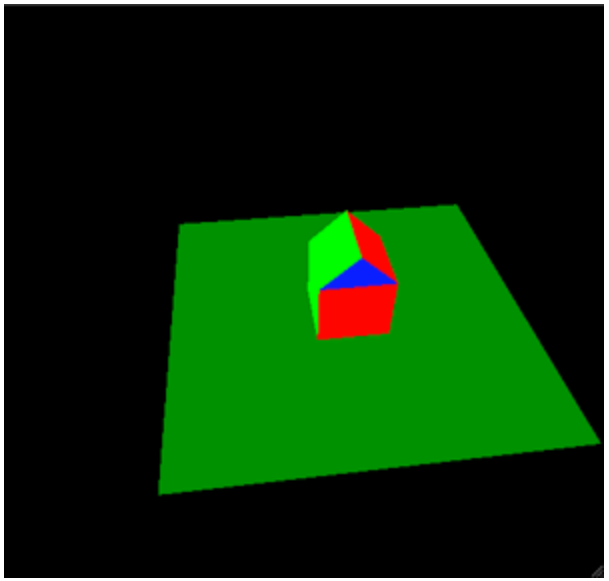
Assignment 2: user interaction

- Include additional material:
  - Use the ObjReader class to read obj files in the second task
  - Use the new shaders *normal.frag* and *normal.vert* by following the readme instruction for the third task

1. Camera & View Frustum

- Modify classes in jrtr project
- Use the formulas from the lecture for the camera- and projection matrices
- Test it as described on the assignment description on the house-scene



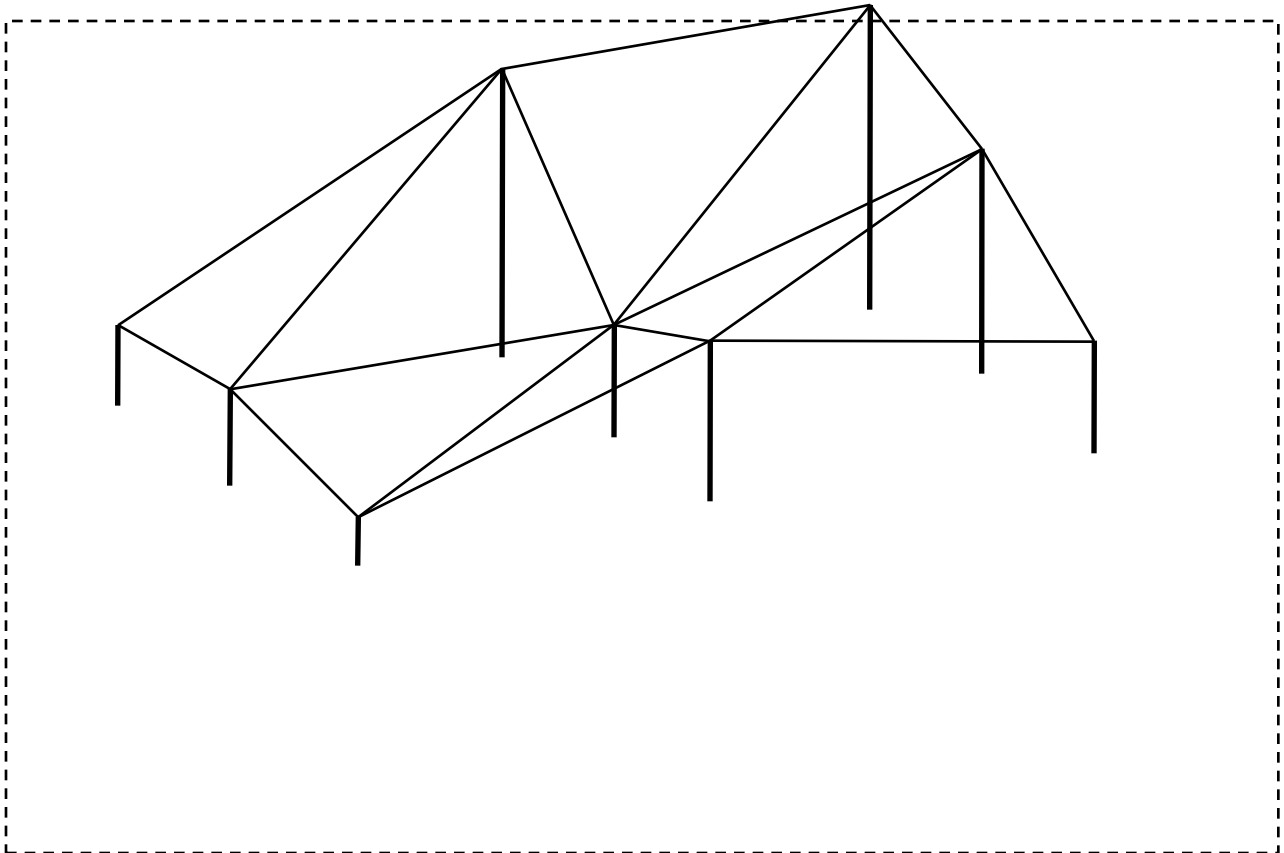


2. Virtual Trackball

- There is a tutorial available on Ilias!

