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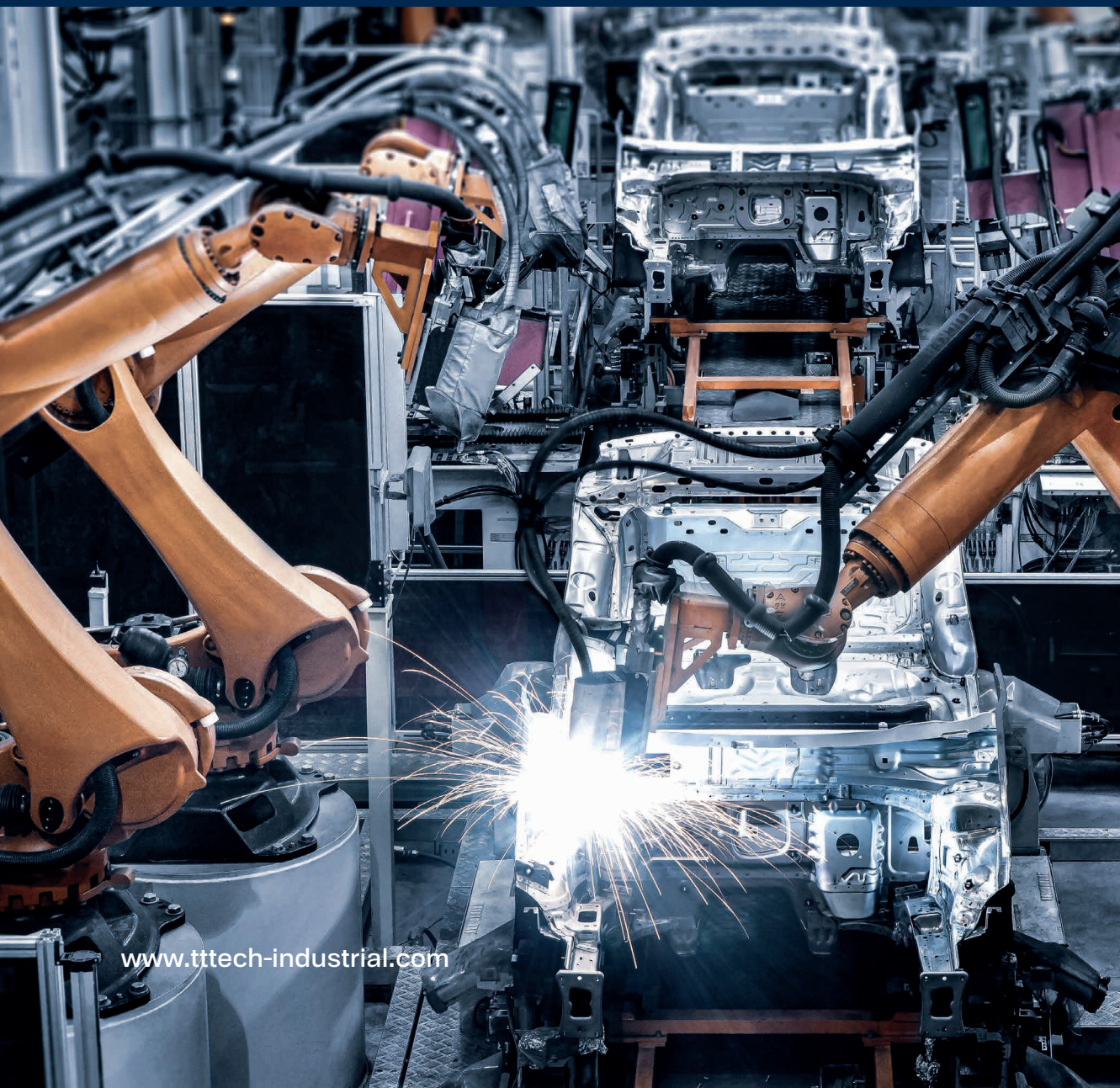
Case Study:

Virtualization of Legacy IPCs in the Automotive Industry



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The customer is a Japanese system integrator in the automotive industry with a focus on supporting customers on their way to digital transformation.

Challenge

The Japanese automotive industry delivers quality through continuous improvement of their production processes. However, well-honed processes that work for the organization are often maintained for many years with minimal adaptations. In such cases, the software involved may outlive the industrial PCs (IPCs) it was installed on. As a result, hardware may need to be replaced, but the software needs to be maintained as is.

However, the software and the respective operating systems, in most cases Microsoft Windows versions (ranging from Windows XP to Windows 2003), do not generally run on newer hardware. Additionally, legacy installations do not provide up-to-date features of centralized supervision and management which are desirable in a modern IT infrastructure to reduce the cost of operation.

Solution

Introducing Nerve as managed edge computing platform addresses the challenges mentioned above by providing legacy IPC virtualization, enriched with software management, monitoring, and remote access capabilities.

Virtualization is commonly used in data centers and on server-class hardware. Nerve brings virtualization to IPC-class hardware. The hypervisor, core component of any virtualization system, in Nerve is configured to support legacy Windows operating systems by emulating hardware drivers which are not available in modern IPCs.

Customers replacing hardware often face the challenge of porting existing software, a capability that even the original software vendor may not be able to provide. Using Nerve, an old IPC can be replaced with a modern IPC, without the customer having to port their existing software to new Windows versions. This saves considerable engineering effort for porting applications to a new system or recreating legacy functionality with new software on modern hardware.

