State of GraphML
Structural Layer & Attributes

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Design Goals

- **simple**

  easy to read and parse, no ambiguities,. . .

- **general**

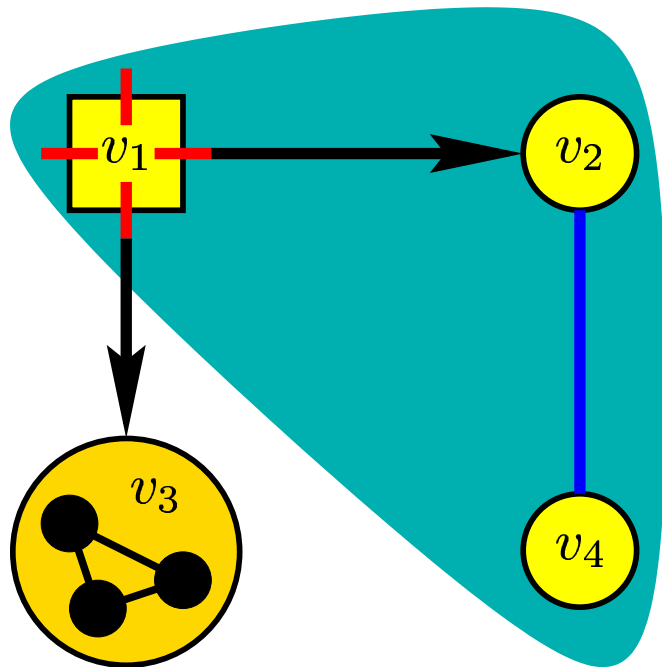 mixed multigraphs, hyperedges, nested graphs,. . .

- **robust**

  layered/modular architecture, fallback interpretations,. . .

- **extensible**

  structured and unstructured data, meta information,

  application-specific data. . .
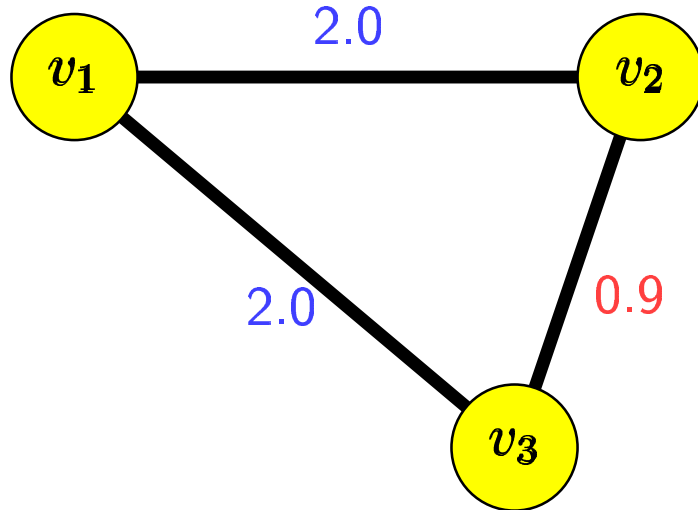
GraphML Example (Structural Layer)


```
<graphml>
  <graph edgedefault="directed">
    <desc>a simple example</desc>

    <node id="v1">
      <port name="north"/> <port name="east"/>
      <port name="south"/> <port name="west"/>
    </node>
    <node id="v2"/> <node id="v4"/>
    <node id="v3">
      <graph> <locator xlink:href="url"/> </graph>
    </node>


    <edge source="v1" sourceport="east" target="v2"/>
    <edge source="v1" sourceport="south" target="v3"/>
    <edge source="v2" target="v4" directed="false"/>

    <hyperedge>
      <endpoint node="v1" port="south" type="out"/>
      <endpoint node="v2" type="in"/>
      <endpoint node="v4" type="undir"/>
    </hyperedge>
  </graph>
</graphml>
```

Data Attributes


```
<graphml>
  <key  id="k1"    for="edge">
    <desc>edge length in cm</desc>
    <default>2.0</default>
  </key>
    ...
    <edge source="v2" target="v3">
      <data key="k1">0.9</data>
    </edge>
    <edge source="v1" target="v3"/>
    <edge source="v1" target="v2"/>
    ...
</graphml>
```

Basic Data Types: Attributes Extension

```
<graphml   schemaLocation=" ⋅⋅⋅ graphml-structure-1.0rc.xsd

                            ⋅⋅⋅ graphml-attributes-1.0rc.xsd">
    <key   id="k1"    for="edge"
        attr.type="double"   attr.name="length">
    <desc>edge length in cm</desc>
    <default>2.0</default>
</key>
    ...
    <data key="k1">0.9<data>
    ...
```

Basic data-types: *boolean*, *int*, *long*, *float*, *double* and *string*.

Structured Data: Custom Extensions

```
<graphml   schemaLocation=" ... graphml-structure-1.0rc.xsd
                            ... graphml-1.0rc+custom.xsd">
   <key  id="k1"   for="node"   custom.content="logfile_entry"/>
     ...
    <node id="n1">
      <data key="k1">
        <entry url="http://localhost/index.html"
               ip="127.0.0.1" referer="n7"/>
      </data>
    </node>
     ...
    <node id="n7"/>
```

Current & Future Plans

- ## extension for lightweight parsers
  node and edge ordering, #nodes, #edges, degrees, . . .

- ## parser
  yFiles Extension, LEDA Extension Package

- ## graph layout extension
  using XSLT for export formats

see: http://graphml.graphdrawing.org/