LabVantage 8.9 Technical Overview

Run your lab more efficiently, secure your data in a central system, and ensure compliance.

KEY BENEFITS

- **100% HTML5 browser-based so there are no client programs that need to be managed**

- **System can be centrally hosted for global deployment and can support thousands of concurrent users located anywhere**

- **Comes ready for integration with instruments and other business systems**

LabVantage provides users the ability to access laboratory information from any device using a commercial web browser. LabVantage is a pure HTML5 compliant browser-based system with zero footprint at the user level meaning there are no client programs to install and maintain, and no applets or plugins to be managed. LabVantage uses standard Jakarta EE application servers and modern databases. It can be centrally hosted (on-premises, cloud, or SaaS) for global deployment supporting thousands of simultaneous users. The system comes ready for integration with instruments and other business systems. LabVantage is easier to maintain than any other enterprise-grade LIMS on the market.

Key Technical Features

Highly Scalable Multi-Tier Architecture

- **Presentation Tier** via standard web browsers (Microsoft Edge, Google Chrome, Apple Safari and Mozilla Firefox for Portal only).

- **Application Tier** utilizes an industry standard and widely supported Red Hat JBoss Enterprise Application Platform.

- **Data Tier** consisting of a database server (Oracle Database or Microsoft SQL Server).

Web Browser

All user access to LabVantage is from a commercial web browser on the presentation tier. The application does not require any browser plug-ins or applets, which significantly simplifies deployment and system validation.

Application Server

The application server tier is the main processing component of LabVantage and is CPU- and network-intensive. It should be hosted in the same data center as the database. Therefore, when configuring the application server, organizations should consider the number of simultaneous users and the complexity of the operations the system will have to perform. Overall performance can be improved by vertically scaling servers (applying more computing resources). Both overall performance and fault tolerance can be improved by horizontally scaling servers into a clustered installation, which uses third-party load balancers to route client requests to multiple application servers within the cluster. If one or more servers fail, client requests are automatically routed to other servers within the cluster so there is no interruption in service.

Database Server

LabVantage supports Oracle Database and Microsoft SQL Server, two industry-leading database management systems. The database server is the repository for all LabVantage data and configuration information, including metadata generated from the LabVantage Web Page Designer, the user interface configuration tool within LabVantage. This metadata is used to drive the runtime architecture and determine business logic execution. LabVantage has been designed to do most of its processing on the application server. As a result, the database server is not CPU intensive; rather it tends to be I/O intensive. Therefore, a high throughput disk sub-system is recommended. When configuring the database server, organizations should consider the number of concurrent users and amount of historical data. Database connections are pooled by the application server, so database-level connection pooling is typically not required or recommended.

Barcoding

Barcode label production and use is a common activity employed throughout the LabVantage solution. Native to the system is an interface to BarTender®, enterprise barcode label-printing software from Seagull Scientific, as well as support for JasperReports® barcode labels.

Instrument and System Integration

LabVantage has a framework to enable integration of instruments, instrument systems and business applications from across the enterprise. This includes a robust Scientific Data Management System (SDMS), a certified interface to SAP S4/HANA, Empower® 3, RESTful web services, and more.

Virtualization and Cloud Support

The LabVantage technical architecture is exceptionally well suited to running in a virtual computing infrastructure, and most LabVantage customers run their system in this manner to decrease cost, encourage self-service, and improve options for scalability. Additionally, many cloud vendors such as Amazon Web Services and Microsoft Azure offer virtualized server environments, relational databases, load balancers, and more on a subscription basis. Where you choose to run your LabVantage software — on-premises, cloud hosted, or via SaaS — is entirely up to you. Simply verify the environment is running the software and versions that comply with the Supported Software list on page 4.

Infrastructure Requirements

LabVantage has experience implementing thousands of systems throughout the world.

To simplify configuration in enterprise environments and to minimize costs, we recommend calculating server needs based on a Base Computing Unit (BCU) model.

Database Required BCUs

Production databases should start with a 2 BCU configuration, where additional BCUs are added based on real-time measurements of CPU and RAM consumption. Development servers can sufficiently operate on 1 BCU.

A Single BCU Consists of: **PROCESSOR:** 4 Cores │ **MEMORY:** 16 GB RAM │ **DISK STORAGE:** 50 GB

Application Server Required BCUs

One BCU supports approximately 80 simultaneous HTTP sessions. A simultaneous HTTP session is defined as a user actively performing tasks in the application. To account for the use of named user and concurrent licenses, LabVantage suggests using the following formula to estimate the maximum simultaneous user load for the application tier.

BCUs Required = (C x 100% + N x 40%) / 80

> Where:
> C = Concurrent User License Count
> N = Named User License Count

Concurrent licenses are calculated at 100% since the assumption is that just enough are purchased to ensure maximum usage and return on investment. The assumption for named user licenses is that only 40% of those users will be logged on and using the system at any given time. The formula can be modified to reflect your expected percent usage for the licenses purchased.

For example, if a laboratory has 50 Concurrent User Licenses and 100 Named User Licenses, it should plan for 2 BCUs to support an expected maximum of 90 simultaneous HTTP sessions (50 x 100% + 100 x 40%)/80 = 90/80 = 1.125 BCUs). Rounding up, the laboratory should plan for 2 BCUs to support the application server. This estimate may vary based upon concurrent usage, data storage, the complexity of the LabVantage configuration and workflows, and the intricacy of reports.

