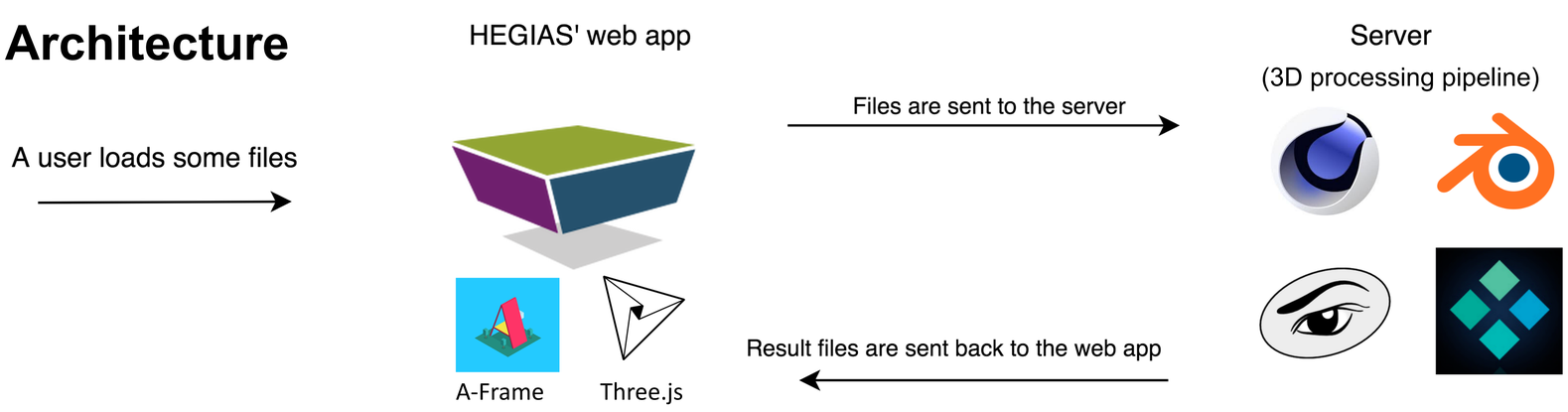
A robust pipeline to process 3D objects

Student: Niccolò Zuppichini Advisor: Piotr Didyk Assistant: Andreas Schmeil

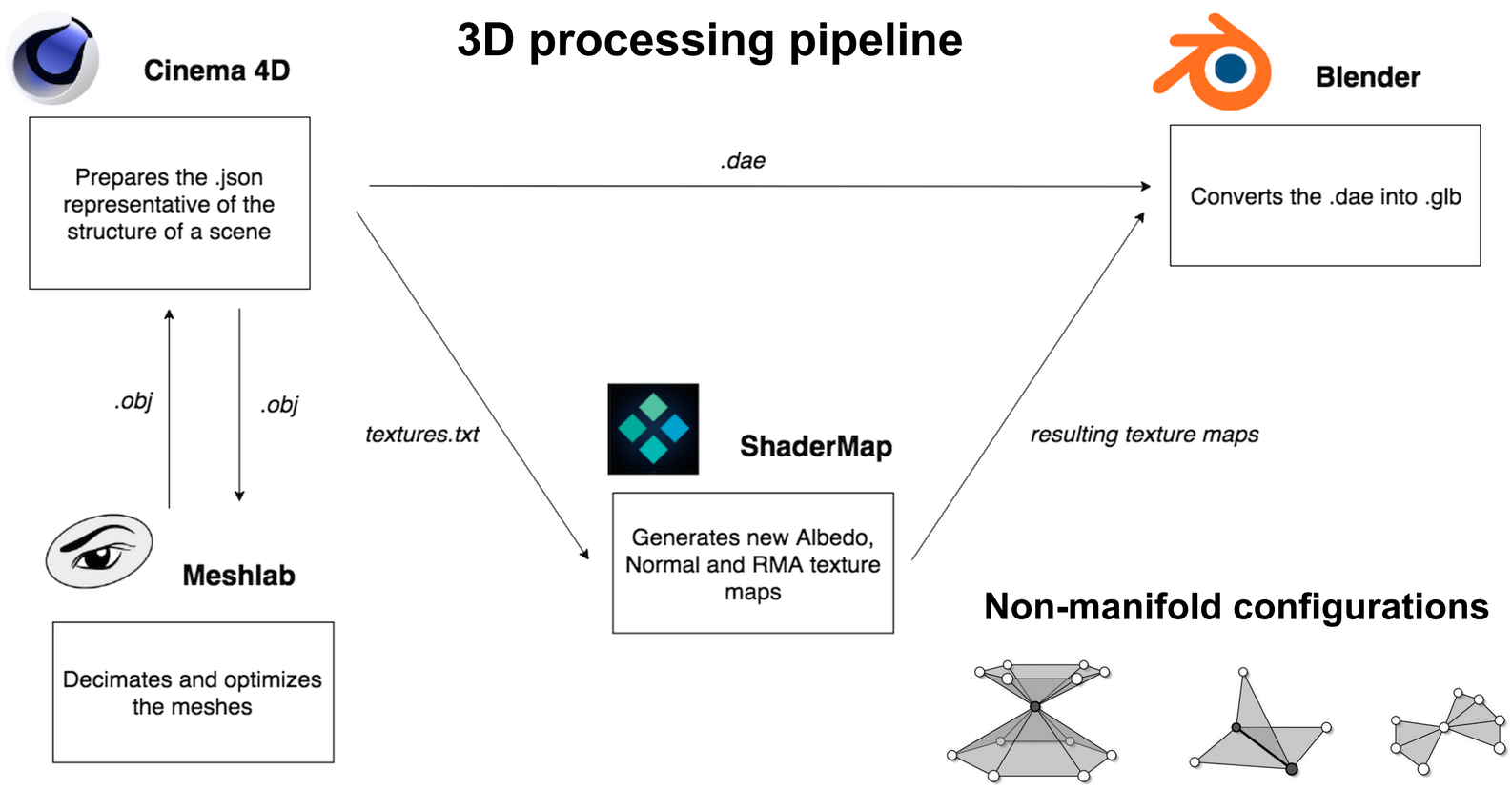
Motivation

HEGIAS, a Swiss company specialized in VR software, is building its VR (Virtual Reality) content on top of A-Frame. HEGIAS' web app is mainly meant to be used by architects to visualize their projects. VR comes with strict requirements in performance, in terms of FPS. This translates into the need to reduce the complexity of objects by decimating their geometries. An important property of an object is to be manifold, non-manifold meshes are problematic for physical engines. The goal of this project is to provide a robust pipeline capable of supporting HEGIAS' web app. The 3D processing pipeline has the responsibility to automatize the preparation of 3D files