Evaluating security concerns of software structure on high performance in-vehicle computational nodes

The traditional approach is automotive industry when developing in-vehicle software & electronic architecture is to provide increasing functionalities for end customer while balancing constraints like cost, scalability, maintainability, manufacturability and so on while not compromising safety and quality. However, security is an often neglected area until recently when its impact on safety, quality and uptime is getting obvious due to different hacking incidents around the world.

With major vendors now offering more powerful processor chips combined with goal to reduce cost, weight and maintenance, the trend now towards moving towards the homogenous centralized architecture integrating functionalities into few powerful ECUs called computational nodes.

Challenge

This thesis work is expected to advance the activities carried out in the HLOISEC project by evaluating security concerns and propose mechanisms around software architecture allocated to high performance computational nodes. The exact goals of the project are to be defined as the thesis starts, but a preliminary list of goals includes:

- Identifying security flaws when integrating application with different levels of security on a single computing platform and proposing secure software architecture.
- A simple prototype demonstrator based on UDP/IP/Ethernet running on Linux OS is available. The students are expected to explore security flaws in it.
- Define mechanisms to tackle selected security concerns from the previous step.
- Evaluate the identified mechanisms in the demonstrator. Basic skills of programming in C++ and basic knowledge of Linux OS should be sufficient.

Background & Requirements

- Final year Master’s student with computer science or similar background
- Knowledge in security and communications
- C programming, modelling language and software engineering skills are merits.

Contact

Tomas Olovsson
Dept. of Computer Science and Engineering and Volvo Group