Benefits of web-based solutions applied to eve for bioprocess software

The development of powerful, modern browsers and the proliferation of mobile platforms has altered the way in which programs run and where data is stored. Concepts like a ‘web-based solution’ and ‘cloud computing’ are everyday terms, but their definition is often very difficult to establish. Brief definitions are provided below which offer a framework in which to discuss the benefits of using these concepts for bioprocess software.

Going hand-in-hand with browser-based software is ‘the cloud’. Cloud computing simply means storing and accessing data and programs over a local network or through the internet instead of a hard drive on a local computer. Accessing information through a small local network rather than over the internet can still be defined loosely as using a ‘local cloud’, even though nothing is stored remotely on third-party servers. A key advantage for typical users is not having to be concerned about their location when accessing data or with the location of the information in itself.

Available anywhere
Access to real-time data over a network from within the organisation or outside via the internet improves efficiency and encourages use of the data being generated. Unlike traditional applications, web systems are accessible anytime, anywhere and through any device with an internet connection. This puts users in charge of where and when they access their information.

It also opens exciting, modern possibilities such as global teams, working from home and real-time collaboration. The idea of
sitting in front of a single computer and working in a fixed location is a thing of the past with web-based applications.

**Easy scaling for personnel projects**

The numbers of people accessing the program can change over time without individual installations of the software for new users, and its scalability allows for larger projects over time and for a move to a ‘big data’ approach. Both individual users and entire projects can be added to the eve bioprocess platform software running on a central server. No work is required from users, who have access via a browser as soon as their credentials are established. Users can be flexibly added and suspended accordingly. Addition of new hardware is dealt with by a different part of the resource allocation features of eve and is similarly flexible in terms of numbers and types of devices.

**Available on a range of platforms and devices**

Web browsers are available for desktop, tablet and smartphone mobile devices, any of which can be used to access bioprocess data. This is also independent of the operating system used, which allows for diversity and choice of computing platforms.

Once again, by developing the eve bioprocess platform software to modern web standards, a variety of browsers (eg, Chrome, Internet Explorer and Edge) running on a range of devices can be used to link a user to the eve bioprocess platform software. This needs no set up or configuration by the user beyond entering an Internet Protocol (IP) address (eg, 169.254.83.180) for access over a local network.

**Security features**

Web-based solutions are often more modern and have security at their heart. Connections from outside a local network can be restricted and users required follow common practices to reduce the chance of unauthorised access. A range of additional security features can be added to the eve core by opting for the ‘user management and reporting module’. These are especially relevant if remote access through the internet is used and include:

- Strong passwords to systems that are more difficult to hack by ‘brute force’ methods
- A limit to the number of attempts to log on before being locked out
- Password ageing to reduce the potential risk of a security breach
- IP address ‘white lists’, so only approved devices can access the software.

**Common web and network standards for enhanced interoperability**

Using the file types, structures and common protocols of network and internet transmission of bioprocess information makes it easier to link to outside sources of data. The eve bioprocess platform software uses web standards to ensure familiarity and a shallow learning curve for new users. Also, the use of standard file types makes manipulation of data inside a browser simpler.

A NoSQL database is at the heart of eve and this is key to having all bioprocess information in one place. Many tools already exist for accessing data of this type via common web protocols and standards eg, the Rest API or OPC communication standards (including the latest OPC UA protocol for added security). Figure 1 shows the relevant parts of eve interactions which benefit from a web-based approach.

**Summary**

The eve bioprocess software represents the next generation in terms of using modern web and network protocol standards for linking both users and equipment in a flexible, secure way. The way the data is structured opens the path for ‘Big Data Analytics’ to be applied to bioprocess data. In the future, this will aid understanding and modelling for real-time control based on the whole process. The fact that this big data concept is often linked with ‘the cloud’ simply reflects the notion that storage of such data requires a lot of server capability and will be accessed by users regardless of geography or scale considerations. In reality, many ‘cloud’ solutions for the pharmaceutical industry may never reside outside an organisation and will be accessed from local networks.

This brings up the second key element of this white paper – the significance of web-based solutions as applied to bioprocess software. The simplest definition is the most widely applicable in that it is the user interface (UI) which is based on web standards and runs within a browser. The eve bioprocess platform software only needs to be installed once on a central server. The key components of this approach are cost-effective, scalable and ‘easy-to-understand’ methods of accessing all bioprocess data – rapidly and from any location – rather than the limited data values available from most Supervisory Control and Data Acquisition (SCADA) packages.

The eve bioprocess platform software can be used by a single user with a single piece of equipment or a large organisation with multiple instruments and users. The point is that the software is the same and only the scale differs – the benefits apply equally. The benefits of modern web standards and protocols are part of what drives these very different ways of utilising the one software package.