3. Fractal Landscape

- Landscape = 2D field of height values
- Connect to triangle mesh

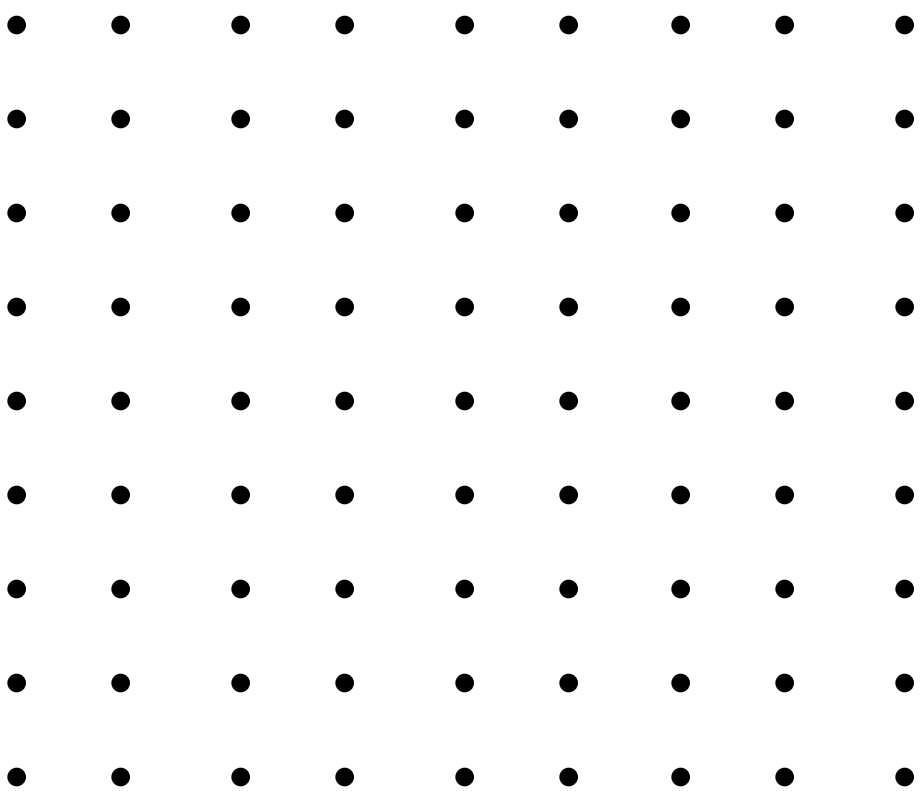


Height values

- First allocate field of height vlaues
  - Size (2^n+1) x (2^n+1)
- Random height values, but „from coarse to fine“
  - Use the Squares & Diamond algorithm
- Each height value is the average of 4 already computed height values plus a small random value

