RÉPUBLIQUE FRANÇAISE
Liberté Égalité Fraternité

PROGRAMME DE RECHERCHE
NUMÉRIQUE POUR L'EXASCALE

WP1 – Large-scale mesh generation

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Work Package 1 - Mesh generation for large-scale models

- Pre-processing step taking up to 80% of engineering time
- Input data: missing information, possibly defective with gaps and self-intersections
- Large and highly-detailed datasets $\rightarrow$ need for scalable algorithms

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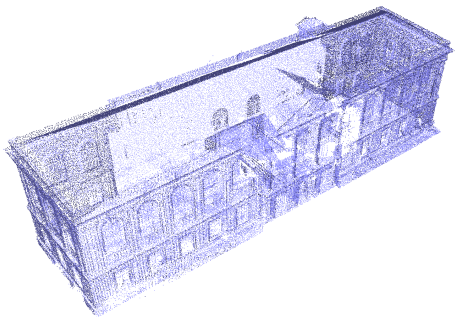

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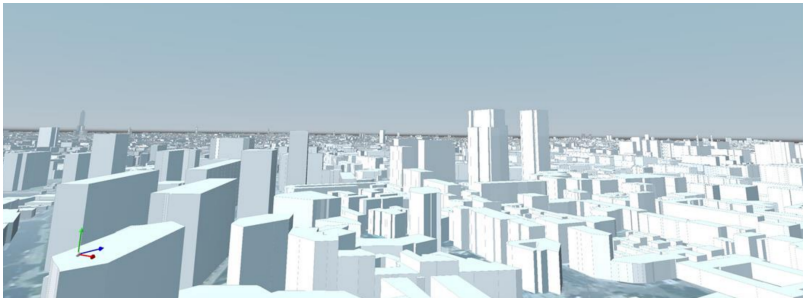
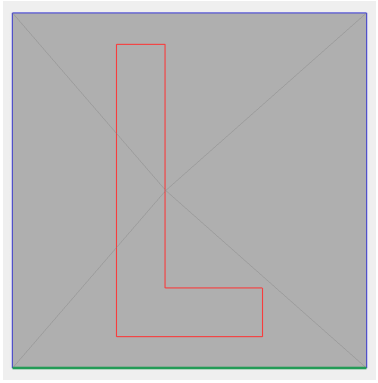


Mesh generation of complex input with Alpha Wrapping

Computational Geometry Algorithms Library (CGAL) - Alpha Wrapping component

Objective: feature-preserving $\rightarrow$ minimal-complexity



Current algorithm

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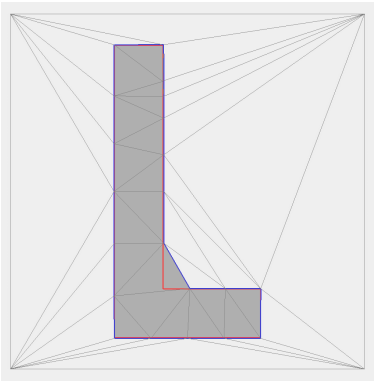

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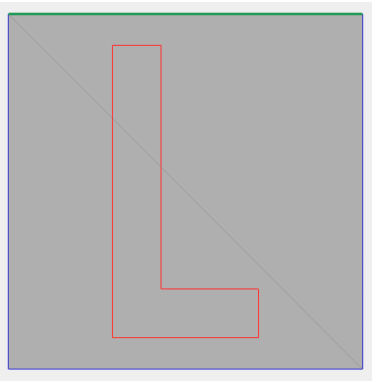

Feature preserving

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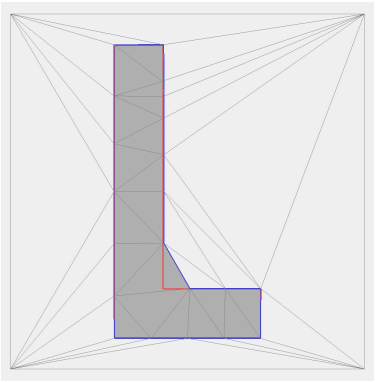

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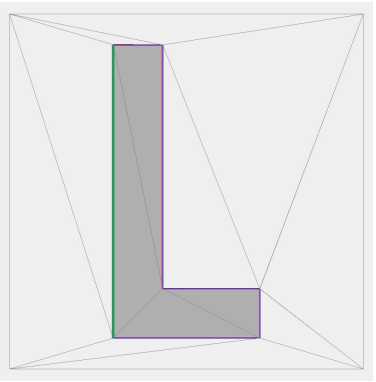

Feature preserving

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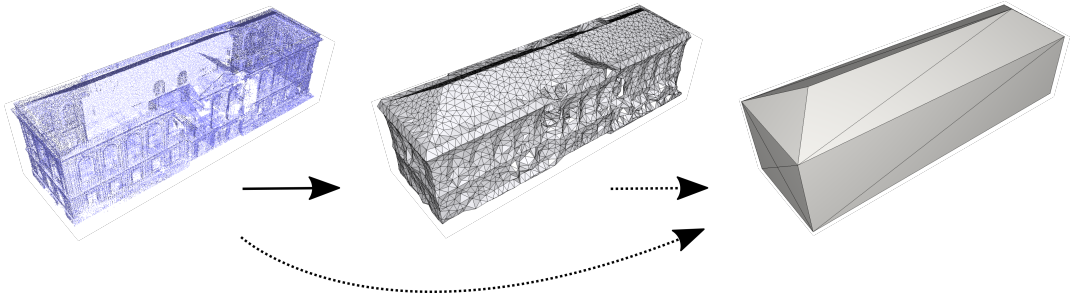
Work in progress in 3D



Scalability - Next steps

Not trivial to develop scalable mesh generation algorithms. Two possible ways:

Straightforward decomposition

Adapted from Prud'homme, C., Chabannes, V., Cladellas, J., Maslek, M., Chappron, G., Pinçon, P. *WP5 - Model Implementation, Urban Building Model.* UNISTRA.

Modular parallelization schemes are currently under development by GeometryFactory and IGN

- CGAL's generic framework
- distributed memory paradigm

Thank you!