User Interfaces and Visualizations for Development-Time Program Analysis

James Holley

Motivation

- Develop a programming environment that allows for real-time static analysis, program visualization and debugging
- Allow the user to manipulate the visualization in order to focus on certain portions of memory
- Allow access to all data provided by the analysis while hiding potentially irrelevant details
Design Flowchart

User Interface

- Allow the user to see the visualization and code side by side
- Allow easy access to all visualizations
- Intuitive and easy for the user to select and view program states that may be useful
User Interface

Visualization

- Allow the user to manipulate the visualization in order to focus on certain portions of memory.
- Allow access to all data provided by the analysis while hiding potentially irrelevant details.
Example Graph – Intuitive?

User Interaction

- **Pan/Zoom:**
  - Move the graph to more clearly see different sections

- **Drag Control:**
  - Move individual nodes

- **Selection and Summarize:**
  - Compress parts of the graph into summaries that can be seen by hovering over the summarized section

- **Restore:**
  - Undo a summary to restore the data that is currently summarized
Example of Summarization

Graph with Summarized Sections

Summaries Explained!

- Allow portions of graph to be compressed to hide irrelevant data
- Can be restored to display the data in the visualization before a certain summarization
- Contents of the summaries can be seen by hovering over the node
- Can be nested to further simplify the visualization
- Bottom Line: Allow the user to simplify the graph to discover useful properties of the program
Future Work and Improvements

- **Improvements to Visualization:**
  - Use color to highlight the link between nodes and labels on the graph
  - Allow user to unfold ‘thick edges’ to show iterations of the recursive data structure

- **Improvements to Overall Design:**
  - User study to explore usefulness of visualizations
  - Integrate into Eclipse’s build manager
  - Find a heuristic that can pre-determine summarized areas

Thanks for the Help!

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