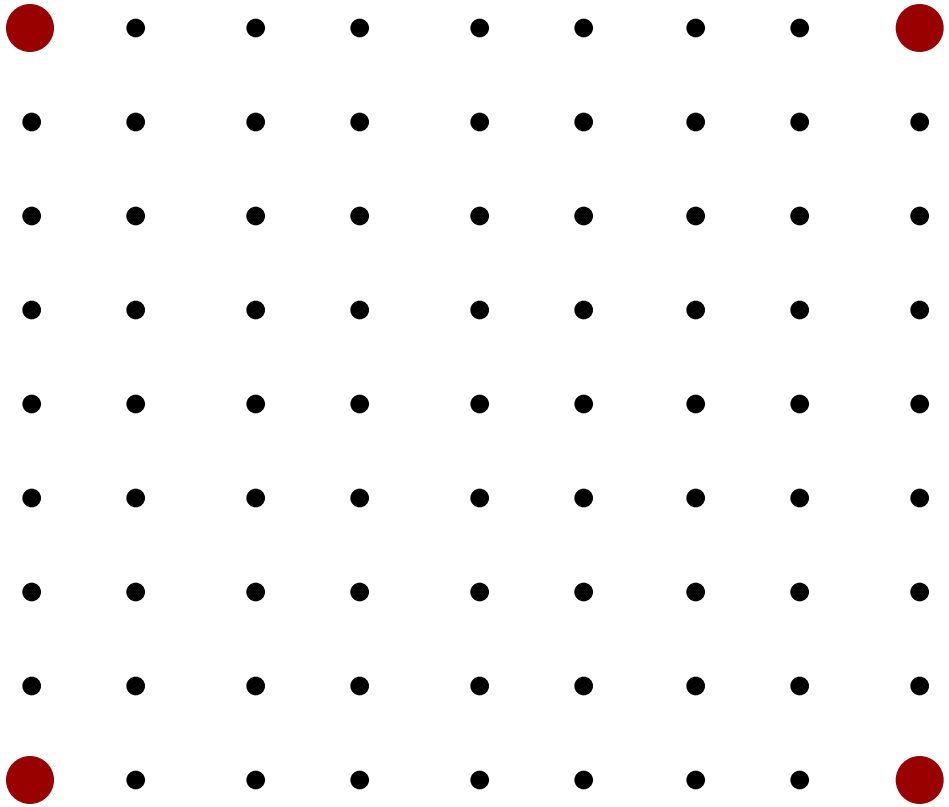
Squares & Diamonds

- Example: field with (2^3+1) x (2^3+1) values



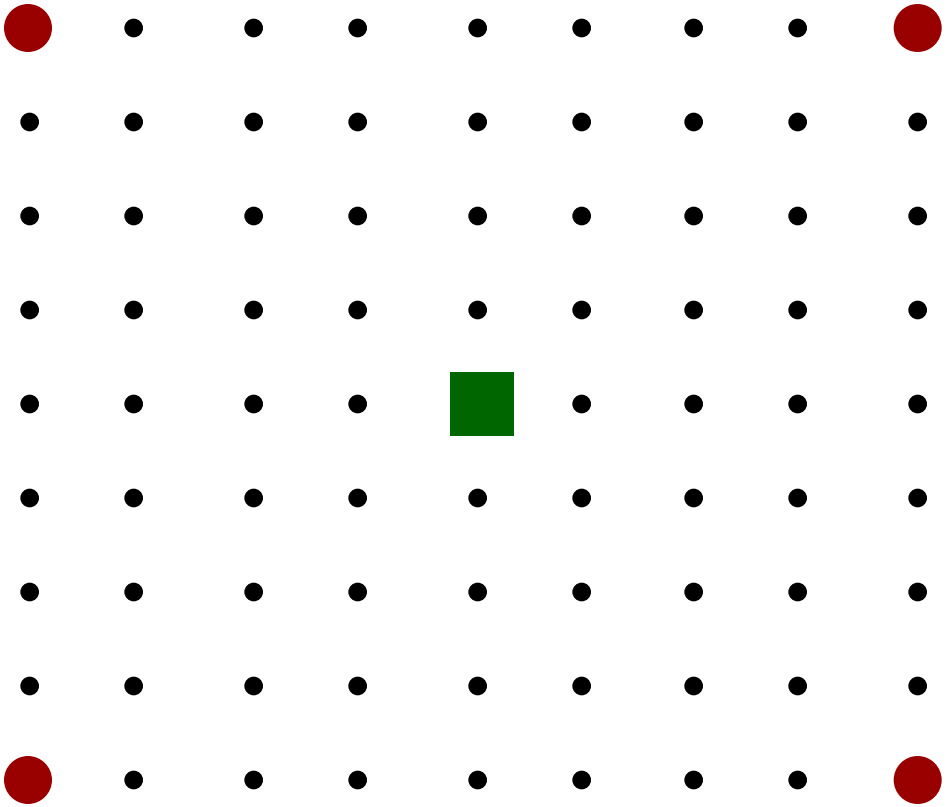
Squares & Diamonds

- Initialization: random heights at corners



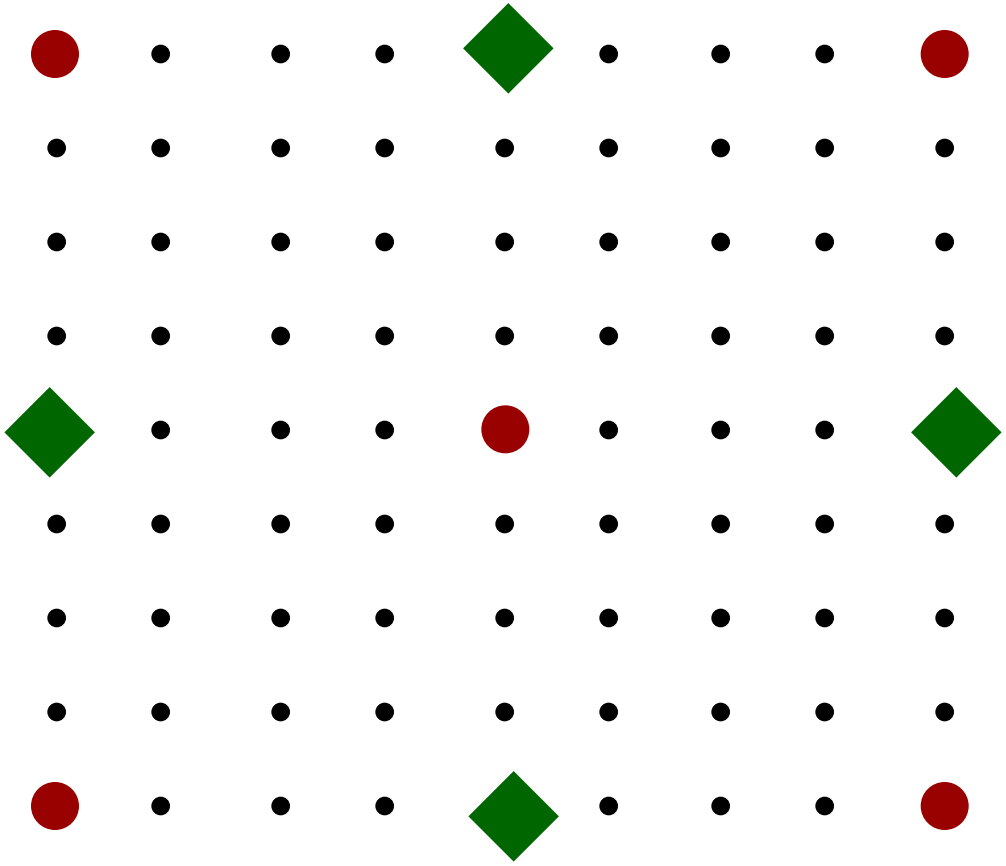
Squares & Diamonds

- Square step: compute green



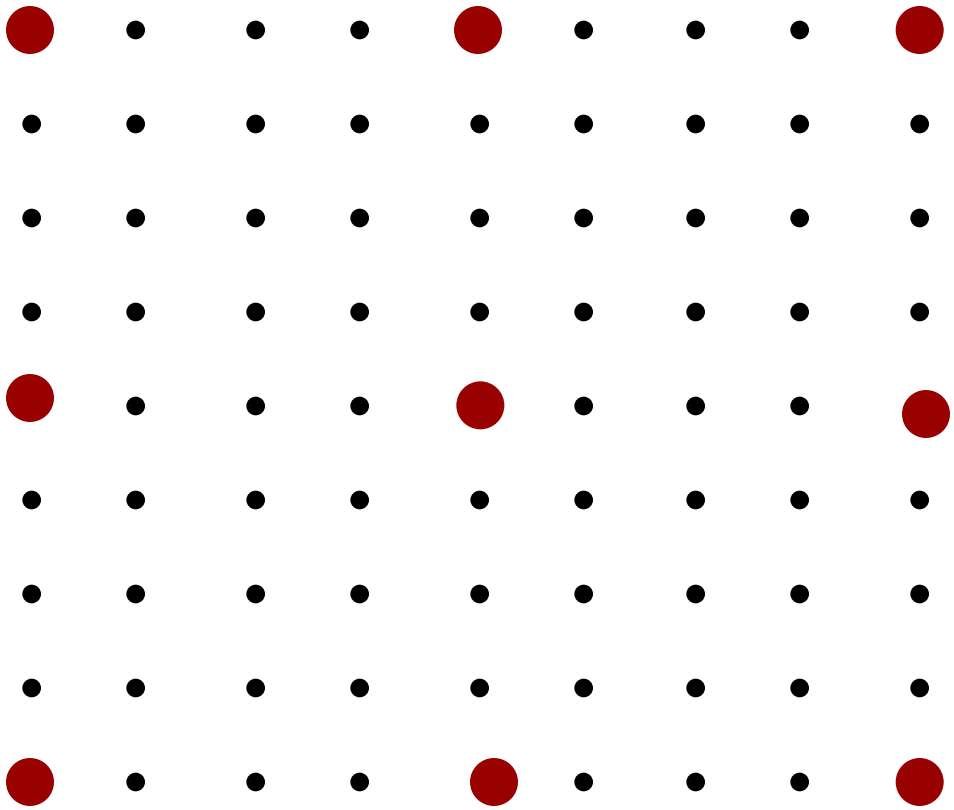
