Minimizing System Modification in an Incremental Design Approach

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Summary

- Mapping and scheduling of distributed embedded systems for hard-real time applications
  - Static cyclic scheduling of processes and messages,
  - Bus access scheme: time-division multiple-access.
- Incremental design process
  - Already existing system,
  - Implement new functionality,
  - a) Existing system modified as little as possible,
  - b) New functionality can be easily added to the system.
- Mapping strategy
  - a) Subset selection to minimize modification time,
  - b) Two design criteria, objective function.

Problem Formulation

- Input
  - A set of existing applications.
  - A current application to be mapped.
  - The system architecture.
- Output
  - A mapping and scheduling of the current application, so that the incremental design requirements are satisfied.
- Requirements
  - a) Constraints of the current application are satisfied and minimal modifications are performed to the existing applications.
  - b) New future applications can be mapped on the resulted system.

Mapping Strategy

- Initial mapping and scheduling
- Requirement a)
  - Subset selection problem
  - Select that subset which will fit.
  - Characterizing existing applications:
- Requirement b)
  - Objective function minimization:

Paul Pop, Petru Eles, Traian Pop, Zebo Peng:
An approach to Incremental Design of Distributed Embedded Systems,
Design Automation Conference, 2001