A Refactoring Tool for Smalltalk

Don Roberts, John Brant, Ralph Johnson
Theory and Practice of Object Systems 1997

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SWE 795, Spring 2017
Software Engineering Environments

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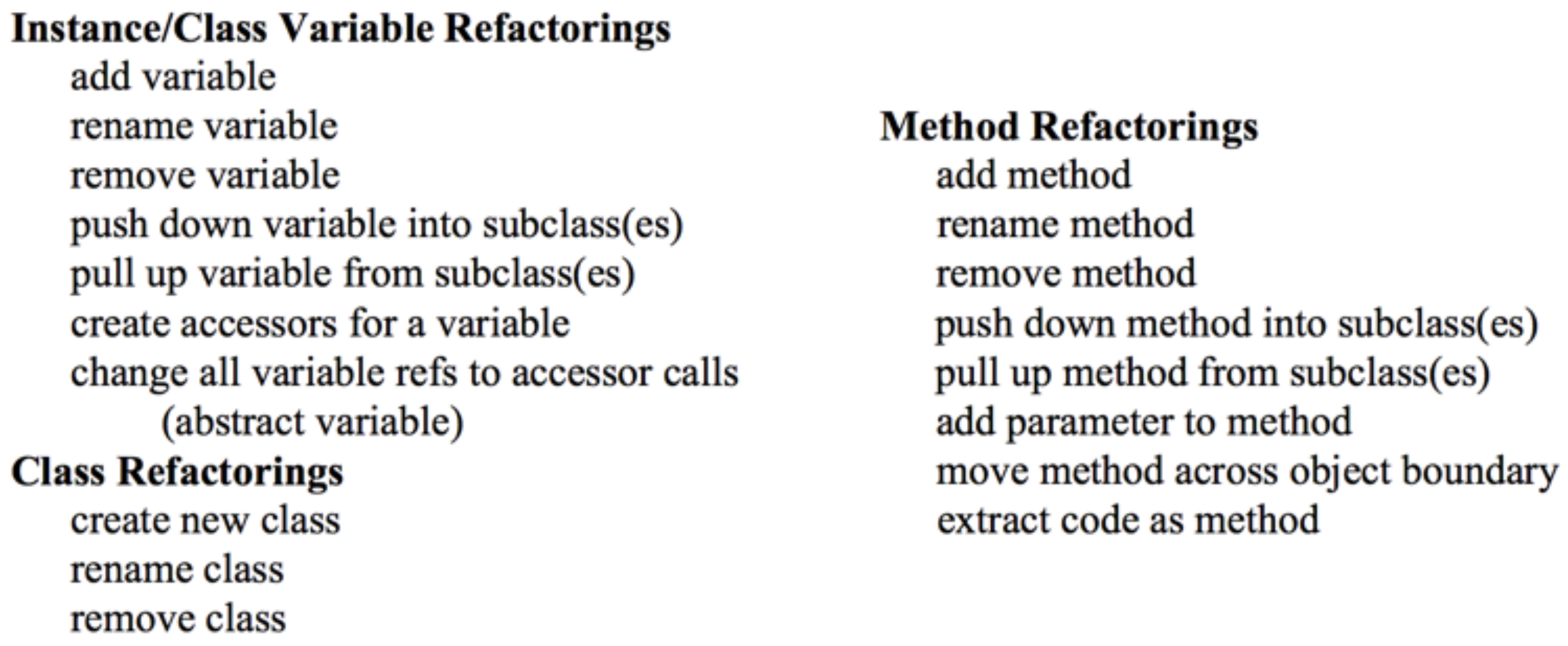
Refactoring: Key Idea

- Concerns may crosscut, making code changes more difficult.
- Important to reorganize code to reduce duplication, organize functionality in appropriate places
- Refactorings are *behavior preserving* program edits designed to improve design of code (e.g., eliminate redundancy)
- Refactoring tools to assist should
    - Be completely automated
    - Provably correct, ensuring no new errors are introduced
    - Offer more complex refactorings composed from primitives

Design goals for refactoring

- Integrated into standard development tools
  - Want to integrate so developers cannot help but use
- Be fast: immediately see results of change
  - Refactorings that are slower will not be used
- Avoid purely automatic reorganization
  - Get input from users (e.g., name for new class)
- Be *reasonably* correct
  - Developers must trust them
  - But features like reflection makes it impossible to be completely correct