Squares & Diamonds

- Diamond step: compute green



Squares & Diamonds

- Initial position for next iteration



Squares & Diamonds

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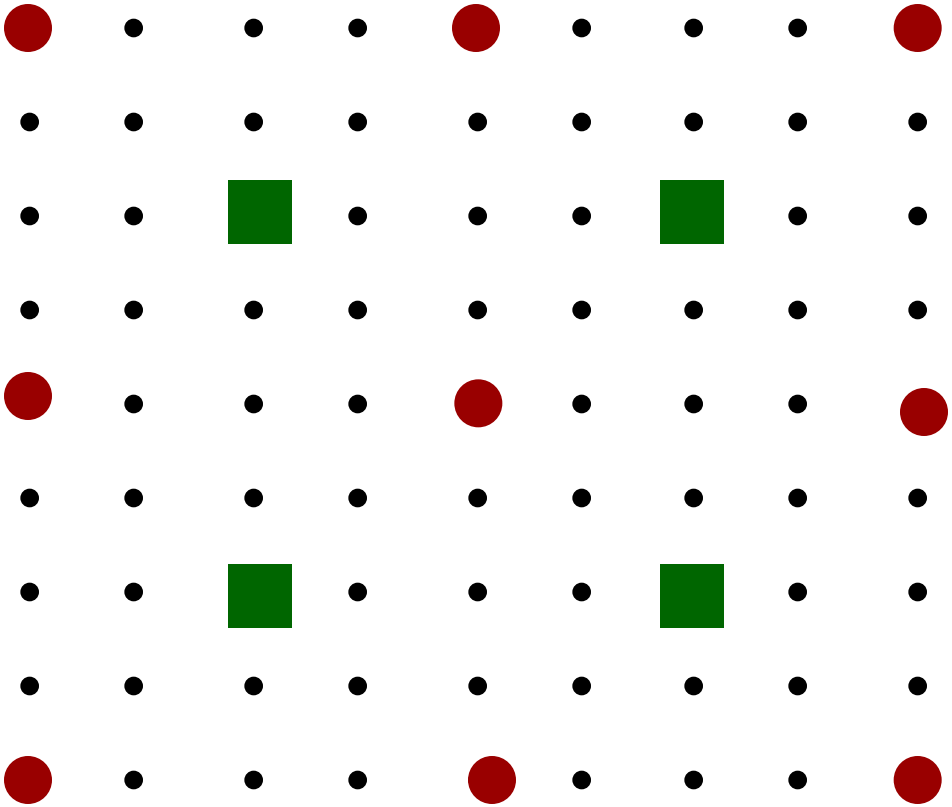

Squares & Diamonds

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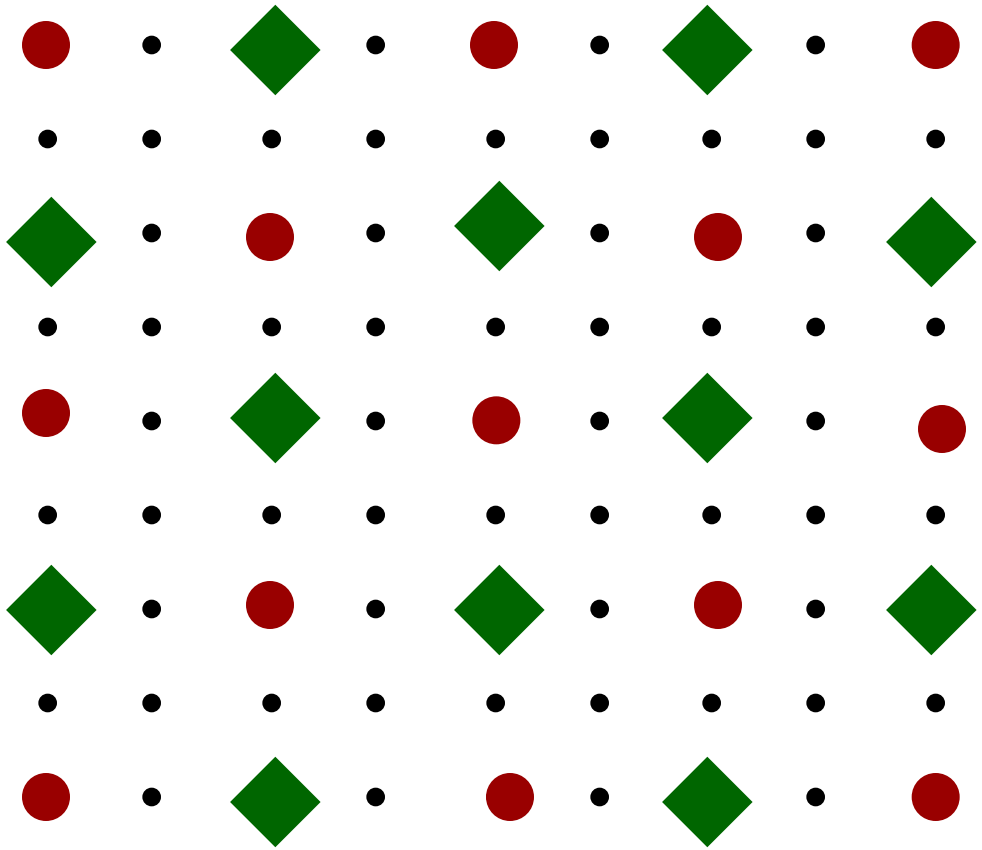