In addition, by migrating the existing application to a virtual machine on a managed virtualization platform, new functionalities become available without any further software changes. Using Nerve, a virtual machine can be started, stopped and automatically backed-up from the central Management System. Even the health status of the system can be monitored centrally and can be forwarded to the alarming systems of the operations team. Centralized logging enables the capture of audit logs which trace relevant changes in the system. Integrated remote access permits viewing an IPC's virtual screen from any location within the company network.

As a result, the virtualization of old IPCs is not just a makeshift solution but an actual improvement of the system's functionality.

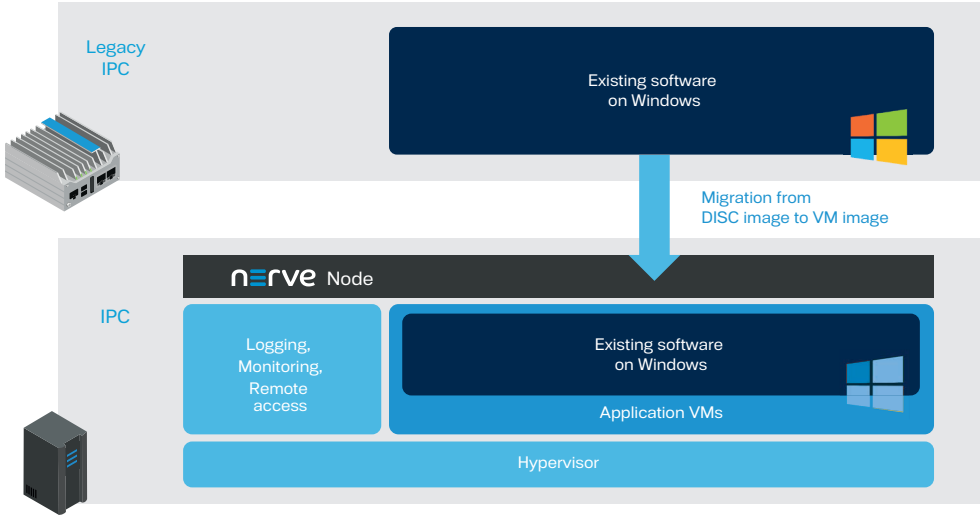

Figure 1: Legacy IPC migration to Nerve

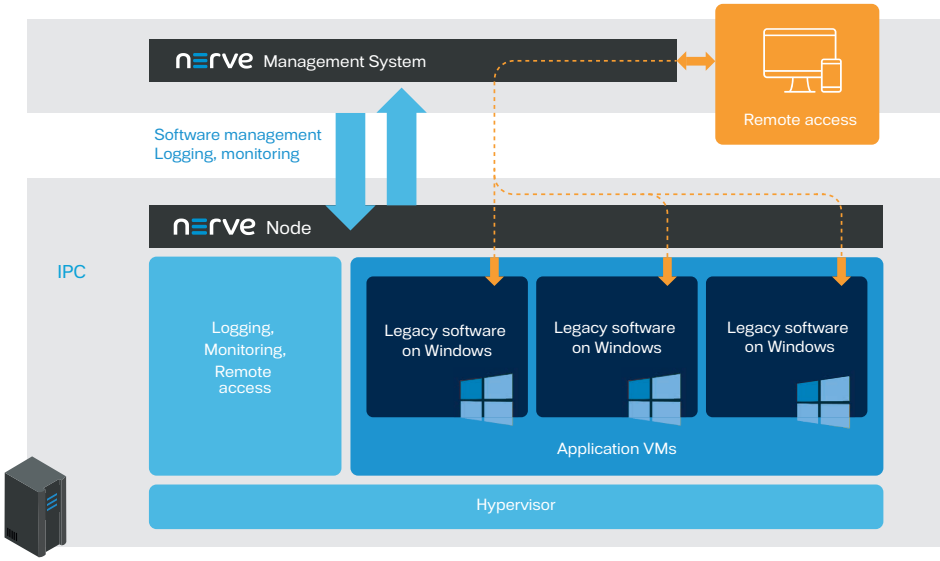

Figure 2: Virtualization of three legacy IPCs on a single modern IPC with additional functions

The migration of the existing software plus the legacy operating system to a virtual machine is in most cases a straightforward process which can be completed in two to three hours, depending on the speed of the legacy IPC and the size of the application. Difficulties can occur when specific interfaces need to be attached which are not available for modern systems. In these cases, an emulation through a software layer may become necessary. These additional software layers can be executed directly on the new IPC, as Nerve can host them as Docker containers or small auxiliary logic virtual machines.

As modern IPCs provide much more computational power than the legacy IPCs which are being replaced, it is often possible to run multiple virtual machines on a single hardware device and to run additional IoT functions on the same device. Such a consolidation of multiple legacy IPCs into a single modern IPC also provides immediate cost reductions. In some cases, though, this approach is not possible because of the physical constraints of the set-up, for example when the IPCs needs to drive a display which is directly attached to it. In such cases, a one-to-one replacement is necessary. The best option for the virtualization can only be decided on a case-by-case basis.

Key Benefits

The key benefits for the system integrator and its customer are the lifetime extension of existing software, monitoring, and remote access to their machines on any day and at any time. Furthermore, customers can decouple their hardware from the software infrastructure to reposition applications more flexibly.

With Nerve, downtime can be reduced by backups, snapshots, and the monitoring capabilities of the centralized Management System. The reduction of downtime increases production efficiency.

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