Streamline Applications with Secure Edge Orchestration for Connected Oilfields

An Intel-based ecosystem collaboration among Advantech, ZEDEDA, and Arrow Electronics for successful oilfield monitoring and control

Real-time visibility of accurate data is imperative for effective management, safety, and productivity in oilfields, especially for remote assets. These sites require numerous pieces of equipment in order to operate effectively and, for the most part, that equipment is required to function in remote, unmanned locations, which can pose challenges for traditional SCADA systems. Implementing edge compute solutions to build a connected oilfield system provides business operations with cost-effective, 24/7 visibility of assets and processes. With actionable insights at oil rigs, wells, refineries, and more, potential cost savings can exceed millions of dollars.

The Challenge

A major oil and gas customer recently needed to modernize and implement a scalable Connected Oilfield Solution. It previously did not have the ability to manage and orchestrate its sizable fleet of thousands of devices throughout several global sites, many located in remote and/or harsh environments. In addition to improving management and monitoring of its fleet — while also eliminating costly truck rolls — the customer sought to improve its software deployment system.

Ultimately, the customer needed complete supervision and accurate data collection for all assets in order to monitor and manage equipment, operations, and software. It also needed deeper insights into day-to-day processes by utilizing machine learning and artificial intelligence for new applications. Additional key objectives of the Connected Oilfield included reducing operational costs, increasing security, consolidating edge hardware, and simplifying deployment, management, and orchestration of edge devices in the field. For example, the customer wanted the ability to validate every time a system started up, confirm correct software components, and ensure downloaded software components came from an accurate and trustworthy source.

To find a Software-as-a-Service (SaaS) solution that met its requirements, the oil and gas company worked with its Intel® IoT Solution Aggregator, Arrow Electronics, to select and implement an ideal Internet of Things (IoT) edge orchestration solution. Choosing the right hardware that would work seamlessly with its chosen SaaS solution was equally essential.

The Solution

ZEDEDA, leader in SaaS edge virtualization, offers a scalable, cloud-based IoT edge orchestration solution that met all the customer's needs: cloud-native agility, freedom of any hardware, application, and cloud, zero-touch provisioning, powerful security, and flexibility for future-proofing applications. The orchestration solution delivers visibility, control, and security for the distributed enterprise, but also offers the independence of deploying and managing apps on 3rd-party hardware and connections to any cloud or on-premise system.

With ZEDEDA's ZEDCloud console, the customer is able to orchestrate edge hardware and apps at scale to add intelligence to its operations on-demand, all while unlocking the value of data for real-time decisions. The secure ZEDEDA orchestration solution works in tandem with the management of select Advantech industrial hardware utilized for data acquisition, intelligent connectivity, edge processing, control, and secure backhaul. <u>Advantech is the industry leader for IoT edge systems and embedded platforms</u>. There are multiple Connected Oilfield edge compute options, depending upon performance and environmental requirements, all with internal Intel® processing:

Performance	Hardware	Processor	Intel® Code	Description
Good	UNO-2271G-V2	Intel® Celeron® Dual Core N6210	Elkhart Lake	Pocket-sized Fanless Edge Gateway
Better	UNO-148	11th Gen Intel® Core™ i Processor	Tiger Lake	DIN-rail Industrial Fanless Edge Computer
Best	MIC-770-V2	10th Gen Intel® Xeon®/ Core™ i CPU Socket	Comet Lake	Industrial Fanless Edge Server
Extreme Environment	UNO-410	Intel® Atom® E3940	Apollo Lake	Explosion-Proof DIN-Rail Gateway with UL C1D2, ATEX/IECEx Zone 2 Certification

To meet the customer's security needs, ZEDEDA utilizes the <u>open source EVE operating system</u> (OS) to create a crypto-based ID leveraging the hardware-root-of-trust (TPM) in Advantech hardware. Combined with measured boot and remote attestation, this ensures trusted devices and correct software systems are is able to connect to ZEDEDA ZEDCloud. Users cannot tamper with the hardware locally without going through ZEDCloud's role-based access control. As an added security measure, I/O ports (e.g. USB) can be disabled remotely. All functions from measured boot and en-cryption of data at rest and in motion build off this trust anchor. The built-in distributed firewall provides granular per-app control over data flow. All resource utilization and network policies are established through the remote ZEDCloud console.