Squares & Diamonds

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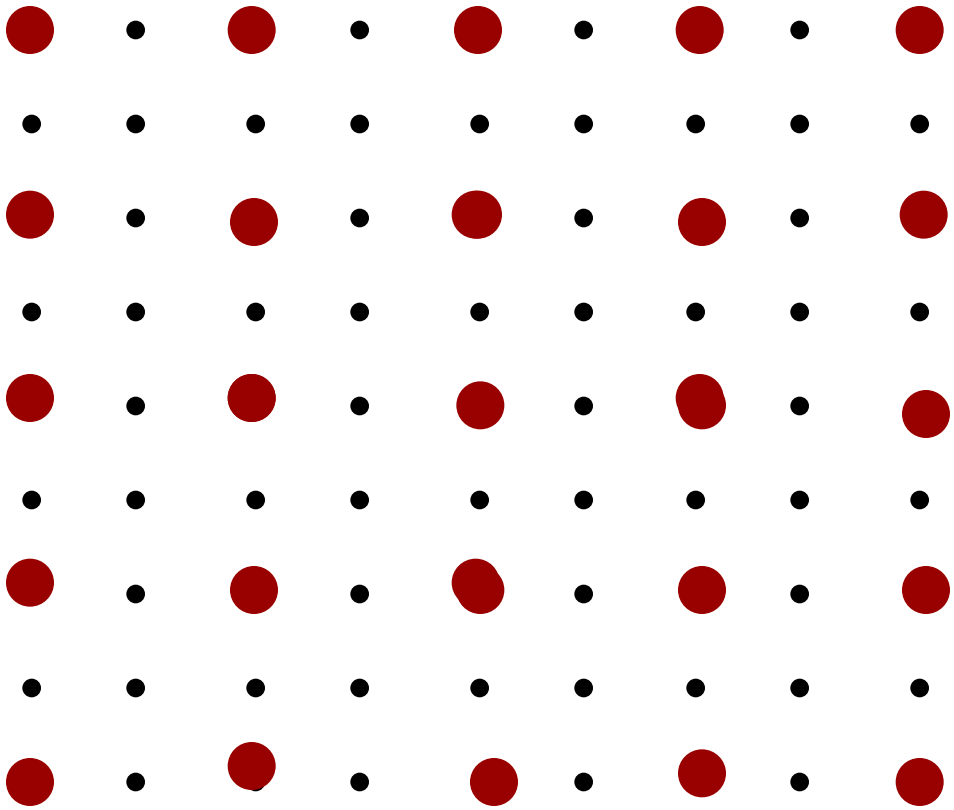
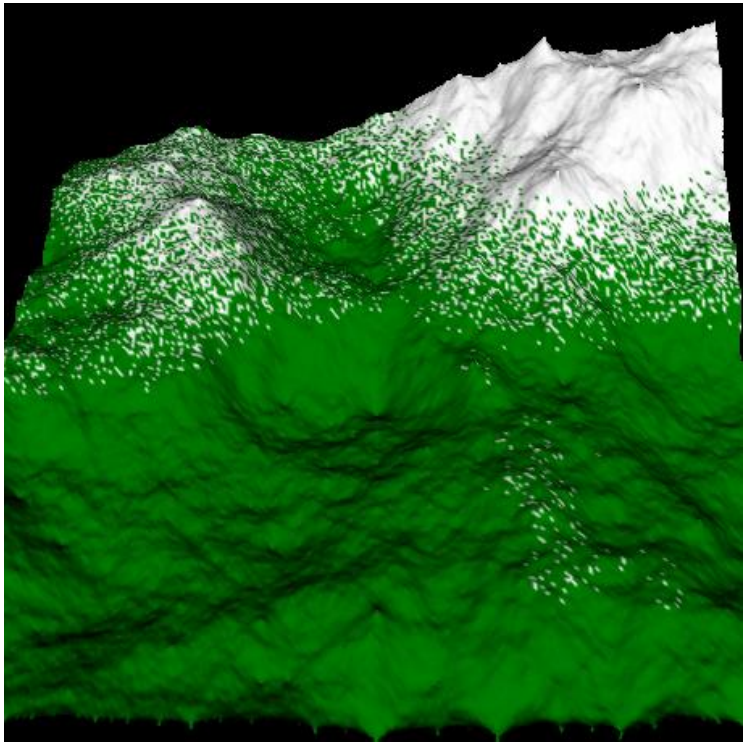
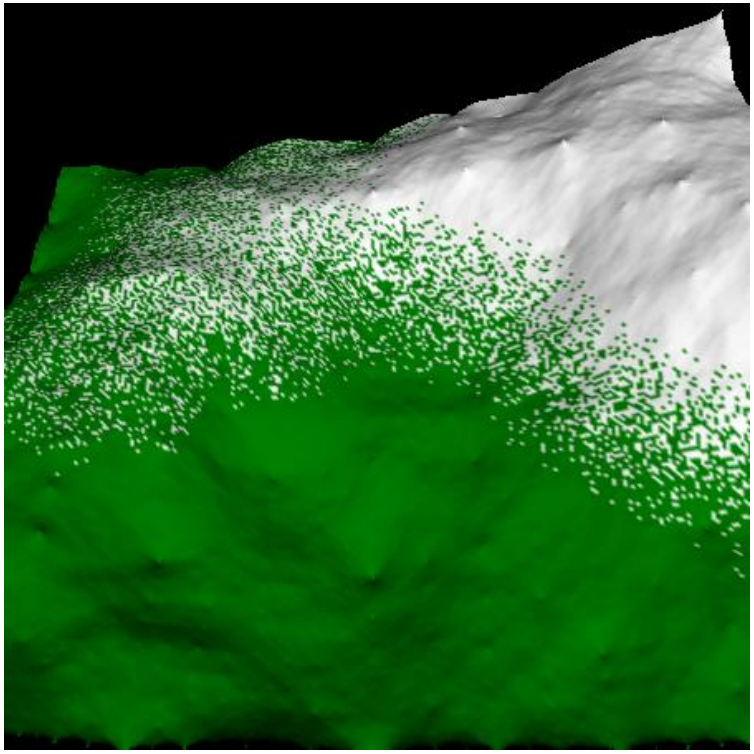


