Real-Time Databases for Engine Control in Automobiles

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Overview

Data management
- Maintain data with temporal constraints
- Maintain transactions
- Handle data items with changing validity intervals

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Time critical application
- Engine Control Unit

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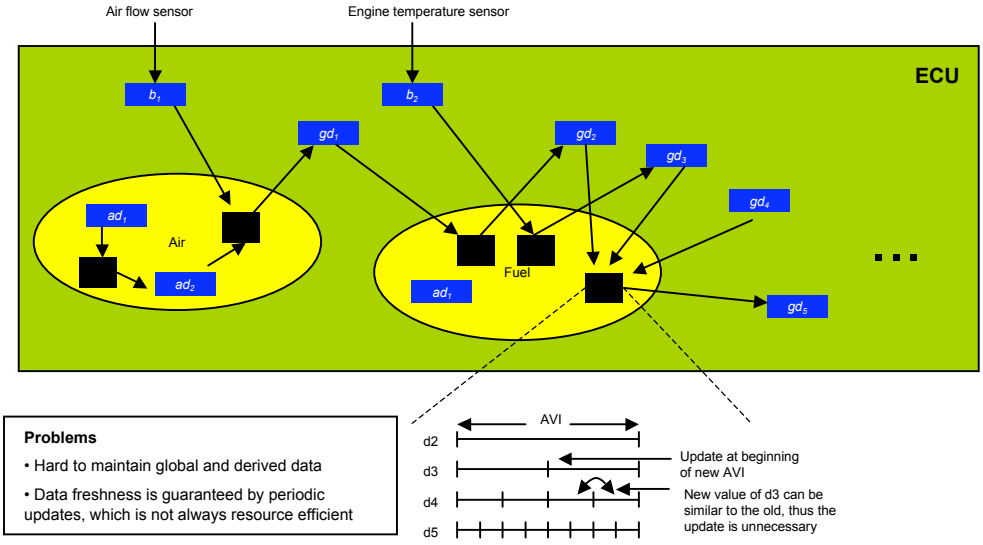
Efficient resource allocation
- Avoid unnecessary updates

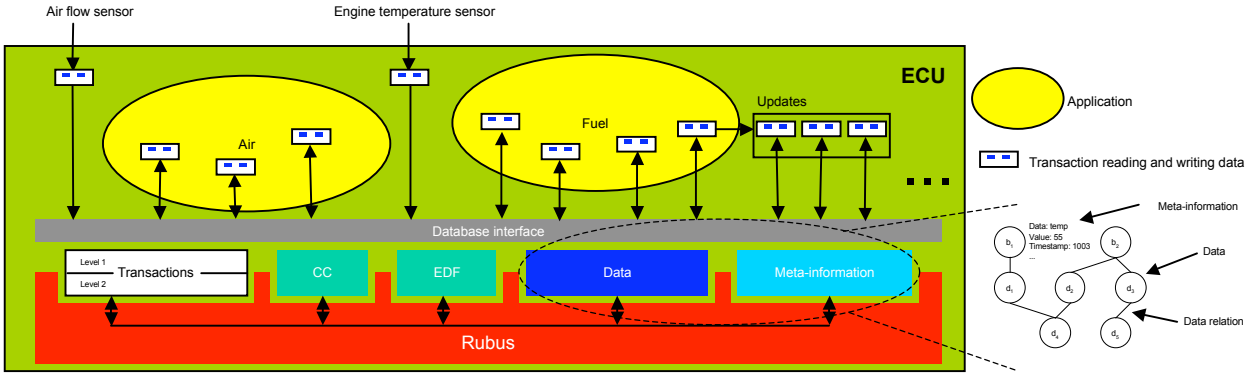
Current System with ECU



Problems
- Hard to maintain global and derived data
- Data freshness is guaranteed by periodic updates, which is not always resource efficient

ECU – Engine Control Unit
- controls fuel-air mixture and ignition

Our solution: ECU with Data Management facilities



Data | Meta-information

Transactions

- **Stored centrally**
- **Meta-information can be timestamps, worst-case execution times, etc.**
- **Data relations are known off-line and stored in a graph**
- **Data are updated on-demand by the database system**

- **Are used to access data in a controlled way**
- **Can be placed in one of two queues to support importance levels**
- **Are executed by earliest deadline first (EDF) (other time-cognizant algorithms are possible)**
- **Concurrency control mechanisms (CC) ensure data access by concurrent transactions**

Project homepage: http://www.ida.liu.se/labs/rtslab/projects/ISIS_DB_EngineControl/

Mecel