ZEDEDA's subscription-based ZEDCloud service is agnostic when it comes to customer application data — all data can stay on-prem or be backhauled to the customer's cloud of choice. ZEDCloud features a built-in application marketplace that includes popular edge applications, such as Azure IoT Edge, Nozomi Guardian, and Intel OpenVINO. ZEDEDA's di-rect integration with Azure IoT simplifies deploying and managing secure IoT solutions at the edge. Enterprises and OEMs can also customize the marketplace with curated apps.
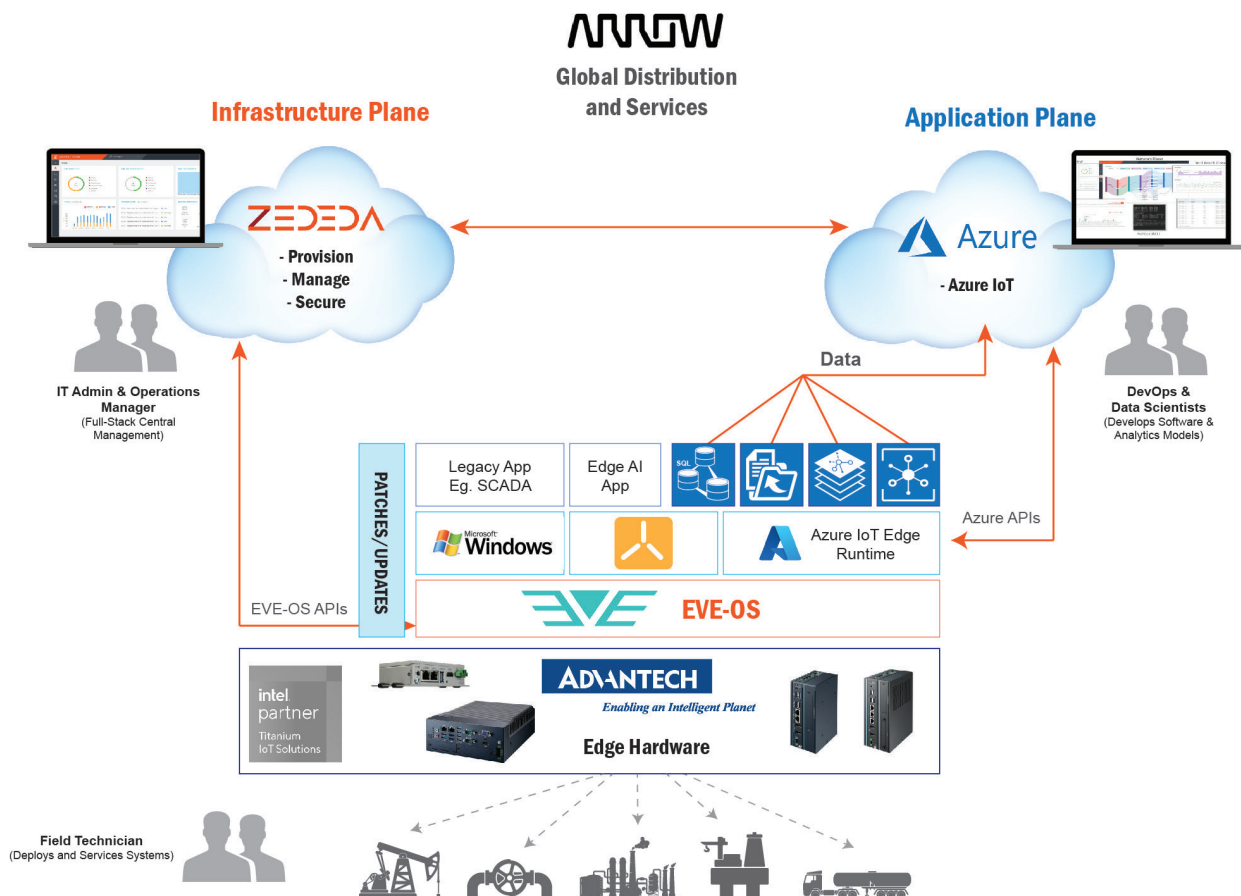
The Hardware

UNO-2271G-V2 Pocket-Size Edge IoT Gateway

- Intel® Celeron® Dual-core N6210/ Pentium® Quad core N6415/ Atom® Quad core x6413E processor with 4GB/8GB DDR4 onboard memory
- Compact, robust, fanless, and cable-free system with high stability
- Modular design offers optimized basic unit with 2 x GbE, 2 x USB 3.2 Gen1, 1 x HDMI 1.4
- Optional second stack for increasing functionality including PoE, COM, wireless connectivity, or iDoor expansion
- Built-in TPM 2.0 for hardware-based security
- Supports Windows 10, Ubuntu Classic, and Ubuntu Core 20

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UNO-148 Fanless DIN-Rail Edge Computer