to be visualized and loaded in such VR environment. This is achieved through an optimal structure of a 3D scene and by decimating objects' geometry.

Architecture



3D processing pipeline



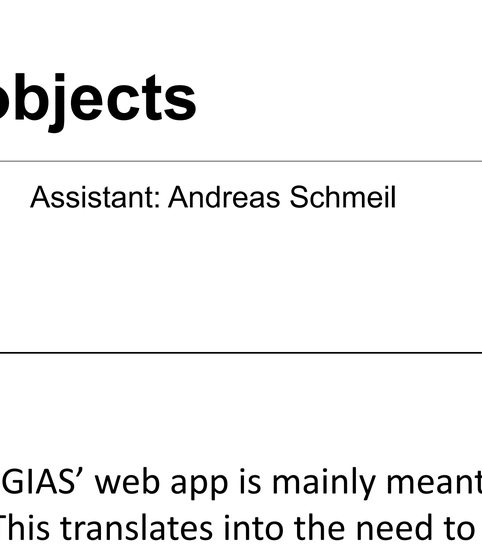
Non-manifold configurations

Bounding box and new origin

Organized scene hierarchy

```
{
  "name": string,
      "params": {
        "category": string,
        "objectId": string
        },
      "bbox": {
        "width": number,
        "depth": number,
        "height": number,
        "center": [number, number, number]
       },
      "position": [number, number, number],
      "rotation": [number, number, number],
      "scale": [number, number, number]
} , ...
```

89 k vertices



5 k vertices

Result

Future work

- Multithreading
- Cluster objects by a hash
- Geometry Instancing
- Compression of 3D files

Example application