Squares & Diamonds

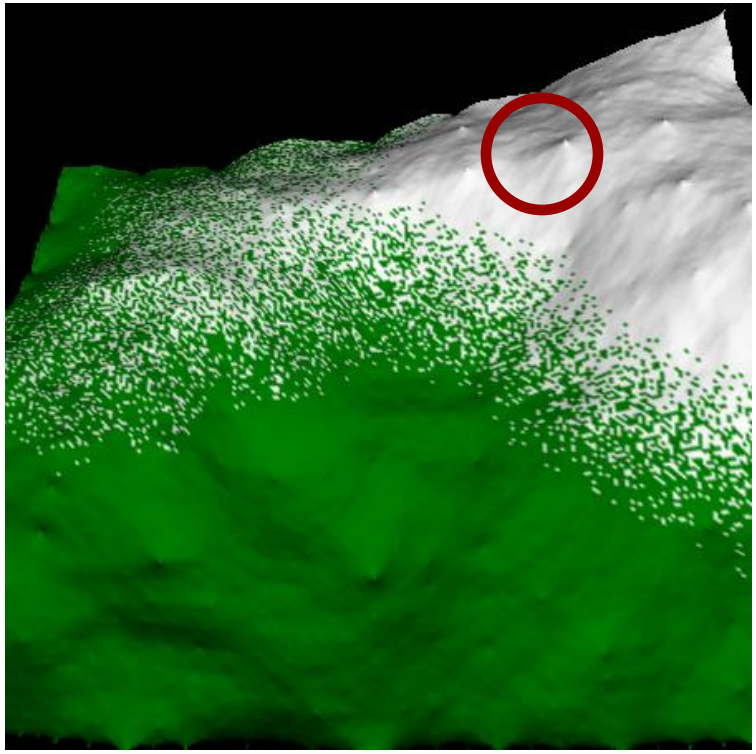
- Iterate until all vlaues are computed
- Random deviations should become smaller over the iterations
  - Parameter to modify look of landscape





Remarks

- Optional: set color dependent on height value
- „spikes“ are artefacts of the squares & diamonds algorithm
- Compute normals on each vertex for realistic shading!



