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Software

as a Service

William J. Miller, MaCT, USA, demonstrates industrial systems' capability to perform in dynamic process environments.

Today, standalone applications that reside on a single computer are the norm. These applications include the human machine interface (HMI), engineering workstations, etc., as part of the software used for process control systems. There is a need for greater built-in intelligence to help operators and maintenance personnel make decisions and to rapidly respond to events such as failures that may occur. The majority of applications today make use of a web browser to provide operations and maintenance functions. However, these applications rapidly become obsolete in a few years and the systems require frequent updates and patches to prevent cyber security vulnerabilities.

There is a new way to look at the problem that can offer greater flexibility, ease of use, and new capabilities. In the past, HMI has been relied upon via the alarm management system to alert the operator of a problem. The alarms can be prioritised or even colour coded. However, using such alarms to advise the user effectively is difficult and more often word of mouth between operations and maintenance personnel has been required. The ability of personnel to interact at times may have limitations and, as a result, vital knowledge that is known to senior personnel may be lost.

The 1990s were characterised by the growth of expert systems and interest in artificial intelligence, a movement that was unfortunately only adopted in a few areas and was for the most part not used. The acquisition of knowledge can take the form of Software as a Service (SaaS). This is a term that has been used in relation to cloud computing.

SaaS has become a common delivery model for most business applications, such as accounting, collaboration, customer resource management (CRM), enterprise resource planning (ERP), invoicing,

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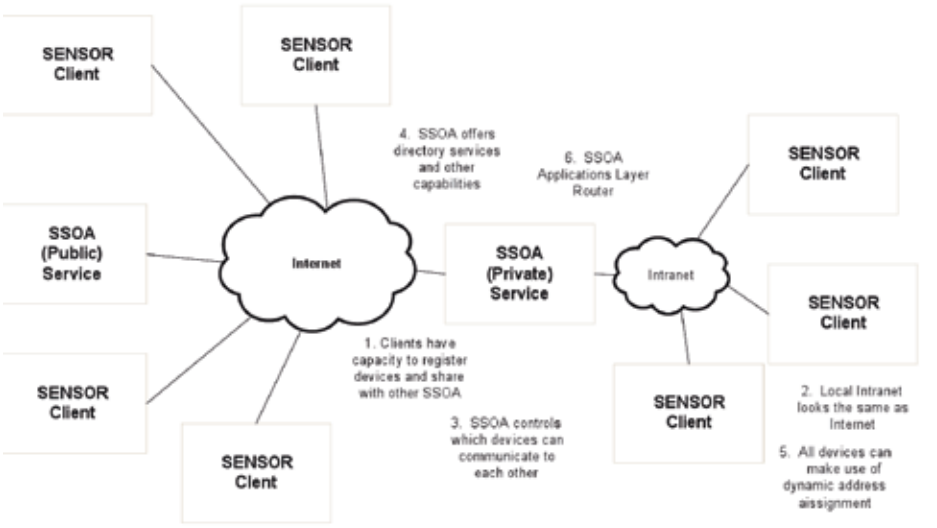

Sensor Service Oriented Architecture IEEE p1451.1d/XMPP.

human relations management (HRM), content management (CM), and help desk management. How can this approach be adapted to serve industrial plants so that operations, maintenance, and management can benefit? Today, the majority of systems used in process control make use of industry standards protocols such as MODBUS/TCP. The integration with this protocol is commonly available over wired or wireless networks and can be leveraged to extend capabilities utilising alert management (via 'Instant Messaging').

XMPP makes use of XML (Extensible Markup Language) stanzas that offer a high level machine readable format defined in the XML 1.0 specification. The design goals of XML emphasise simplicity, generality, and usability over a network including the internet. XMPP offers a way to connect to any device that provides MODBUS/TCP, for example, and a trigger set to initiate a message that is technology agnostic and protocol independent.

A new standard

The Institute of Electrical and Electronics Engineers (IEEE)'s Committee on sensor technology is pursuing the establishment of a proposed 1451.1d standard to provide session initiation management and XMPP transport for smart transducers including sensors, actuators, and devices. This capability will provide a missing link for 'consumer' devices consisting of either sensors or actuators to contact a 'provider' to request access to the 'service'. IEEE 1451.1d provides session initiation management and makes use of extensible mark-up and presence protocol (XMPP).

The new standard is able to incorporate the use of common alerting protocol (CAP), which is an XML-based data format for exchanging warnings and emergency alerts. CAP allows a message to be consistently disseminated simultaneously over many warning systems. It also increases warning effectiveness and simplifies the task of activating a warning in the form of a message related to the state or value that has been determined to be a level of concern. The event or a value can trigger a message that can be disseminated through the facility or only to specific individuals in the plant.

For example, if a critical tank level is reached, a supplier can be notified to refill a tank at the same time as plant personnel and operations, including the supervisor, are notified. This capability can be leveraged for other critical areas of the plant to share information via devices such as mobile phones, iPads, etc. There is a variety of information that can be disseminated from remote areas of a facility or shared within the corporate network since only those that are registered can obtain the information and only information that is of interest will be sent. The decision as to what device receives an alert is easily controlled from a web browser. The utility of this approach is further enhanced in that the use of XMPP can offer data transformation, conversion, etc. without modification of the existing hardware or changes to software.

This is a break from the traditional approach in which all digital and analogue data would be sent to a central database for reporting, retention, or alarm management. Much of this information is not used and in large facilities it can be difficult to determine what has really happened. This new approach can be layered on top of an existing process control system or in time it can subsequently provide intelligent alerts to personnel when they are either on or offsite. The event and messages can also be sent via SMS (short message service) over the internet and since this is an outbound service it is not a cyber security concern.

The IEEE 1451.1d makes use of a service oriented architecture (SOA), which adds additional security to network infrastructures since any devices and users must be registered with the service broker to participate in the network. The endpoints make use of characteristic identity of devices in the form of XML metadata that provide useful information on the status of devices that are registered. This approach also facilitates a means to update the software for devices that incorporate the 1451.1d standard, such as weigh scales, which can have the 1451.1d capability embedded into the device. These devices can be essentially anywhere around the world and report in near real time over the internet.

Bob Wynnyk with Vishay BLH, Canada, noted "the industry, traditionally a 'value' purchaser of weigh systems, is investing in higher performance industrial weigh systems to reduce costs and meet more demanding product specifications."

"In addition to performance improvement," he added, "industrial systems such as those from Vishay Precision Group – BLH comply with current industry standards, such as the IEEE 1451.1d smart transducer standard, assuring interoperability and use of advanced functionality of cloud computing."

Conclusion

IEEE 1451.1d/XMPP and CAP offer advanced capabilities that leverage existing software and hardware systems with a layered approach that can offer interoperability, scale of use and security. Now a user can look at the process in a new and dynamic way and determine what events represent concerns and help the users, including operations, maintenance, and management, share important information about plant operations.