Invitation to attend a licentiate thesis defence.

Time: May 12, 2003, 1:15 PM
Place: Room V226, building Vargens Vret,
               Mälardalen University, Västerås

Title: COMET: A Component-Based Real-Time Database for Vehicle
               Control-Systems

Respondent: Dag Nyström, Mälardalen University, Västerås

Opponent: Henrik Lönn, Volvo Technology AB, Göteborg

Welcome, Dag

Abstract:
Vehicle control-systems have evolved from small, isolated controllers to complex, distributed computer-systems. These systems include nodes spanning from simple 8-bit micro-controllers with a minimum of memory to complex 32-bit processors with vast resources. The main motivation for this evolution is the need for an increased functionality in vehicles. Examples of functionality include momentary fuel consumption measurements, anti-spin systems, and computerized diagnostics of vehicle-status. The increased functionality implies handling and maintaining a larger amount of data, which has created a need for a uniform and efficient way to access and maintain data in these systems. A real-time database management system could provide a solution to fulfill this need by providing a uniform and efficient data management. However, an extensive survey of commercial as well as experimental database management systems has shown that no system currently exists that fulfills the requirements of vehicle control-systems.

In today's system, data management is done in an ad-hoc fashion at a low level of abstraction, using internal data-structures, e.g., shared variables and structures. This approach requires that the consistency of the data is maintained by the application, by resolving data access conflicts through the use of mechanisms such as semaphores.

This thesis presents a flexible and configurable database management system called COMET, suited for embedded systems, in particular vehicle control-systems. To be able to handle the varying requirements imposed by different systems, COMET emphasizes configurability and tailorability, by adopting a component-based architecture.

The result of this research is the implementation of COMET BaseLine, which is an instance of COMET suited for a particular vehicle control-system. The required behaviour of this database is based on requirements gathered from a case study performed at Volvo Construction Equipment Components AB in Eskilstuna. To fulfill these requirements, a concept called database pointers has been introduced and implemented. This concept allows time- critical database operations to execute efficiently and temporally deterministic, while still providing a high level of conceptuality.