

Current graphics hardware supports the rendering of triangulated point clouds, enabling a photo-realistic presentation of digitized parts. The software module **Meshing** offers the possibility to create triangulated meshes from point clouds digitized by any optical or tactile scanning device. Large meshes can be efficiently reduced according to a given tolerance, preserving geometrical features like object edges.

## Applications

- Visualization: Shaded rendering of digitized objects, e.g. for animations
- Surface reconstruction
- Additive fabrication (rapid prototyping)
- Feature detection on triangular meshes
- Simulations, FEM
- Virtual Reality

## Features

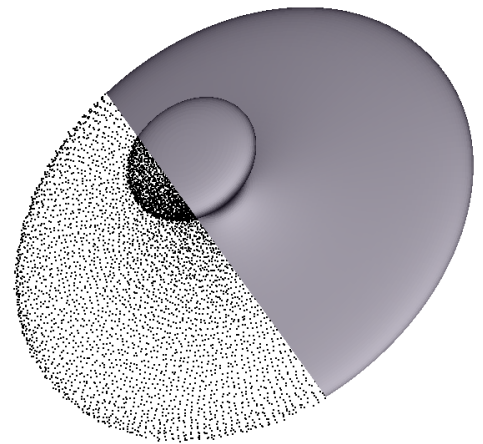
- No special structure of the point cloud required, therefore independent from scanning devices
- Fully automated process
- Runtime and memory optimized, therefore applicable for large point clouds
- Curvature based reduction according to a given tolerance, preserving geometric features like object edges
- Filling of holes with homogeneous transition

## Methods

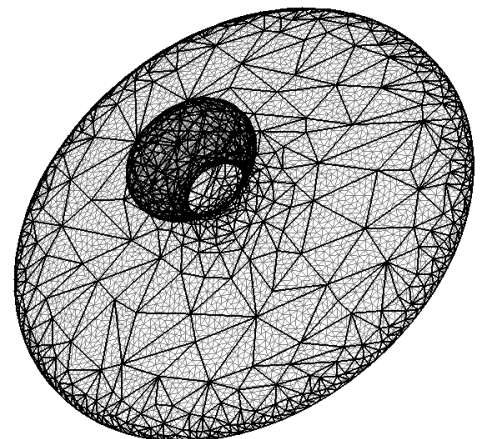
- Approximation of the object using iso-surfaces and triangulation using marching cubes
- Alternatively: Interpolation of the 3D-points using incremental surface reconstruction
- Reduction by feature preserving multi-pass vertex removal, alternatively: iterative edge contraction with quadric error metric

## Implementation

- Programming language C++
- Modular design either for the integration into existing software systems or as stand-alone application including visualization (OpenGL) and STL export
- Support of multi-core architectures and 64-bit platforms



*Meshing of point cloud*



*Mesh reduction*