- General operation temperature range (-20°C~60°C / -4°F~140°F)
- Port isolation for 8 x DI, 8 x DO, 4 x COM
- Supports M.2 M key 2280 NVMe SSD Storage
- Supports M.2 B+M key 2242 storage and 3042/3052 cellular modules
- Supports M.2 E Key 2230 WiFi modules
- Supports Time-Sensitive Network technology
- Remote out-of-band power management with Advantech iBMC technology
- Onboard TPM 2.0 to provide hardware security
- Compliant with IEC 61010-1 safety requirements

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MIC-770-V2 Compact Industrial Fanless Edge Server

- Intel® 10th Gen Xeon®/Core™ i CPU socket-type (LGA1200) with Intel® W480E/H420E chipset
- Wide operating temperature (-10°C~60 °C / 14°F~140°F)
- VGA and HDMI output
- 2 x GigaLAN, 2 x USB 3.2 (Gen2), and 6 x USB 3.2 (Gen1)
- 2 x RS-232/422/485 and 4 x RS232 serial ports (optional)
- 1 x 2.5" HDD/SSD and 1 x mSATA
- Supports FlexI/O and iDoor technology, flexibly configure additional HDMI, DVI, Comport, DIO, remote switch I/O
- Supports Advantech i-Modules

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UNO-410 Explosion-Proof DIN-Rail Gateway

- Explosion protection with UL listed Class 1, Division 2 /ATEX Zone 2/ IECEx Zone 2 certification
- Intel® Atom® E3940 processor (1.6 GHz) with 8 GB DDR3L memory
- Port isolation for 8 x DI, 8 x DO, 2 x COM
- Dual storage with M.2 2242 SATA SSD and 2.5" HDD/SSD
- Onboard TPM 2.0 provides hardware-based security
- Supports M.2 3042/3052 module

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Oil & Gas Industry Data

Upstream oil and gas operations have been collecting and analyzing large amounts of seismic data for years. Downstream of exploration, producing oilfields also generate large amounts of data. Collected data includes:

- Reservoir: downhole indicators, such as pressure, temperature, flow rate, drainage patterns, and composition, help adjust extraction techniques.
- Field wells: well data helps optimize limited resources, identifying the most productive opportunities.
- Surface equipment: oilfield equipment is subject to performance-degrading events (vibration, shocks, wide temperatures, flow rate, pressure, maintenance cycles, chemicals, and more). Predictive analysis can reduce downtime and unnecessary expenses.
- Drilling efficiency: comparing data from various drilling operations to identify best practices leads to more efficient and repeatable operations.
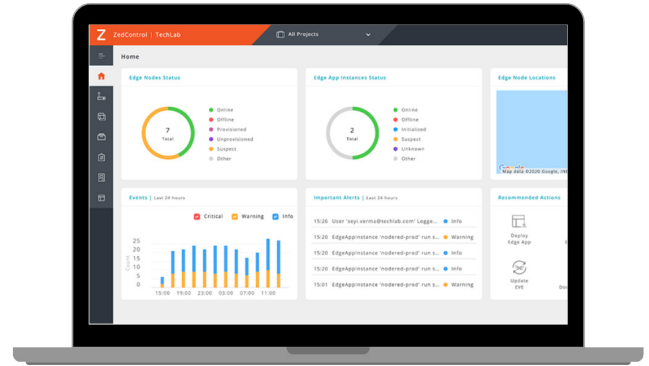
The Value

Following implementation, the previous use case oil and gas customer saw the following returns on investment (ROI):

- Ability to supervise a whole fleet of devices through a single view
- Highly-secure solution for deployment in remote areas
- Ability to deploy existing Windows-based software alongside new containerized investments
- Scalability of the solution with Kubernetes (K3s) at the edge
- Safe solution allowing full revert of software deployment to previous version without "bricking" the device
- Improvement of productivity and security through systematic remote software updates
- Full overview of hardware and software statuses of every fleet device, at any time
- Ability to deploy applications at the edge to analyze data, create insights, and make actionable decisions

The combination of ZEDEDA's edge orchestration solution with Advantech hardware enabled the customer to modernize its numerous remote locations and fleet devices to create a successful Connected Oilfield Solution. The same infrastructure is also the perfect fit for additional oil and gas industry applications in various operations. Intel, Arrow Electronics, Advantech, and ZEDEDA provide infrastructure that is helping oil and gas companies deploy data strategies that are secure, flexible, and scalable.

Contact Us to Schedule a Demo

To schedule a demo of the combined Connected Oilfield solution,
please contact us at ANA.Oil.Gas@Advantech.com. If you have any other questions regarding
the combined solution, inquiries can also be sent to ANA.Oil.Gas@Advantech.com.