

Smart Grid: Virtualisation of custom RTOS

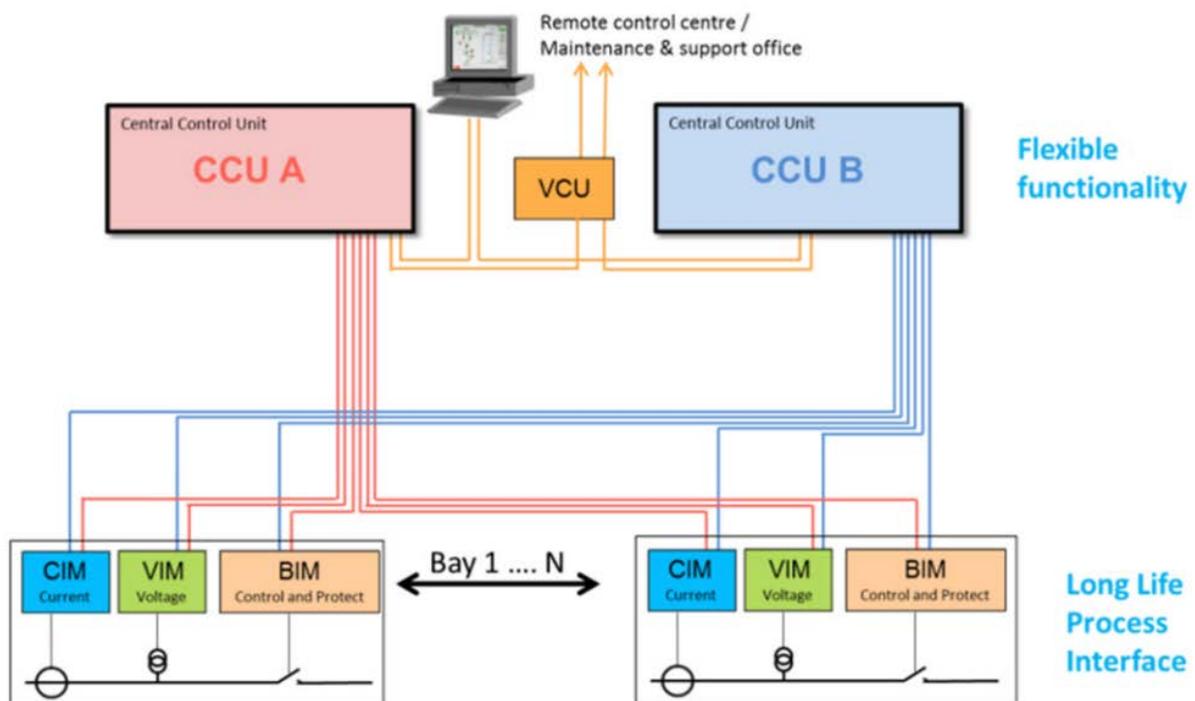
Theme	Virtualisation of custom Real-time Operating System
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Introduction

SASensor® is the most widely adopted Smart grid Centralised Protection and Control (CPC) system on the market for primary substations, with more than 4 million hours of reliable use in the field. Centralisation of protection and control does not only benefit increased reliability and availability of the grid, it also improves safety and optimises of Total Cost of Ownership.

The uniqueness of the SASensor system architecture is the separation between physical devices (hardware) and functionality (software) on the one hand and fast ageing components (computers) and the long unalterable interface with the primary process (process interface modules) on the other hand.

The separation between hardware and software effectively solves the lifetime issues of digital equipment. Our interface modules, which are to be installed as close as possible to the primary equipment, can remain there for decades (at least 30 years), which minimizes future installation and maintenance costs. Software can be simply updated and Control Units can be easily replaced in case they have reached the end of life.



Assignment

We are looking for ways to support the next generation of Control Unit hardware. At the moment, our own real-time custom operating system is used. In order to keep up with the fast moving hardware market we need a solution which is future-proof and preferable based on off-the-shelf software.

Other aspects of the system should not be forgotten. Because the currently increasing demand of new functionality on the Control Units, the wish is to be able to increase the performance of the system by moving to new and faster hardware architectures (e.g. multi-cores).

The assignment is to investigate different solutions and to port (a part of) the current functionality of the Control Units to a new platform.

Research questions

First of all, the student needs to take the time to investigate the current solution based on several aspects.

We have the following research questions:

- What are the state-of-the art solutions (e.g. virtualization techniques) to port the current functionality of the Control Units to a new software platform?
- How do the different solutions compare on e.g. reliability, predictability, performance, scalability, maintainability, security, reliability and releasability?

Deliverables

- Comparison of different solutions to port the software to a new platform.
- Proof-of-Concept implementation and documentation.
- Internal company presentation.

Student profile

The student(s) need to have:

- Ability to gather knowledge and track own progress.
- Good investigation skills.
- Good communication skills.
- Knowledge of the c programming language.
- Basic knowledge of different RTOSes and virtualization techniques is an advantage.