Master Thesis

Group Smart Resource Integration from OFFIS R&D division Energy has an announcement for an immediate master thesis.

Energy Efficient Time Series Forecasting

*Data centres, energy efficient hardware, workload forecasting methods,
software implementation, energy efficiency evaluation*

INTRODUCTION/CHALLENGES:

The **energy demand of data centres increases continuously** due to higher demands of high performance systems or modern media. Many use cases are about **processing requests** from customers in application systems, e.g. web shop ordering systems. To satisfy customer's needs companies usually rely on big resource pools to be prepared for all incoming workload. However, often there are also **periods of low utilization** (e.g. night times, weekends) when servers do busy waiting. By using historical data of server utilizations it is possible **to recognize patterns and forecast expected workloads** for optimizing the server uptime proactively and achieve better energy efficiency. This approach is utilized by the workload management developed in the M2DC (Modular Microserver Data Centre) project.

TASKS:

The master thesis' objective is to **research and develop a combined SW/HW** system to support energy efficient time series forecasts. The system will continuously run in background, updating or creating forecasts. To keep energy savings from optimised workload phases, the **energy demand of the system should be as low as possible** while performance has not to be considered. After **research on suitable forecasting methods** (e.g. statistical models, neural networks) and hardware platforms (e.g. ARM64, low power x86, FPGA), **the chosen system will be bought** from project budget and **has to be implemented.** Eventually, the energy efficiency of the implemented system has to be **evaluated compared to the given SW** approach used in M2DC.

- Research of appropriate forecasting algorithms for time series (data centre workloads)
- Research of energy efficient hardware platforms for data centres
- Combined selection of software and hardware to be most energy efficient executing forecast algorithms and libraries (no focus on performance)
- Implementation of software on selected hardware
- Energy efficiency evaluation and comparison to existing (SW) approach

REQUIREMENTS/PROFILE:

- Experience and interest in software development
- Work can be done completely in English or German language

REVIEWER:

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