ifcXMLNetwork: A visualization to explore and understand relationships between elements in an ifcXML file

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BIM: Building Information Model

- Building information modeling (BIM) is a process involving the generation and management of digital representations of physical and functional characteristics of places.
IFC Viewers
Problems?

• IFC Viewers concentrate on spatial properties of BIM models.

• Relationships between different kind of elements are not directly shown.

• This information is hard to retrieve from ifcXML files. Data in different elements connected through reference identifiers.
Understanding the Data

• Schema: Structure of ifcXML file.
• Object: Real world object.
• Properties: Information about objects.
• Elements [Relational and Non-relational]: Similar to tables in relational databases.
• Data instances: Rows of data in tables.
• Attributes: Column name in table

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data instance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tasks and Encoding

Overview

X-Axis: Common non-relational elements amongst subsystems
Y-Axis: Systems defined in the ifcXML file

A.ifcFlowSegment, B.ifcFlowFitting, C.ifcBuildingElementProxy
D.ifcDistributionPort E.ifcFlowTerminal

- mechanical exhaust air 1
- mechanical exhaust air 2
- mechanical supply air 2
- mechanical supply air 3
- mechanical supply air 4

Summarize
Tasks and Encoding

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>i2229</td>
<td>M_Supply_Diffuser - Rectangular Face Round Neck:600x600 - 250 Neck:39322</td>
</tr>
<tr>
<td>i2535</td>
<td>M_Supply_Diffuser - Rectangular Face Round Neck:600x600 - 250 Neck:81693</td>
</tr>
<tr>
<td>i64995</td>
<td>M_Supply_Diffuser - Rectangular Face Round Neck:600x600 - 250 Neck:143325</td>
</tr>
<tr>
<td>i93651</td>
<td>M_Supply_Diffuser - Rectangular Face Round Neck:600x600 - 250 Neck:144981</td>
</tr>
<tr>
<td>i927260</td>
<td>M_Supply_Diffuser - Rectangular Face Round Neck:600x600 - 250 Neck:144981</td>
</tr>
</tbody>
</table>
Tasks and Encoding

Node-Link Diagrams
Connections and Marks
- NETWORKS
- TREES
Demo

**ifcXMLNetwork**

A visualization to explore and understand relationships between elements in an ifcXML file

**Overview**

X-Axis: Common non-relational elements amongst subsystems

Y-Axis: Systems defined in the ifcXML file

- A.IfcFlowSegment
- B.IfcFlowFitting
- C.IfcBuildingElementProxy
- D.IfcDistributionPort
- E.IfcFlowTerminal

**Search**

- mechanical exhaust air 1
- mechanical exhaust air 2
- mechanical supply air 2
- mechanical supply air 3
- mechanical supply air 4

**History**

All visited identifiers are shown here

**Network**

Relationship Network
Summary

- **OVERVIEW:** Common Non-relational data between subsystems.
- **SEARCH:** Find specific data instances through identifiers.
- **HISTORY:** Data instances already visited.
- **NETWORK:** Display relationship tree of selected data instance.
Future Work

• Add more interactivity

• Extract more information from ifcXML data and visualize other results.
Thank You