SimGrid XML Platform Description File Visualization

Cathy Kim, Tam Nguyen

ICS 496 Capstone Project, Spring 2023
Information and Computer Sciences Department - University of Hawai‘i at Mānoa

Sponsor: Henri Casanova
University of Hawaii at Manoa

Introduction:

- Computer Science researchers can run into issues when performing experiments
  - expensive, limited scope, difficult, etc.
- To mitigate these issues, researchers have resort to **simulation**
- SimGrid, a popular simulation toolkit, allows users to input an XML file that describe a simulated hardware platform

Problem:

- SimGrid platform description XML files can hard to understand, troubleshoot and/or modify
- There is a strong need for users to visualize existing platforms described in XML files
- There is also a need for users to be able to edit these files

Solution:

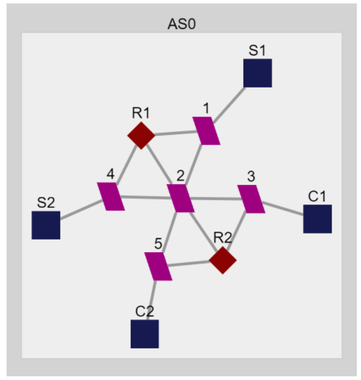
Implementation of an in-the-browser tool, realized in JavaScript, for visualization, modifying, exporting and eventually creating, SimGrid XML platform description files.

Methodology:

Waterfall Methodology

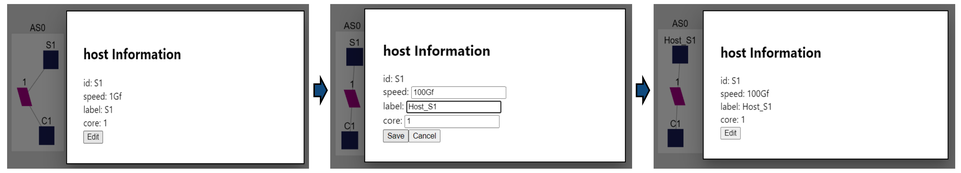
- Project was broken into six phases
  - Phase 0: Mockup
  - Phase 1-4: Implement support for various XML tags
  - Phase 5: Editing/Export capability
  - Phase 6+: Full-fledge construction capability
- Both team member assume equal responsibility of all roles
- After completion of small task, the other team member much check work before merging

XML Visualization:

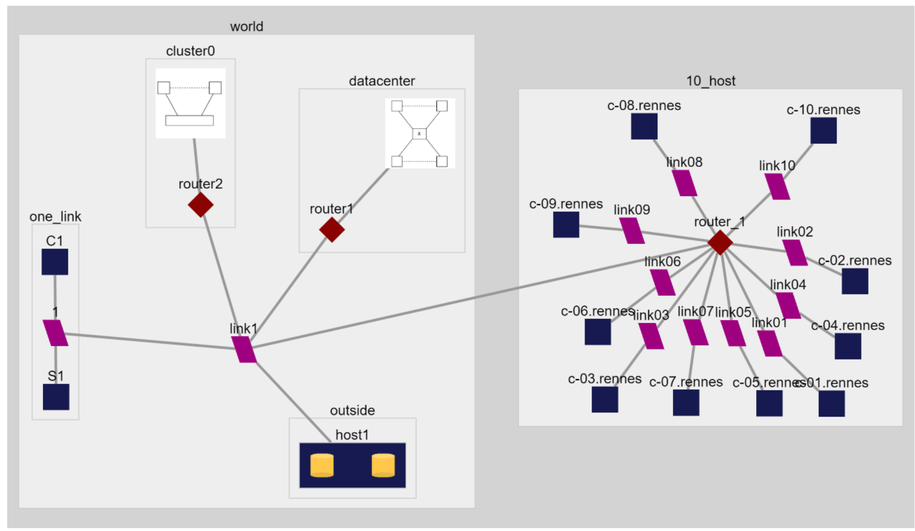



```
▼<platform version="4.1">
 ▼<zone id="AS0" routing="Full">
    <host id="S1" speed="1Gf"/>
    <host id="C1" speed="1Gf"/>
    <host id="S2" speed="1Gf"/>
    <host id="C2" speed="1Gf"/>
    <router id="R1"/>
    <router id="R2"/>
    <link id="1" bandwidth="100MBps" latency="10ms"/>
    <link id="2" bandwidth="100MBps" latency="10ms"/>
    <link id="3" bandwidth="100MBps" latency="10ms"/>
    <link id="4" bandwidth="100MBps" latency="10ms"/>
    <link id="5" bandwidth="100MBps" latency="10ms"/>
   ▼<route src="S1" dst="C1">
      <link_ctn id="1"/>
      <link_ctn id="2"/>
      <link_ctn id="3"/>
    </route>
   ▼<route src="S2" dst="C2">
      <link_ctn id="4"/>
      <link_ctn id="2"/>
      <link_ctn id="5"/>
    </route>
```

```
   ▼<route src="S2" dst="C2">
      <link_ctn id="4"/>
      <link_ctn id="2"/>
      <link_ctn id="5"/>
    </route>
   ▼<route src="S1" dst="C2">
      <link_ctn id="1"/>
      <link_ctn id="2"/>
      <link_ctn id="5"/>
    </route>
   ▼<route src="S2" dst="C1">
      <link_ctn id="4"/>
      <link_ctn id="2"/>
      <link_ctn id="3"/>
    </route>
   ▼<route src="S1" dst="R1">
      <link_ctn id="1"/>
    </route>
   ▼<route src="R1" dst="R2">
      <link_ctn id="2"/>
    </route>
   ▼<route src="R2" dst="C1">
      <link_ctn id="3"/>
    </route>
   ▼<route src="S2" dst="R1">
      <link_ctn id="4"/>
    </route>
   ▼<route src="R2" dst="C2">
      <link_ctn id="5"/>
    </route>
  </zone>
</platform>
```



XML Visualization (Advanced):



INFORMATION & COMPUTER SCIENCES
UNIVERSITY of HAWAI‘I at MĀNOA

Tech Stack:

Cytoscape JS

Challenges:

The main difficulties mainly stemmed from technology-related issues caused by a shortage of expertise

- Cytoscape: utilized for visualizing and arranging graphs
- Browser/OS portability issue: certain features made by one member might not work on the other member’s machine

Next Steps:

The next step for the client is full-fledged platform construction/editing capabilities

- Make it possible for the user to construct the platform interactively
  - Adding/removing object
  - Copying object
  - Undo/redo buttons
  - Connecting/disconnecting objects

Learning:

- Improved in developing and constructing a secure full-stack web application
- Improved identifying and resolving errors and malfunctions that arise in web applications through debugging
- Improved understanding of data structure