Celtic-Plus
Smart Connected World

Project Information

SENDATE EXTEND

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Partners:

ABB Corporate research, Sweden

Arctoslabs AB, Sweden

BnearIT AB, Sweden

Eitech, Sweden

Ericsson AB (EAB) , Sweden

LTU, Sweden

Metria AB, Sweden

Netrounds AB, Sweden

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Project Websites

www.celticplus.eu/project-sendate-extend
www.sendate.eu

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

SENDATE EXTEND is taking a holistic approach on management, control and orchestration in datacenters. The project wants to break down the automation silos in a datacenter. Improve efficiency and flexibility of deployment, monitoring, operations, maintenance and management of storage, compute, communication and energy supply infrastructure within datacenters and in a distributed cloud.

Main focus

Large Data Centers (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 cost of sending data is going down and the power availability is limited in populated areas. It could be paraphrased as photons are sent instead of electrons.

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. Many new applications for 5G for example autonomous cars, drones or distance-controlled equipment are expected to need local compute capacity. The high demands on security, location awareness, service guarantees, flexibility, energy efficiency and latency require a convergence of telecommunication networks, operational technologies and IT, optimization of datacenter operation and energy consumption as well as distributed data center functionalities, which are placed closer to the customers and end devices.

The trend is that the future will bring more distributed cloud. But a distributed cloud is made up of two parts; centralized hyper-scale datacenters and decentralized edge datacenters and sites. It is not a decentralized cloud, but rather a distributed cloud since hyper-scale will not go away. So a project looking into the future needs has to work with both. It is a lot to win by doing that. Central datacenters run most latency independent applications or latency independent parts of an application. Then cheap power and energy efficiency is the most important requirements. Edge datacenters run low-latency parts or applications. That will grow in importance but it will not over-grow central datacenters. A distributed cloud with optimized software for distribution over central and decentralized sites will be a winning concept. We need to address both performance and sustainability for that.

Approach

- The goal of the SENDATE-EXTEND project is to provide the scientific, technical, and technological concepts and solutions for
- A clean-slate architecture for control, management and orchestration for a distributed cloud including both central large-scale datacenters and edge datacenters supporting the application scenario all the way out to devices
- Intra and inter-DC holistic control and management of energy optimization cross-layer from building, cooling, energy supply to ICT software
- Placement, control, and management of some Virtual Network Functions (VNF)
- High speed transport networks to interconnect servers in a DC, data centers together, the end-users and the end-devices

In summary; this project is based on the insight that a holistic approach is needed for a sustainable and winning concept for the communication infrastructure. The approach is to co-optimize cross-layer from IT load and communication to building, energy and cooling supply. Parts of the co-optimization are automation, integration, monitoring and control of compute, communication, storage and supporting infrastructure. The project will improve efficiency and flexibility of deployment, monitoring, operations, maintenance and management of storage, compute, communication and energy supply infrastructure within datacenters and in a distributed cloud. See figure 1.

To address the overall goal, a number of network related topics will be covered. Examples

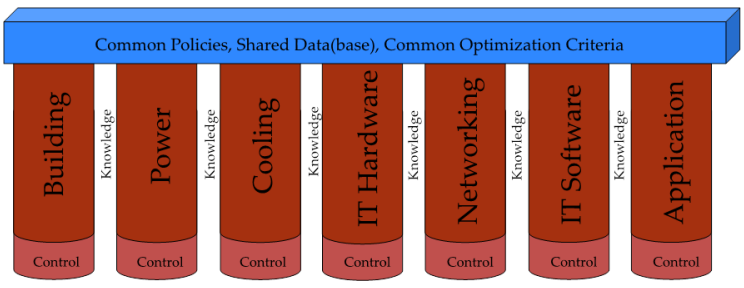

Figure 1: Holistic approach to break the barriers between datacenter silos.

are inter and intra datacenter transport network control and orchestration to improve flexibility, maintenance and performance and high performance virtual network overlay (SDN) to enable datacenter functions over a grid of compute equipment from the central datacenter over edge datacenters to the end-user equipment itself.

