Overview

Nerve Blue is a versatile software that enables machine builders to deliver data and offer services to customers from machines installed anywhere in the world. Nerve Blue offers an out-of-the-box experience, with an intuitive user interface and edge computing features that allow users to collect, store and analyze machine data, consolidate multiple functions on one device, and remotely manage software. Using Nerve Blue, machine builders can reduce system complexity and cost, improve machine performance, and offer innovative new services to customers.

Problems to be solved:

- You want to increase vendor independence by establishing an open architecture

- You have many machines or other assets in the field and want to access them remotely

- You want the ability to manage software deployment and updates centrally

- You want to leverage virtualization technology even for critical control systems

- You want to run analytics and other complex applications at the edge

Solutions with Nerve Blue:

- Comprehensive industrial software platform running on various hardware

- Builds on open technologies e.g. Linux, Xen, Dockers, OPC UA, MQTT

- Offers an edge/cloud-based infrastructure for software lifecycle management

- Integrates CODESYS® soft PLC in real-time virtual machine for running critical applications

- Provides access to data from brownfield systems via real-time Ethernet fieldbuses

Features

Nerve Blue enables data to be acquired from machines and used seamlessly throughout a system. The Nerve datapath provides connectivity to PLCs or remote IO modules via Ethernet fieldbuses such as PROFINET and EtherCAT in order to gather data from machine sensors and actuators. This data is modeled in OPC UA, allowing information to be shared in a standard way with other applications at the edge, be stored as time-series data, and be sent via MQTT to the cloud for further analysis. Nerve also integrates a CODESYS® soft PLC that supports the ingestion of real-time data (<1 ms) from virtually any control system.

Nerve Blue implements a virtualized software environ-ment on multi-core edge devices. The integrated Xen hypervisor ensures a strict isolation of virtual machines that enables them to share compute resources (e.g. CPU, memory, network) safely and securely. Applications can also be run as Docker containers, offering a light-weight form of virtualization within a Linux or Windows virtual machine. The CODESYS® soft PLC can be used for executing real-time control applications (<1 ms)

and is hosted as a virtual machine to ensure isolation of critical functions from interference.

Nerve Blue includes a web-based management system that can be hosted locally or in the cloud. The management system provides access to Nerve devices around the world, enabling software configuration and remote diagnostics. It also acts as a central repository for workloads, which can be remotely deployed as Docker containers, VMs or CODESYS® applications to any connected device. Labeling of workloads and devices ensures that the deployment is done in a simple, precise and uniform way. Updates to device software are also handled by the management system, allowing transpar-ent version management and regular security patching.

Nerve Blue scales to run on various CPUs ranging from Intel Atom to i7. An example is the MFN 100, which is a qualified Nerve Device that is optimized and tested for use with Nerve software. The device is designed for harsh industrial environments (-40 °C to +70 °C). It is based on an Intel Atom x5-E3940/50 CPU and offers

4 GB/8 GB RAM and up to 512 GB SSD storage. MFN 100 offers 1x IO port for Ethernet-based fieldbus connectivity, 4x GbE switch ports and 1x SFP port. Additional interfaces include 2x USB 2.0 ports and 1x Display Port.

Benefits

Nerve Blue offers users the freedom to process data wherever and whenever it is needed.

Nerve Devices close to the machine provide the means for data to be stored, processed and visualized at the source, allowing for decisions to be made more quickly than if data were being sent to the cloud for analysis. For low-latency applications such as motion control, Nerve Blue provides a CODESYS® soft PLC where data can be ingested and used in real-time (<1 ms) Faster response times to information from sensors help to prevent critical incidents and promote more efficient machine operation.

Users can also choose to send data to the cloud of their choice for storage, visualization and analysis. Nerve Blue provides interfaces to multiple IoT cloud solutions (Azure, AWS and more) and data can be sent in a number of ways (MQTT, REST/JSON, OPC UA). This offers users the flexibility to quickly and securely integrate machine data into their own edge-cloud or a third party IoT cloud solution. Nerve Blue allows sensitive and critical data to be kept at the machine or within the plant, with only non-sensitive data being sent outside of the perimeter network (DMZ). Data can be collated at the edge and sent to the cloud in batches to reduce bandwidth usage and associated costs.

Nerve Blue optimizes virtualization technology for the industrial world.

Sharing compute resources between operating systems and applications enables the convergence of various functions that previously required dedicated hardware (industrial PC, PLC, gateway, firewall etc.) in one device. Users are able to cut their hardware spending, often by 50% or more, due to the reduced number of devices required and the lower costs of maintenance in a converged system.

With Nerve Blue, users can migrate their legacy software environment as a virtual machine to support existing applications, as well as deploying new applications in Docker containers. Isolating individual applications in virtual machines can improve stability, security and scalability of software by protecting applications from interference with other applications, potential malfunctions or hackers. Docker containers can further help to reduce CPU load and memory resource demands, as well as being quick and easy to deploy. Decoupling software functionality from hardware with virtualization dramatically reduces the risk of hardware obsolescence.

Nerve Blue provides an open platform that enables users to create, deploy and run applications. There is no lock-in to any single application source or vendor. The Nerve Base System provides a standard application environment, meaning that there is no need for developers to work on the software infrastructure around apps. Python SDKs with REST APIs are available for integration with existing management systems, allowing developer resources to be focused on areas that drive value.

Nerve Blue makes software management easy and efficient.

Instead of updating individual machines on site, Nerve's management system allows for software updates to be securely deployed from a central repository to connected machines around the world. Access to device information locally and remotely gives users an overview of what software versions are running, and control over how deployment is managed. The ability to easily and efficiently deploy software encourages regular updates and helps to optimize machine performance and productivity.

Central management of device software and applications delivers new operational flexibility and reduces support and maintenance efforts. Nerve Blue allows users to remotely login and securely view screens of virtual machines, giving an enhanced ability to diagnose and resolve software issues remotely. Security threats or critical bugs can also be responded to more quickly and accurately by applying patches remotely to any affected machine.

Find out more about Nerve Blue at
www.tttech-industrial.com/nerve