4. Interactive camera movement

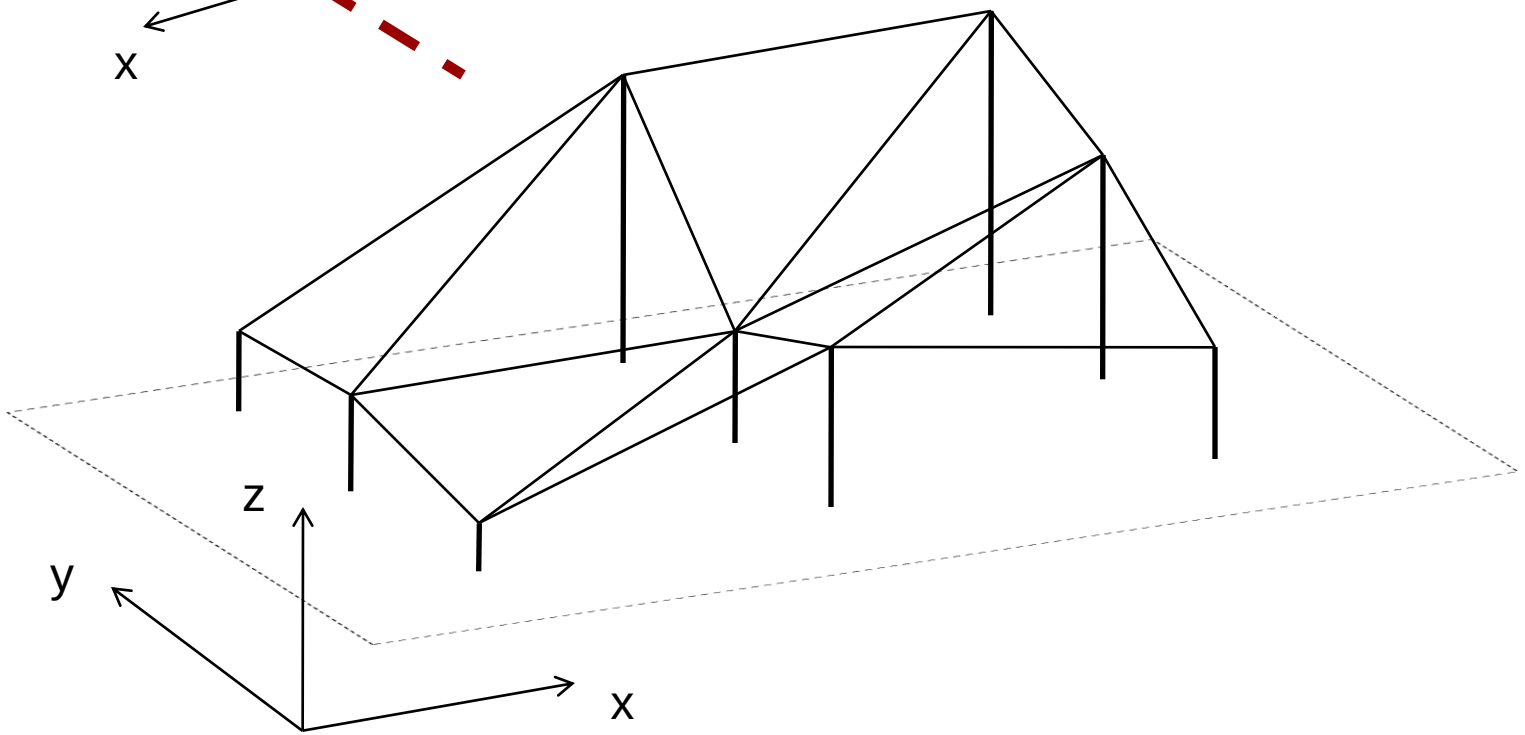
Camera coordinates

World coordinates

4. Interactive camera movement

Camera coordinates

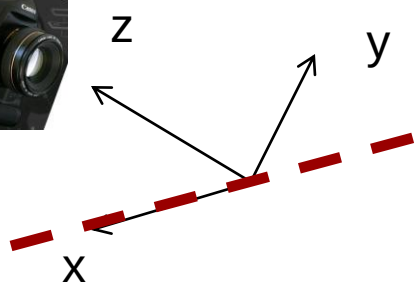
press W / S:
Go forward / backward



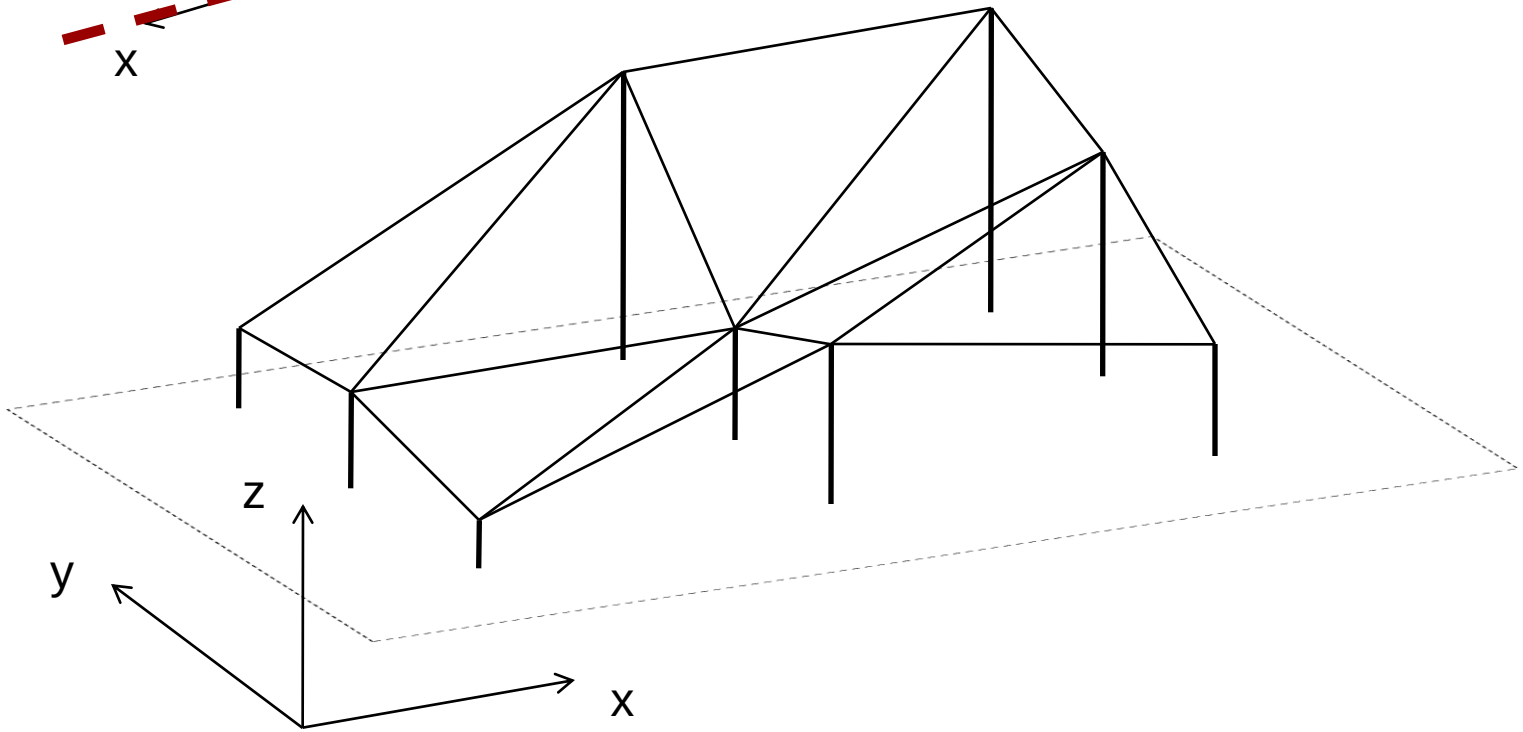
World coordinates

4. Interactive camera movement

Kamerakoordinaten



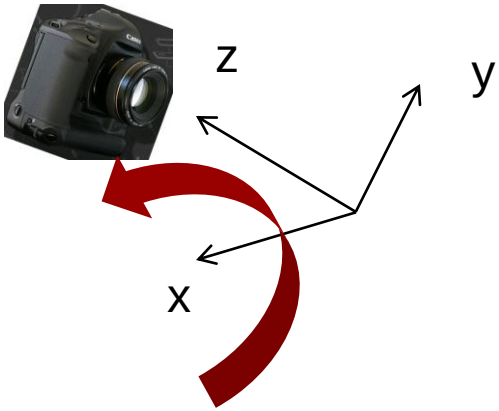
Press A /D:
go left /right



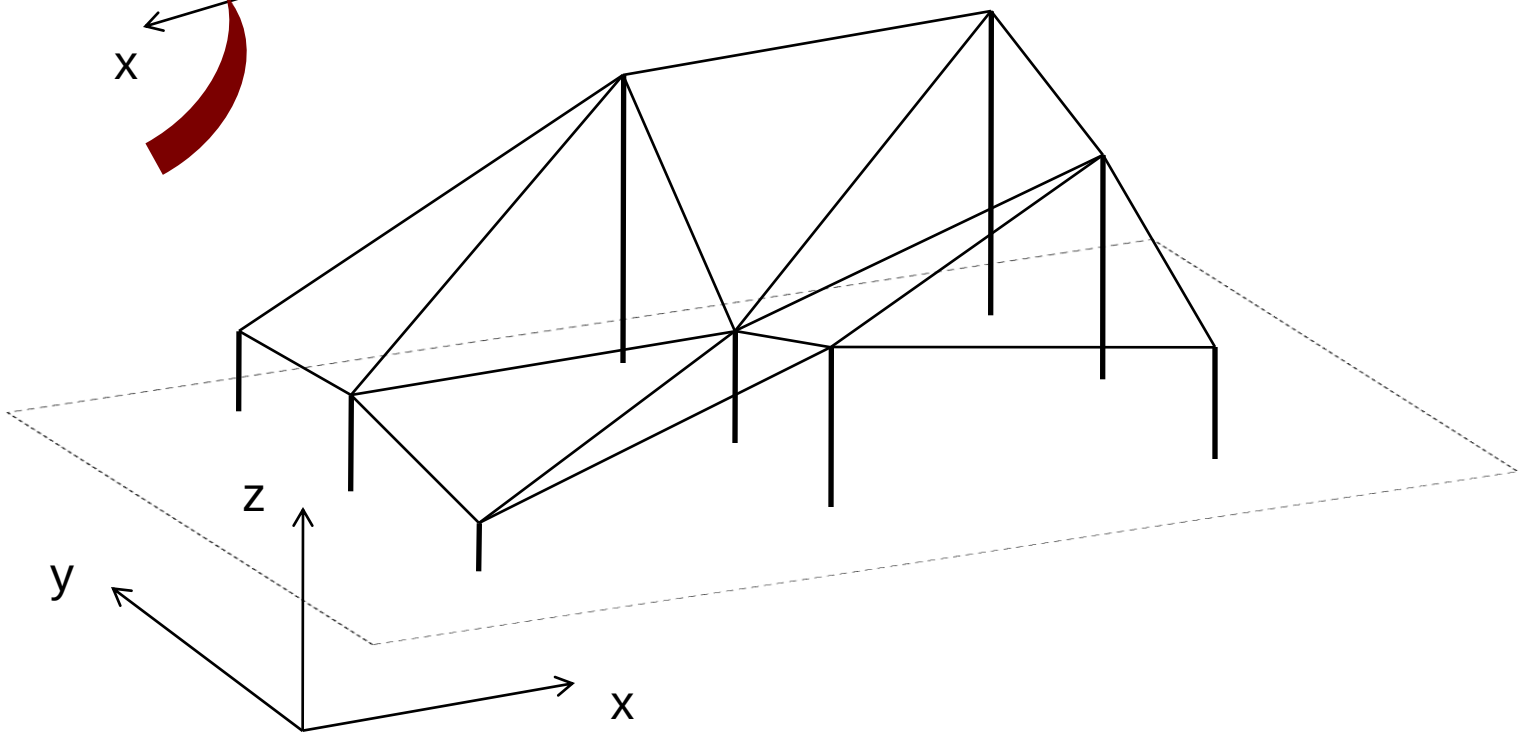
Weltkoordinaten

4. Interactive camera movement

Camera coordinates



mouse up/down:
