

# MULTINATIONALIZATION

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FOR GLOBAL LIMS DEPLOYMENT

## OVERVIEW

Successful companies leverage their assets to achieve operational efficiencies. By streamlining work processes and reducing redundant systems, such companies ensure that their products and services are made and delivered to consistently high standards worldwide. However, companies have faced significant challenges in addressing these goals with their laboratory information management systems (LIMS). This is because most LIMS available on the market today are thick-client or web-enabled solutions that require multiple servers or end-user thick-clients. Most of these systems have poor multinationalization capabilities for end-users and for information technology (IT) departments. From an end-user viewpoint, they only support I18N functionality. From an IT perspective, IT departments have had to deploy multiple systems to maintain enterprise-wide operations. Although these systems provide some internationalization and localization features, they are very limited, time-consuming, and costly to deploy. Ultimately, systems with I18N solution fall far short of thin-client solutions with M18N capabilities.

## WHAT IS I18N/M18N?

I18N is short for Internationalization, with the number 18 signifying the 18 letters between the first I and the last N in the word. Internationalization allows a company to only deploy systems that support international time and date conventions within a single locale that shares those conventions. Thus, a single server could not support both US and European users, or even different locations within Europe.

M18N is short for Multinationalization, with the number 18 signifying the 18 letters between the first M and the last N in the word. M18N is a computer system standard for handling international and local time zone and language requirements, providing a consistent methodology worldwide from a single server. A thin-client solution with M18N capabilities allows a company to deploy one solution that supports international languages, time, number format, and date conventions across multiple locales, eliminating the need to provide multiple servers or thick-clients. Put simply, M18N enables a solution to be end-user specific, rather than server or client specific -a significant limitation of I18N.

LABVANTAGE - Microsoft Internet Explorer

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Local intranet



A thin-client solution with M18N standards goes beyond I18N to offer multilocalization, multilanguage support in a single solution that can be deployed worldwide. Multinationalization of computerized systems is vital to global companies because it can reduce user confusion, support audit requirements, and streamline IT system deployments around the world. Unlike with thick-client systems, thin-client solutions offer cost advantages in deployment and maintenance. M18N compliance also provides end-users with enhanced user satisfaction and increased productivity.

A fully thin-client M18N compliant solution offers several features that resolve many IT department dilemmas associated with multinationalization. These include:

- Time Zone Support
- Date Time & Numeric Formatting
- Enhanced Translation

### Time Zone Support

M18N eliminates the ambiguity that previously existed for users and IT departments alike with regard to the question: “What time is it?” With I18N systems, a time zone is established for the regional server or client, rather than for the end-user. If the user is in a different time zone compared to where the server resides. The user must mentally make the conversion and perhaps

not calculate the correct time. With M18N, the time zone is established on the single server, but can be set for each user. This means that the database and application server can be maintained by the IT department in Shanghai, China, the main laboratory functions can perform sample receiving and testing in Slough, England and in New Jersey, United States, and headquarter operations in Paris, France can perform reporting and analysis functions, all at the same time, on the same server, and each reflecting their local time zone. Accordingly, a French user will see his own French time zone, and does not need to convert the time from wherever the server resides.

### Enhanced Translation & Full Unicode Support

Pure multinational solutions utilize Unicode (see “Why is Unicode Important?” Sidebar) to support multiple languages. This means that various character sets for offices worldwide can be supported, and users can enter information into the LIMS using different languages. The screens and data are properly localized so that users can work in their native language regardless of the server location.

Moreover, static text translation enables IT departments to eliminate redundant pages previously required for each local language. In I18N systems that do not utilize Unicode, in order to support different character sets,

## WHY IS UNICODE IMPORTANT?

A standard for language support, Unicode has existed since the beginning of the Internet. It is a character encoding system, like ASCII, designed to help developers create software applications that work in any language. It provides a unique number for every character – including letters, punctuation, and technical symbols – regardless of platform, program, or language.

Other encoding systems, often conflict with one another because they use the same number for two different characters, or use different numbers for the same character. As a result, computers (especially servers) need to support many different encodings, yet whenever data is passed between different encodings or platforms, that data always runs the risk of corruption. Not only does Unicode resolve these conflicts, it has been adopted by industry leaders such as Apple, Microsoft, Oracle, SAP, Sun, and Unisys.

In addition, Unicode is required by numerous modern standards, such as XML, Java, ECMAScript (JavaScript), LDAP, CORBA 3.0, and WML, and is the official method to implement ISO/IEC 10646. It is also supported by many operating systems and all modern browsers. The emergence of the Unicode Standard – and the availability of tools supporting it – is among the most significant recent global software technology trends.

Source: <http://www.Unicode.org>

IT departments have had to mix codes and programs to handle characters from a wide variety of languages at the same time, which is not only time-consuming, but challenging as well. This is because all data has to be tagged, and mixing data from different sources is extremely difficult. Since Unicode has a single definition for each character, in a M18N solution with full support for Unicode, data corruption problems that plague mixed code set systems no longer exist.

