Analysis and Advanced Visualization of Software

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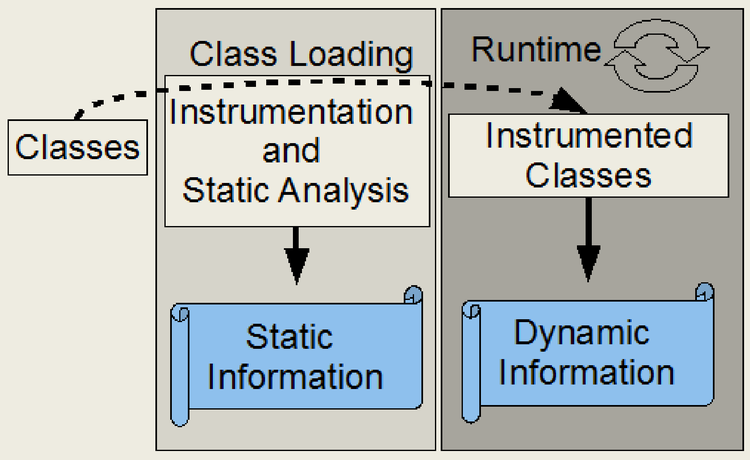
The Problem:
Software is complex and contains large amounts of information. This makes understanding its design, functionality and behavior a difficult and time-consuming task.

A Solution:
Use analysis techniques to extract and compute useful metrics on the software system. Then represent these metrics through suitable abstractions and metaphors to ease the understanding of the software.

Tracing Software with VITRAIL

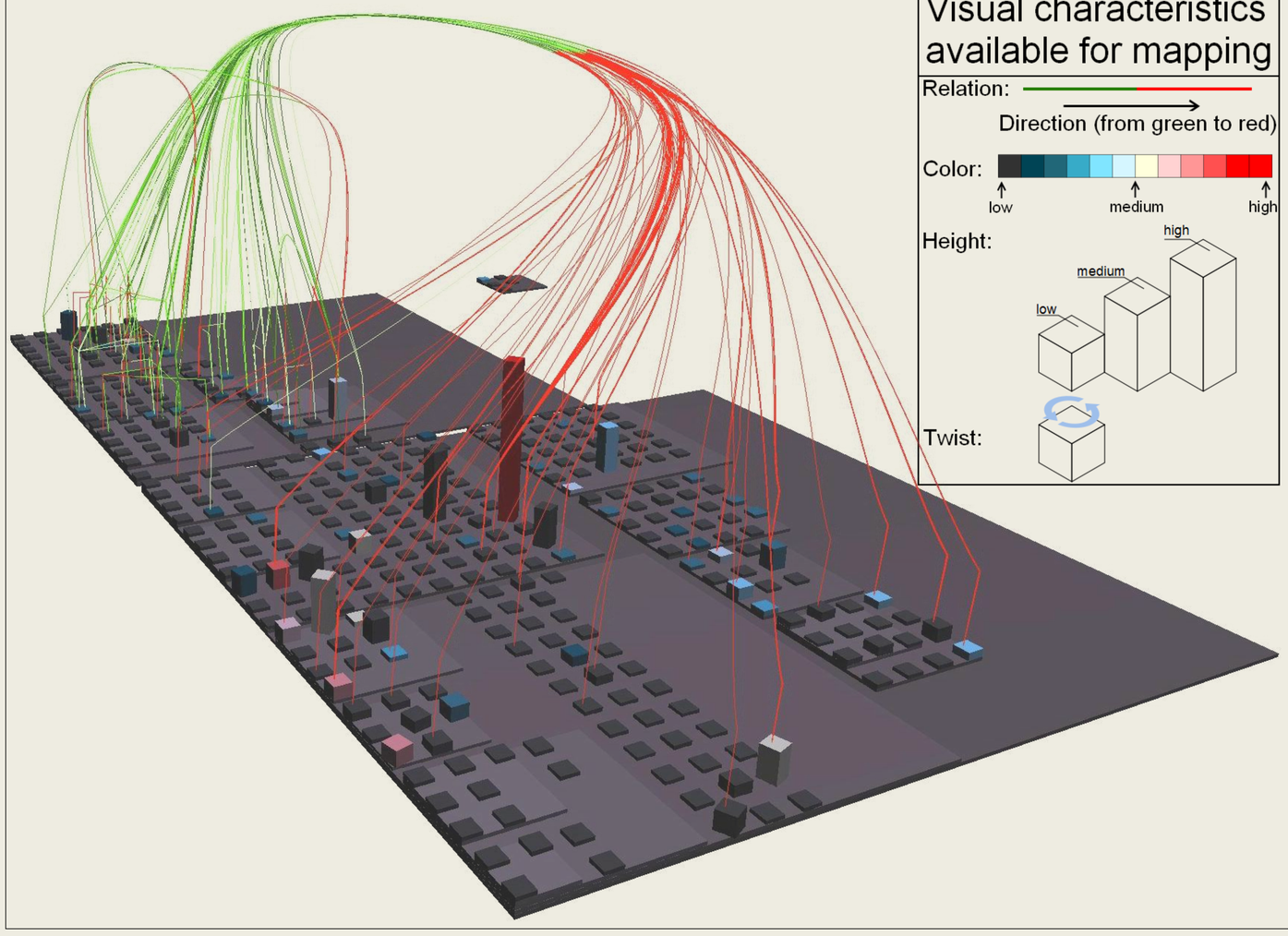
JBInsTrace:
Instrument bytecode to collect static as well as dynamic information on the software.