rotation around camera x



World coordinates

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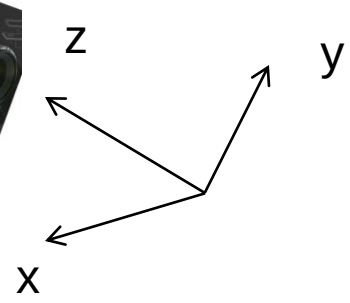
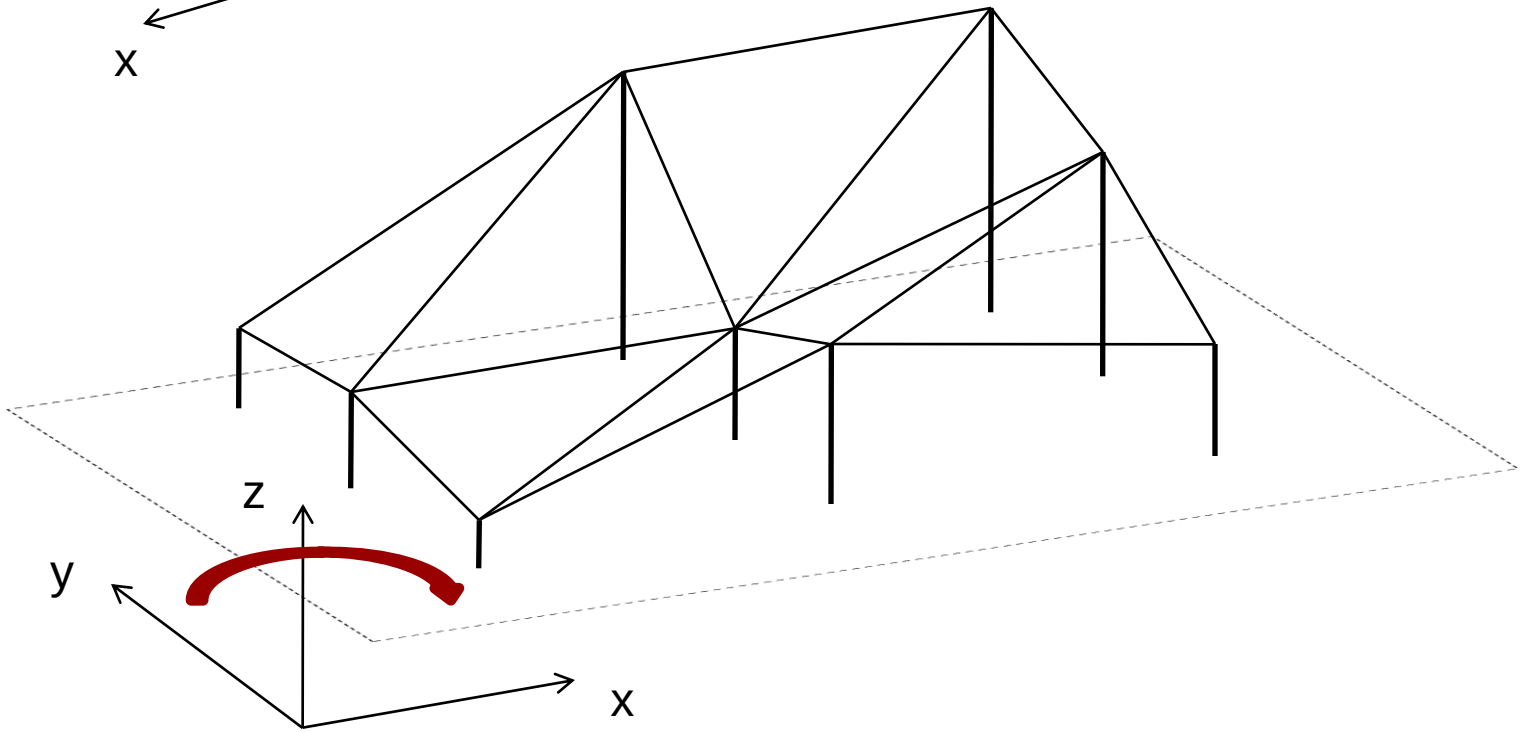


Mouse left/right:
rotate around world z



World coordinates

User input in Java

```
public static class MyKeyListener implements KeyListener {
   public void keyPressed(KeyEvent e) {
    switch(e.getKeyChar()) {
        case 's':  …; break;
        case 'w': …;break;
        …
    }
   }
   public void keyReleased(KeyEvent e) {
   }
   public void keyTyped(KeyEvent e) {
   }
}
```