SENDATE-EXTEND

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Project Websites

www.celticnext.eu/project-sendate-extend

www.sendate.eu

SEcure Networking for a DATa Center Cloud in Europe—Extended Datacenter solutions

Data Centers (DC) are the most important control centers of the Internet today and have massive computing power, storage capacities, and performance.

The high demands on service guarantees, flexibility and energy performance require an optimization of datacenter automation and energy consumption.

The goal of the project is to provide concepts and solutions for Intra and inter-DC - control, -management, and –orchestration of datacenter networking, applications and energy optimization of the operations.

Main focus

Large DCs are forming the most important control centers of the Internet nowadays. Within datacenters data is stored, processed, and communicated to provide business value. Current datacenters have a huge computing power, massive storage capacities, and an enormous performance based on centrally stored and processed data. They are mostly located far away from the end-customers close to the main resource the power.

The network is used for transport and content distribution in Content Delivery Networks (CDNs). The energy used is also growing along the growing amount of data stored, processed and communicated. This leads to low flexibility for new requirements, long delays to customers for delay sensitive applications, and need for continuous energy performance improvements.

New application scenarios of our digital society, such as Industrial Internet, mobile connected objects, Internet of Things and especially 5G, lead to a huge number of end devices and an enormous increase of traffic volume and data processing. The high demands on security, location awareness, service guarantees, flexibility, energy performance and latency require a convergence of telecommunication networks and IT, optimization of datacenter automation and energy consumption as well as distributed data center functionalities, which are placed closer to the customers and end devices.

Approach

The project is based on the insight that a holistic approach is needed for a sustainable and winning proposition. The approach is to co-optimize cross-layer from IT load and communication to building, energy and cooling supply. This will enable a head start and leapfrog the Swedish industry into the future datacenter operations and products. Parts of the co-optimization are automation, integration, monitoring and control of compute, communication, storage and supporting infrastructure.
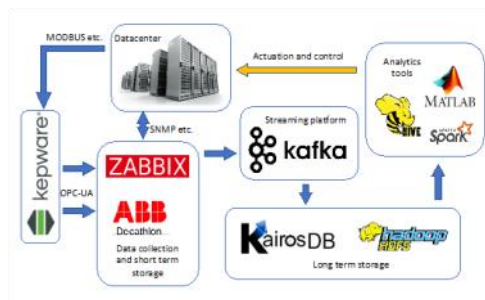
Achieved results

The main achievements of the project are 4 new product prototypes, 16 improved products and a large number of scientific publications. Dissemination has been carried out by demos of the two new product concepts at Mobile World Congress / ETSI
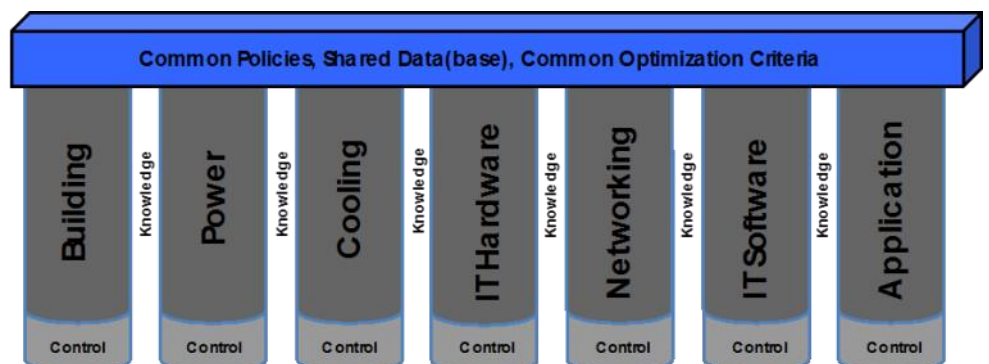
industrial event by WP1. These products are well received by the market, with a potential for a high return of investment. The product concept developed in WP3 has been demonstrated to many potential customers and disseminated as well at a number of industry events, e.g. the Data Centre World. The data center monitoring prototype is also used in a pilot data center in a H2020 project. A start-up based on the results is also evaluated.
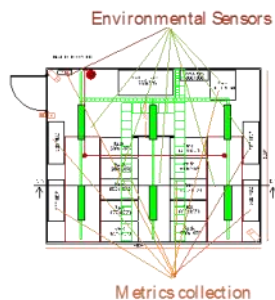
SENDATE sub-projects and telecom operators. In WP4 a close collaboration between Ericsson KTH and RISE on machine learning, anomaly detection, and root-cause analysis to support data center and cloud management has resulted in publications and patents that will have an effect on future product concepts. Finally in WP5, WP6 and WP7 the great collaboration led by ABB together with LTU, RISE, Ericsson and others has led to many new concepts

concepts developed in WP1 and WP3. The project has produced 8 patent applications, 19 prototypes/trials, 20 journal publications, 62 conference publications, 13 participating PhD students and 23 master thesis students and a number of open source software contributions have been made.

Impact

The major impact is that two new product prototypes have been developed, demonstrated and brought to market and one existing product in commercial operation has been improved in several aspects from WP1.

The WP2 scientific work will have a long-term impact on the industry and in short-term two new employees at Ericsson.

The successful development and implementation of a full data collection chain in WP3 will become the blueprint of RISE IoT and data collection and analysis system. It will also be used in a coming commercial activity in a start-up that will offer data collection, monitoring and analysis software to the data center market.

In WP4 One of the approaches for anomaly detection and Root Cause Analysis (RCA) has proven to be specifically interesting for one of Ericsson products within management of private LTE networks and several of the developed technologies have been protected by IPR with a longer-term impact. The impact of WP5 is an increased understanding of next step in asset management for data centers.

A data center simulator from WP6 is currently a prototype, but can be a product within ABB with further development. The scientific work has improved the knowledge space of the data center industry and will have a future long-term effect.

The concepts, methodologies and technological solutions in WP7 have been implemented, tested and validated as field trials & prototypes using the industrial platform ABB Ability™ Data Centre Automation used in RISE research data center. It can potentially include in short term as new features of the ABB Ability™ platform.

A large number of scientific achievements are results from the project as well, that will have a long-term effect on the industry for example Ericsson, ABB and the other industry partners with results, PhD dissertations and master thesis engineering reports. In WP2, with KTH and Ericsson involved, a number of studies have been successfully performed on the data and control plane as well as the resiliency and physical layer security in collaboration with other

in a fairly unexplored area of data center operations. The comparable "new" area has been industry led by giants like Facebook, Google, Microsoft etc., but need scientific quality to take the next steps in energy and cost efficiency of data center operations. The results on monitoring, modelling, simulation, automation and control will lead to future product concepts.

The expected return of investment for the project is high for some of the results, especially the product

About Celtic–Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new „Smart Connected World" paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the intergovernmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies

or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

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