Analyzing Software with VITRAIL Analyzer:

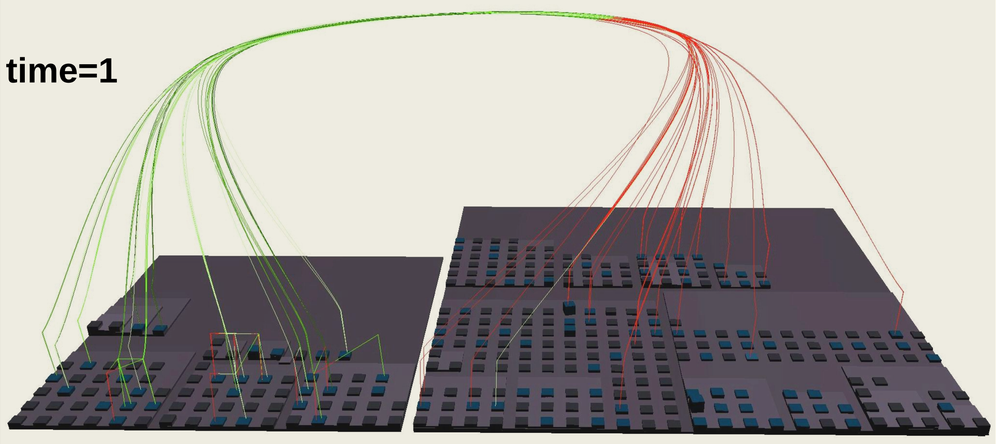
Static Information:	Dynamic Information:
- Software architecture (inheritance, packages, relations …). - Static receiver type on call-sites. - Static metrics (number of bytecodes, number of if-statements …).	- Control flow (at basic block level). - Dynamic instance type used on call-sites. - Dynamic metrics (number of executed bytecodes, number of if-statements taken …).

Visualizing Software with VITRAIL Visualizer:



Visualizing Software Evolution with VITRAIL Visualizer:

time=1



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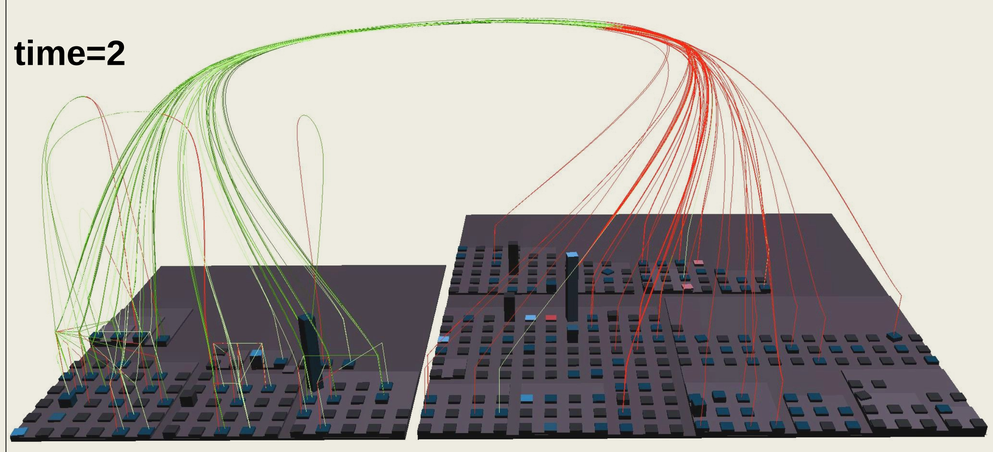

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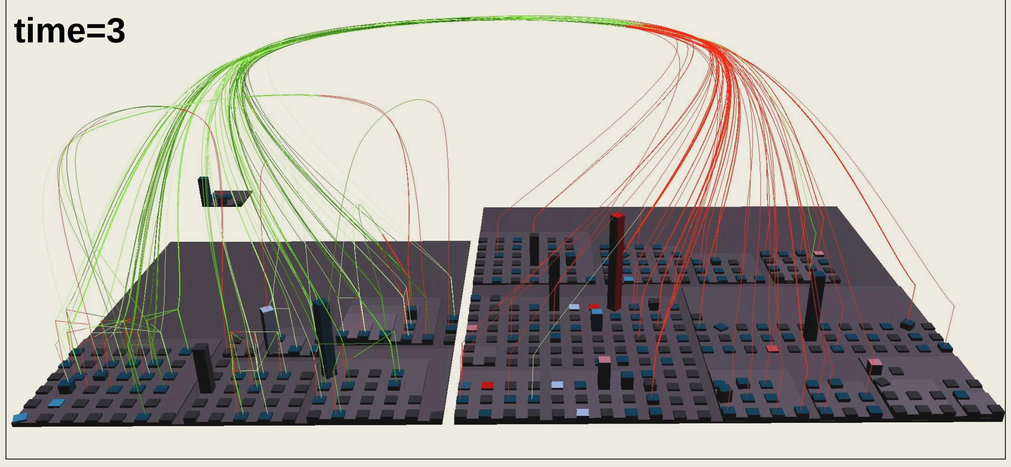

Understanding Software Functioning:

- Static relations between software components.
- Dynamic relations between software components.
- Evolution of these dynamic relations during runtime.
- Impact of each component on the whole system.

Purpose :

- Design and Source code optimizations.
- Improve maintenance process.
- Study the habits of object-oriented developers.

Current Work:
- We perform tracing and analysis on many pieces of software to get useful static and dynamic information.
- We study how software was designed and its behavior at runtime using VITRAIL Visualizer.
- We use new interaction and display technologies to ease manipulation and understanding of the visualization.