

## Software Lab:

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| Modeling:    | <input type="checkbox"/> |
| Mathematics: | <input type="checkbox"/> |
| Programming: | <input type="checkbox"/> |
| Science:     | <input type="checkbox"/> |

# Real-time design transfer across BIM applications using GraphQL

## Description

Collaboration among project partners plays an increasing role in the AEC industry. Particularly challenging, however, is the data exchange between several parties. In practice, each architect/engineer models a part of the building in BIM authoring tools and exchanges information based on entire monolithic files.

However, many design problems can greatly benefit from real-time information transfer between decentralized design environments. With implementing GraphQL endpoints against application programming interfaces (APIs) of existing authoring tools, it is possible to query information and exchange them between tools of different vendors. In this software lab topic, the focus is to provide a practical solution for the exchange of partial models across different BIM authoring tools using webservices and APIs.

<https://blog.unity.com/aec/design-build-and-operate-faster-with-the-pixyz-plugin-for-aec>



## Task

Implement a client-server architecture, in which each client contains a design environment for a specific design task. and equip each client with a suitable GraphQL endpoint. The project aims to showcase real-time information transfer between BIM authoring tools of different vendors.

- Get in touch with the basic principles of GraphQL [1] and understand limitations of related technologies like Speckle [2]
- Implement a communication interface between two BIM authoring tools (e.g., Autodesk Revit and FreeCAD)
- Play around with simple data (like properties and propertySets) [2]
- Implement design transfer mechanisms that can synchronize the design state on both BIM authoring tools in real time [3]

## Supervisor

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## References

[1] <https://www.graphql.com/>

[2] <https://speckle.systems/>

[3] <https://www.youtube.com/watch?v=7LnbP4n4RYM>