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Bachelor's Thesis
Synchronization of Hover Effects
Across Multiple Visualizations in JavaWiz

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JavaWiz is a teaching tool for software development in Java that visually depicts all steps taken by a program during its execution. It provides various views to help students understand different aspects of the program's behavior, such as the heap-and-stack view, which shows the state of the heap and stack at each step, the list view, which displays the evolution of linked lists, and the array view, which illustrates operations performed on arrays.

One challenge in JavaWiz is that information about a particular entity, such as a list node, can be seen in multiple views simultaneously. For example, a list node may be visible in both the heap view and the list view. To enhance the user experience and facilitate better understanding of the relationships between entities across different views, advanced hover features can be implemented.

The goal of this bachelor's thesis is to develop a synchronized hover effect mechanism in JavaWiz. The main objectives are as follows:

1. Familiarization with JavaWiz's codebase:
   - Study and understand the technologies used in JavaWiz, including TypeScript, Vue.js, and D3.js.
   - Analyze the existing visualizations, such as the heap-and-stack view, list view, and array view, to gain insights into their structure and functionality.
2. Implementation of advanced hover features:
   - Develop a mechanism to detect the type of entity being hovered, such as heap objects, local variables, or class names.
   - Establish a communication channel to propagate hover information to all relevant views.
   - Update each view accordingly when an entity is hovered, ensuring a consistent and synchronized hover effect across the visualizations.
3. Adoption of at least 3 views:
   - Implement the hover synchronization mechanism for the DeskTest view, HeapStack view, and LinkedList view.
   - Ensure that hovering over an entity in one view highlights the same entity in other relevant views.
   - For example, when hovering over a field of a heap object, the field should be highlighted in all views where it appears, and the object pointed by the field should also be highlighted.

The implementation of synchronized hover effects in JavaWiz will enhance the user experience and facilitate a better understanding of the relationships between entities across different visualizations. By highlighting related entities in multiple views simultaneously, students can gain a more comprehensive understanding of the program's behavior and the interactions between various components.

Modalities:
The progress of the project should be discussed at least every four weeks with the advisor. A time schedule and a milestone plan must be set up within the first 3 weeks and discussed with the advisor. It should be continuously refined and monitored to make sure that the thesis will be completed in time. The final version of the thesis must be submitted not later than 15.09.2024.