Finding Reusable Software Components in Large Systems

WCRE 96

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Motivation

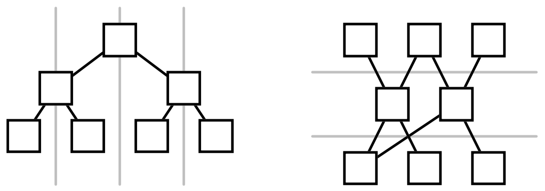
- work performed between 1980 and 1992
- need reusable software components for a KB forward engineering system (Draco)
- extract reusable software components from existing systems that contain hard to get problem domain knowledge
- large systems must have a lot of domain knowledge
- Goal: manual/semiautomatic extraction and KB encoding of domain knowledge. Can we find its location in a large existing system?

Hypotheses

- economics of large systems - more reengineering than anything else, fit into that context

- problem domains of large systems - too many of them. Focus on existing structure to provide a context for manual extraction of domain knowledge.

- architecture of large systems - focus on "cells" (subsystems) formed by tradeoff between functional decomposition and API decomposition



Experimental Method

- gather interconnection data

- analyze interconnections to form subsystems
  1. cross references
  2. diagrams

- ask system developers
  1. What have we included that doesn't belong here?
  2. What have we not included that does belong here?

Results: Data Collection

- development issues of large systems
  system function, suite of programs, source code availability, version (features), configuration (hardware), nonstandard language usage, lack of documentation

- interconnection data

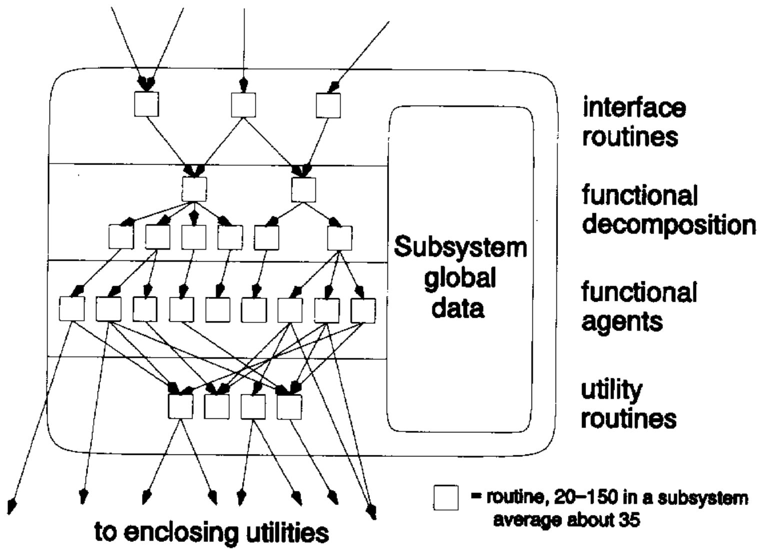
system	role	size	source
Telcom / Datacom switch	Software Architect (full time)	4M SLOC 3,800 modules	Pascal, C, assembly
CAD/CAM	Consultant (part-time)	2M SLOC 3,394 modules	FORTRAN, C
CAE/CAD	Manager (full-time)	4M SLOC 7,089 modules	FORTRAN, C

- maintenance programming

Result: Subsystem Analysis

- determining subsystems
  1. **failure:** decomposition
  2. **failure:** intermodule data flow analysis
  3. **success:** module name pattern matching
  4. **success:** reference context

- subsystem structure



Conclusions

- subsystems validated by users - they use output
- subsystems are good for reengineering manpower loading
- subsystems are big (average 35 modules with 17,000 source lines)
- subsystems serve as focus for KB extraction
- subsystems may be used to (re-)construct object hierarchies