Note that these requirements incorporate the minimum hardware specifications recommended by the manufacturer of the third-party software products running on each of the LabVantage tiers. In addition, the hardware requirements are for a standard LabVantage implementation and may not be representative of the hardware required for an organization's specific implementation. With the emergence of high-performance blade and other low-density systems, simplifying the hardware specification using BCUs eases the task of identifying and procuring systems for an implementation. Additional storage – as in the case of the database server – should be a high-performance external disk subsystem such as a U320 array or SAN.
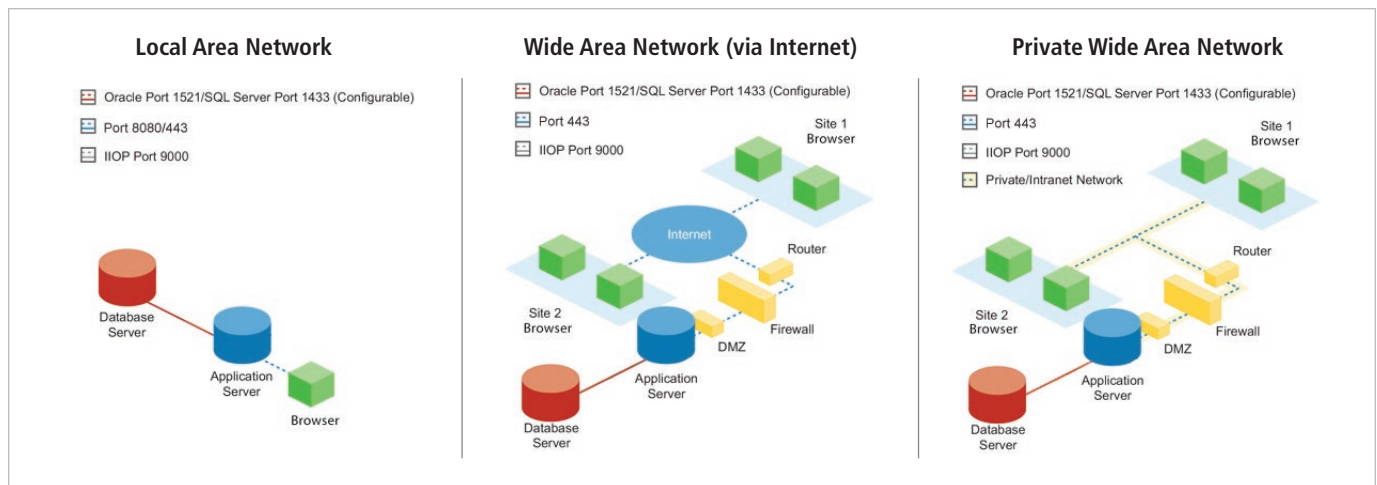
In a non-clustered environment, a basic configuration would require several separate systems. Individual systems may be used for the database server and application server. Storage for the database might be provided separately via SAN or an external storage array. In a clustered environment, if load or performance requirements increase for any tier, an organization can simply add another BCU to that tier in the appropriate cluster configuration. Clustering one tier has no requirement of clustering any other tier. Each tier could be independently clustered according to vendor specific clustering technologies.

At minimum, we recommend the following base systems to be used:

SIMULTANEOUS HTTP SESSIONS	APPLICATION SERVER	DATABASE SERVER
80	1 BCU	2 BCUs
160	2 BCUs	2 BCUs
240	3 BCUs	2 BCUs

Network Configuration

Whether running on a local area network (LAN) or a wide area network (WAN), LabVantage can be configured to provide the appropriate network security and requires an HTTPS connection. The following diagrams provide examples of possible configurations.

Local Area Network

- Oracle Port 1521/SQL Server Port 1433 (Configurable)
- Port 8080/443
- IIOP Port 9000

Database Server
Application Server
Browser

Wide Area Network (via Internet)

- Oracle Port 1521/SQL Server Port 1433 (Configurable)
- Port 443
- IIOP Port 9000

Site 1 Browser
Internet
Router
Site 2 Browser
Application Server
Firewall
DMZ
Database Server

Private Wide Area Network

- Oracle Port 1521/SQL Server Port 1433 (Configurable)
- Port 443
- IIOP Port 9000
- Private/Intranet Network

Site 1 Browser
Router
Site 2 Browser
Application Server
Firewall
DMZ
Database Server

Technical Specifications for LabVantage 8.9

	SOFTWARE	VERSION
Application Server	Red Hat JBoss EAP	8.0
Database Server	Oracle	19c
	Microsoft SQL Server	2019 2022
Report Server	JasperReports	7.0
Barcode Printing	BarTender	2022 R8 2021 R9
Statistical Process Control	NWA Quality Analyst & Web Server	Analyst 6.3 Analyst Editor 2.4.326 Analyst Web Server 2.2.63
Chromatography	Waters Empower	3.7.0 and 3.8.1
Browsers	Microsoft Edge based on Chromium	Latest Version
	Google Chrome	Latest Version
	Apple Safari (Apple devices only)	Latest Version
	Mozilla Firefox (Portal only)	Latest Version

LabVantage Solutions, Inc.
265 Davidson Avenue, Suite 220
Somerset, NJ 08873
Phone: +1 (908) 707-4100

www.labvantage.com

ABOUT LABVANTAGE SOLUTIONS

A recognized leader in enterprise laboratory software solutions, LabVantage Solutions dedicates itself to improving customer outcomes by transforming data into knowledge. Its highly configurable, 100% browser-based platform consists of LIMS, ELN, LES, SDMS, and advanced analytics, supporting seamless deployment into any environment. Serving over 1,500 customers across life sciences, pharmaceuticals, biobanking, food & beverage, forensics, and more, LabVantage Solutions empowers innovation, helps improve product quality, and ensures compliance with industry regulations. Headquartered in Somerset, NJ, with offices worldwide, LabVantage Solutions has driven laboratory digital transformation for over 40 years.

For more information, visit www.labvantage.com.