Thesis work:
Verified boot in embedded environments with hard boot time constraints

About us
On-board Telematics (OBT) is a global department within Volvo Group Trucks Technology (GTT) Vehicle Engineering, established to secure connected vehicles supporting the increasing demand for soft products. Connectivity is a key enabler for fleet management, uptime services and advanced vehicle services such as driver assistance and fuel reduction, targeting reduced costs as well as increased revenues.

Description of thesis work
The security of in-vehicle ECUs has become a major focus for vehicle manufacturers over the recent years. As such looking at incorporating security technologies pioneered by other industries is a natural step. As a part of this work implementing a verified boot sequence is an interesting path, one which could help protect against firmware tampering. Verified boot is currently a well-established practice in both desktop computers as well as mobile devices, vehicle ECU however are often burdened with hard boot time requirements. In practice this means that once the key is turned on in a vehicle an ECU only has a limited number of milliseconds before it's expected to be operational.

The objective of this thesis is to investigate various technical solutions for a verified boot process and their impact on the system - mainly on boot times but also any other potential overhead. Technologies like Secure boot – using asymmetric keys to verify an unencrypted flash memory/file-system, TPM seal in combination with an encrypted file-system (similar to Microsoft's BitLocker) and virtualization/Hypervisor based integrity checks should be part of the scope of the investigation.

Expected deliverables
- State-of-the-art analysis of different technical solutions for a verified boot process
- Recommendation for OBT regarding optimal solution for fast boot process
- Simple proof of concept

Experienced engineers and researchers at GTT will supervise the thesis workers. The work will take place in Gothenburg, Sweden. Apart from the thesis report, students are also expected to give a presentation at AB Volvo at the end of the project.

We are searching for:
- Students with strong computer science interest with a system security perspective
- Interest in (automotive) embedded systems
- Interest in security technologies
- Self-motivated and analytical

Thesis Level: Master
Language: English
Number of students: 2 (we want you to apply in pairs)

For further information, please contact:
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