A number of internal datacenter topics will also be covered like performance metrics data & information architecture and database implementation for enabling data sharing between layers in the datacenter stack or between facility and IT, monitoring software platform and measurement probe integration to collect data from all parts in a datacenter see figure 2, and analytics algorithms for prediction and problem detection for both cloud software functionality and facility hardware.

Main results

A number of use cases will be explored and demonstrated in the project.

One use-case is a cyber physical system and a highly distributed environments of datacenters to support an application running on a number of physical equipment. To secure performance for the application one connected use-case is a troubleshooting northbound SDN controller application.

Another use case is an application platform to support end-user ease of use and management efficiency. A use-case connected to that is anomaly detection and root-cause analysis techniques for clouds and services to support the operations and maintenance.

Inside the datacenter one important use-case is the integration of total energy usage monitoring and load balancing software to enable energy efficiency improvements. Part of that is the use-case for prediction of energy use depending on application load changes and an add-on use-case networking performance monitoring integrated with IT load and energy monitoring.

Impact

In this project Ericsson will develop together with project partners new technologies in the field of inter- and intra-datacenter communication, distributed datacenter software and management systems based on analytics. All this will be key differentiating technology for 5G service delivery and communication in the digitalization of industries and for holistic operation of cloud and datacenter infrastructure.

ABB and Swegon will together with project partners develop important datacenter system technologies for the holistic automation and control of energy and cooling supply systems. Integration of supply sub- systems and integration with IT equipment will be key differentiating factors for these solutions. Large-scale automation experiments including IT software and hardware and energy supply systems will be important to show business value.

Metria and Eitech, as datacenter end-users, are part of the project to increase the competence in the field of datacenter IT and energy system operations to increase the competitiveness in their service delivery. BnearIT, Netrounds and Arctoslabs will develop innovative new product and service solutions together with project partners in the fields of management and monitoring of datacenter communication and equipment.

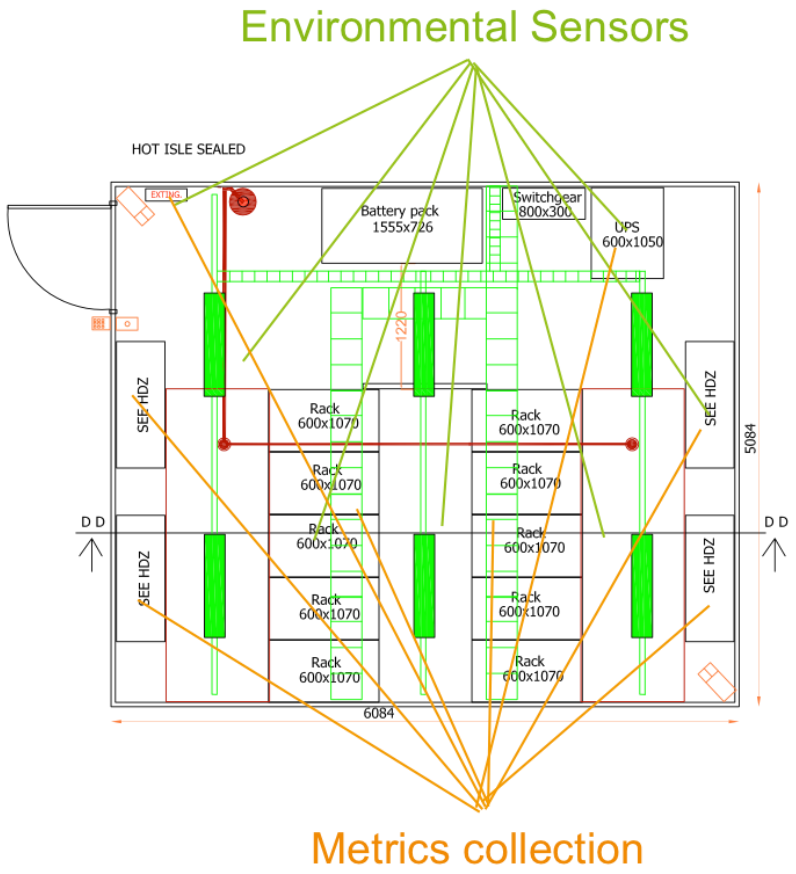

Figure 2: Data collection from all parts in a datacenter.

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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