Refactorings supported

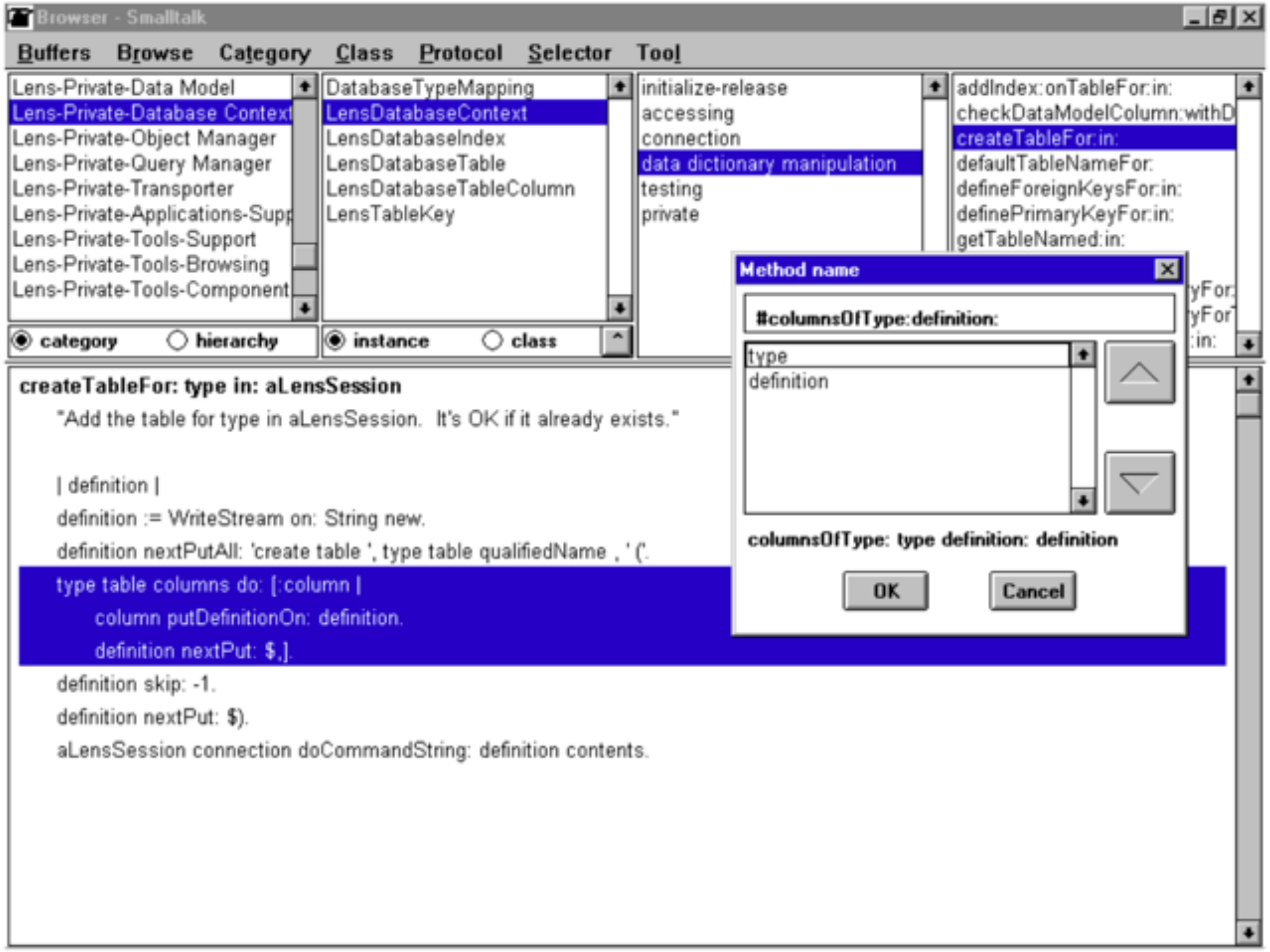


Instance/Class Variable Refactorings
- add variable
- rename variable
- remove variable
- push down variable into subclass(es)
- pull up variable from subclass(es)
- create accessors for a variable
- change all variable refs to accessor calls (abstract variable)

Class Refactorings
- create new class
- rename class
- remove class

Method Refactorings
- add method
- rename method
- remove method
- push down method into subclass(es)
- pull up method from subclass(es)
- add parameter to method
- move method across object boundary
- extract code as method

Example: Extract Method



```
createTableFor: type in: aLensSession
    "Add the table for type in aLensSession.  It's OK if it already exists."

    | definition |
    definition := WriteStream on: String new.
    definition nextPutAll: 'create table ', type table qualifiedName , ' ('.
    type table columns do: [:column |
        column putDefinitionOn: definition.
        definition nextPut: $,].
    definition skip: -1.
    definition nextPut: $).
    aLensSession connection doCommandString: definition contents.
```

```
#columnsOfType:definition:
columnsOfType: type definition: definition
```

Figure 2 - Screenshot of Refactoring Browser during extract code as method refactoring

Questions for discussion

- Overall reaction to the paper
- What are the barriers to using refactorings today?
- How much trust in the correctness of a refactoring is enough?
  - How much would a developer have to know to even reason about when to trust the tool?
- What additional refactorings might be valuable?