### Date Time & Numeric Formatting

Flexibility over date and numeric formats enables IT departments to select between time and date, and numeric designations on a per user basis on a single server, rather than on a regional basis per server or on each end-user's thick-client. IT departments can select short, medium and long format conventions associated with the end-user's norm. For example, the use of January 12, 2006 is the standard convention in the United States, but is written as 12 January 2006 in Sweden. This may not be confusing in long form, but can get very confusing if written in short form. In an I18N system, if one colleague in the United States enters the January 12th date as 1/12/06, the colleague in Europe would read this December 1, 2006. True

multinationalization accommodates and resolves this conflict with no action required by the user. The solution automatically converts the date information into the selected format of the end-user. The adjustment takes place transparently at the server level and is correctly displayed on the end-user's thin-client browser.

As another example, numeric formats of these localities differ in the placements of "commas" and "decimal points" when signifying the thousand or decimal places. To illustrate this, "ten thousand ninety and two hundredths" in the U.S. numeric format is recognized as "10,090.02," whereas in Sweden it is "10.090,20" (notice the difference in the locations of the comma and decimal point). This discrepancy can generate false data, and its effect is demonstrated in the following example.

Suppose that there is a collection of samples where measurements between 50 and 100 meet specification and all other measurements do not. If an end-user or instrument in Sweden enters a reading of "50,002," which translates to "fifty and 2 thousandths," an M18N solution, no matter where the server resides, will recognize this measurement to meet the specification. However, a non-M18N system located within the U.S. will read "50,002" as "fifty thousand two" in its local numeric format, and interpret it as out of specification.

With a non-M18N system, the only resolution to this problem is to configure all sites to the same regional settings on their laptop/PC, which would interfere with the use of Microsoft Excel and other applications, as this setting affects all time and numeric formatting on their local computer. However, rather than configuring the regional settings to be consistent across the world and rely on the end-users to accurately input the "standardized" numeric format, an M18N solution automatically converts the numeric format at the server level based on the selected format of the end-user. This allows users to input numbers in the format they are comfortable with, while at the same time enabling the solution to process data correctly, eliminating the possibility for errors.

### TRUE LIMS MULTINATIONALIZATION & M18N COMPLIANCE

True multinationalization of global LIMS is now possible with LABVANTAGE®. As the first thin-client LIMS to offer the full scope of M18N functionality, LABVANTAGE can help global organizations leverage their enterprise LIMS implementations to better support organizational objectives.

LABVANTAGE is a true thin-client solution, not just a web-enabled one. All that the end-user requires is Internet Explorer 6.0+, nothing else (see LABVANTAGE Architecture sidebar). LABVANTAGE's thin-client architecture coupled with its M18N multinationalization functionality enables IT organizations to support one application server for all international users. The IT department assigns a locale, time zone and language to each user by creating a profile for each user on the local application server. With full implementation of Unicode, LABVANTAGE accommodates languages with any character set, including Chinese, Japanese, Arabic, Swedish, German, Spanish and French. An organization would need to run multiple application servers or clients around the world with a thick-client system to achieve this same level of convenience. With LABVANTAGE, the IT department would not have to be concerned with end-user thick-clients, or the deployment of multiple regional servers. Therefore, LABVANTAGE greatly increases the speed and efficiency of a global LIMS deployment.

LABVANTAGE also provides IT departments with additional flexibility and low total cost of ownership through greatly simplified server support. When time comes to upgrade LABVANTAGE, IT departments need only to apply the upgrade to the local application server, rather than each regional server or end-user thick-client. Therefore, IT investments are better leveraged and cost of ownership is reduced.

## SUMMARY

Thin-client and M18N has become a mission-critical standard for global organizations as they seek to deploy more efficient and cost-effective solutions. LABVANTAGE's is the only thin-client M18N-enabled LIMS on the market and offers significant advantages over thick-client and non-M18N enabled LIMS.

## LABVANTAGE ARCHITECTURE

LABVANTAGE has as its foundation a thin-client based architecture, developed to provide users, both internal and external to the laboratory, with the ability to access their LABVANTAGE system from any Internet or Intranet access device utilizing Microsoft Internet Explorer 6.0+. This pure browser-based architecture (with no applets on the client) leverages an organization's standard corporate infrastructures by enabling the open flow of information between internal and external systems, and by enabling the integration of 3rd-party applications.

The LABVANTAGE J2EE application server provides the application interface between the server and the client machine via HTML and JavaScript. The web browser provides the application user interface. This browser/server approach results in a zero-installation, zero-footprint client architecture that greatly simplifies enterprise application deployment and administration. Thin-clients communicate with the web server and LABVANTAGE pages using request management servlets. Requests are verified and authenticated before being forwarded by the appropriate JSP page. JSP pages are text-based documents that contain standard HTML combined with a rich set of LABVANTAGE configured tags, standard JSP tags and raw Java. LABVANTAGE configured tags provide access to the standard LABVANTAGE functionality by communicating through a set of Java classes that, in turn, interact with the components in the application server.

The LABVANTAGE architecture provides a powerful, low-cost, low-maintenance framework for today's competitive laboratory environment, particularly when compared to thick-client/server implementations, which typically carry a high cost of deploying applications to a large end-user base. By leveraging standard Internet technologies, LABVANTAGE provides easy access to disparate data, both internal and external, using common web browser software. The architecture is scalable, highly reliable and secure.

For further details about the LABVANTAGE architecture and capabilities, please download the White Paper LABVANTAGE from [www.labvantage.com](http://www.labvantage.com).

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