Developer Refinement of Runtime Architectural Structure

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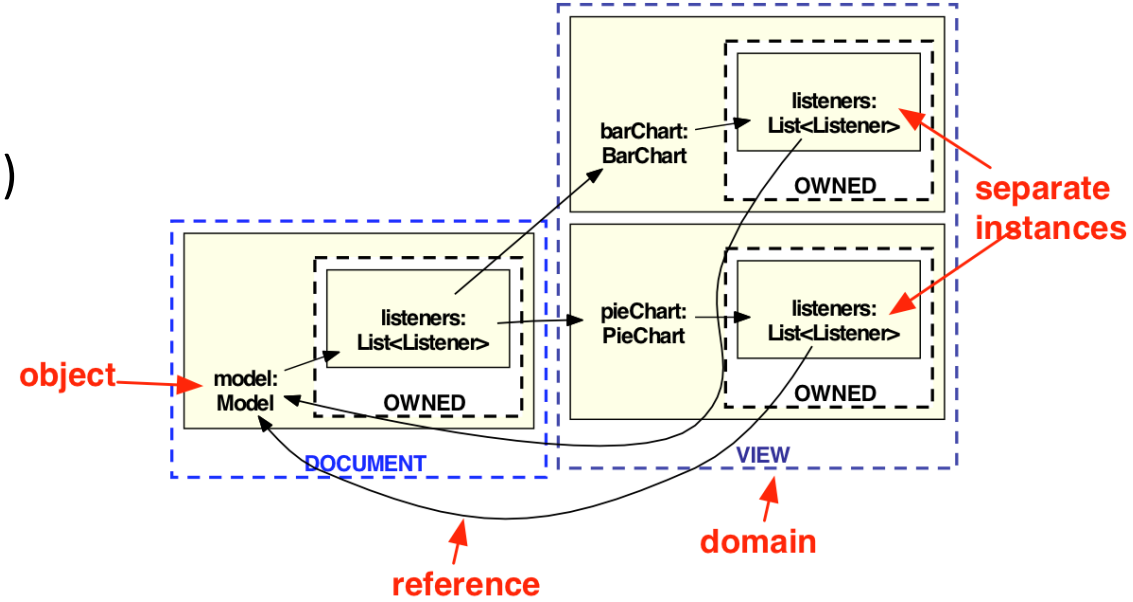
SCHOLIA depicts runtime object structure

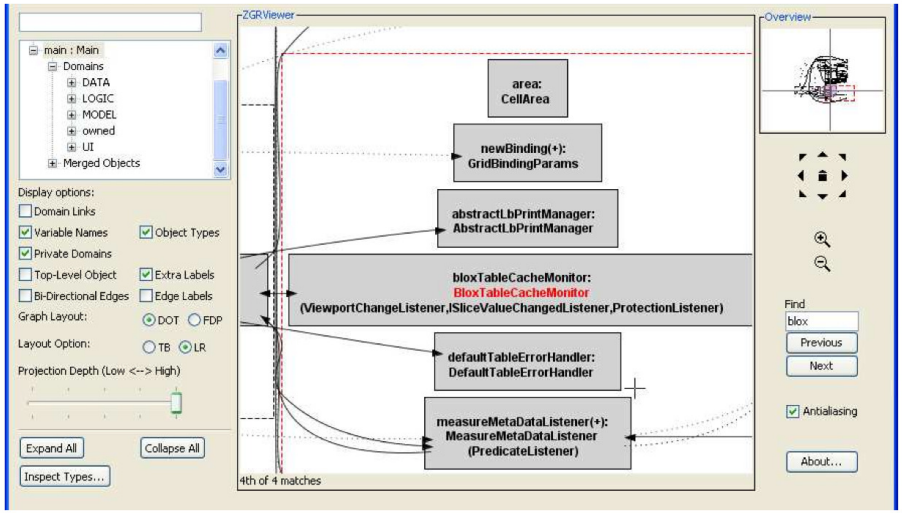
Compile-time approximation of
runtime object structure:
Ownership Object Graph (OOG)

Represents architecture as
hierarchical **encapsulation / logical containment**
and **points-to** relationships
between objects



Interactive OOG viewer:

- zoom / pan / scroll diagram
- collapse / expand object
- trace to code
- search by type or identifier



Pilot study of a developer in the field

Research question

What **interactive** features are required to help developers edit a reverse engineered OOG to better **match** their mental model of the **runtime** architecture?

Previous study [PASTE'08]

Selected 30-KLOC **module** of a 250-KLOC industrial system

Experimenter **reverse-engineered** OOG
talked to developer, added annotations, ran **extraction** tool

Current study method

2-hour **interview** with developer of module

Use interactive **viewer** tool; trace to code

Developer's desired edits to diagram

- **Move** object between domains
- **Abstract** low-level object
  - Push it underneath more architectural object
  - Hide it somehow (must maintain soundness!)
- **Group** an object into another object without enforcing encapsulation (**logical containment**)
- Collapse **related** instances of subtypes
- Edit object **labels**
- **Split** an object into separate objects
  - Show objects for supertype, subtype
  - Not supported by runtime view

Other features a developer might need

Navigate from **type** in IDE to objects in OOG

Task-specific view rather than complete view

- Hide portions of system that are not interesting
- Challenging to do while maintaining **soundness**

Express **constraints** on allowed relationships

- Show error when structural constraints violated
- Supported by approach:
  - Use additional layer of annotations (**domain links**)
  - Extract-abstract-present OOG in ADL
  - Use predicates to enforce constraints