LABVANTAGE® HARDWARE CONFIGURATION REQUIREMENT

TAILORING THE RIGHT CONFIGURATION

LABVANTAGE®
Laboratory Knowledge. Delivered.

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ARCHITECTURAL OVERVIEW

LABVANTAGE 6 provides users the ability to access laboratory data from any device using a Microsoft® Internet Explorer or Apple® Safari web browser. Using 100% browser-based client software that does not require applets or plug-ins, the software enables the open flow of information between internal and external systems and simplifies the integration of laboratory instruments. LABVANTAGE's scalable, high-performance, environment is based on a multi-tier architecture that may be tailored to accommodate any laboratory workload.

LABVANTAGE TIERS

The tiers of the LABVANTAGE 6 architecture are (1) browser client, (2) application server, (3) database server, and optionally, (4) a dedicated report server. Each tier runs certain third party software – Microsoft Internet Explorer or Apple Safari browser on the browser client tier; Oracle® WebLogic Server, JBoss® Enterprise Application Platform, or IBM® WebSphere Application Server on the application server tier; and Oracle or Microsoft SQL Server on the database server tier. Reports may be executed from LABVANTAGE on the application server tier using Jaspersoft® JasperReports, or from a dedicated report server tier using SAP® Business Objects or similar.

Browser Client

LABVANTAGE 6 runs in a web browser on the client tier, and supports Microsoft Internet Explorer, Google Chrome and Apple Safari. Unlike other LIMS systems, the client does not require any browser plug-ins or applets, which significantly simplifies deployment and system validation. Based on standard Java EE technology, the client requires approximately 12kB of TCP/IP bandwidth. LABVANTAGE recommends a 100MB LAN with no single point being less than 64kB for the first user, scaling up to 128kB for 15 users.

Application Server

The application server is LABVANTAGE's main processing component and is CPU and network intensive. Therefore, when configuring the application server, organizations should consider the number of concurrent users and the complexity of the operations the solution will have to perform. LABVANTAGE supports the following application servers:

- Oracle WebLogic (11g) Server Premium 10.3
- IBM WebSphere Application Server Network Deployment 7.0.0.19
- Red Hat JBoss Enterprise Application Platform 5.1.0

Performance and reliability can be improved by adding servers to 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 6 supports Oracle 11g R2, and Microsoft SQL Server 2008 R2, two industry-leading database management systems. The database server is the repository for all LABVANTAGE data, including metadata generated from LABVANTAGE Web Page Designer™, the screen 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, the amount of historical data, and which database engine will be used. Database connections are pooled by the application server, so database-level connection pooling is typically not required or recommended.

Report Server

LABVANTAGE 6 supports several options for the analysis and reporting of data. Out of the box, LABVANTAGE uses JasperReports 4.0, which executes from the application server. Additionally, SAP Business Objects XI R3.1 is also supported, and typically runs on a dedicated reporting server tier. Finally, any reporting solution that can retrieve data via the LABVANTAGE web services is also supported.

A dedicated report server hosts the reporting software and associated data. Like the application server, a dedicated report server is CPU intensive. Organizations should consider the number of reports being generated, the detailed nature of the reports, as well as, the number of users generating reports at a given time.

CALCULATING HARDWARE NEEDS- BASE COMPUTING UNIT

LABVANTAGE has experience in implementing thousands of LIMS throughout the world. To simplify configuration in enterprise environments and to minimize costs, LABVANTAGE recommends calculating hardware needs based on a Base Computing Unit (BCU) model. A single BCU consists of:

- **Processor:** Intel® Xeon Processor - 1U Server/Blade
- **Memory:** 4GB RAM
- **Hard Drive:** 18GB HDD minimum
- **Network:** 100Mbit NIC minimum

Required BCUs

One BCU supports approximately 25 click-concurrent HTTP sessions. LABVANTAGE suggests 40% click-concurrency for an application server and 10% for a report server. For example, if a laboratory has 125 licensed users, it will require 50 click-concurrent HTTP sessions (125 x 40% = 50). Accordingly, the laboratory needs 2 BCUs to support the application server. For reporting, it will require 12.5 click concurrent HTTP sessions (125 x 10% =12.5) and needs 1 BCU to support the report server.

The above estimated numbers may vary based upon concurrent users, 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. Note further, the hardware requirements are for a standard LABVANTAGE implementation, and may not be representative of the hardware requirements required for an organization's particular LABVANTAGE 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. One system each might be used for the database server, application server, and optionally, report 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 a minimum, LABVANTAGE recommends the following base systems to be used:

Total Users	Click-Concurrent HTTP Sessions	Application Server	Database Server	Report Server
62.5	25	1 BCU	1 BCU	1 BCU
125	50	2 BCU (Cluster)	1 BCU	1 BCU
187.5	75	3 BCU (Cluster)	1 BCU	1 BCU

As of January 2012, International Business Machines Corporation (IBM) estimates the following cost for a BCU in the minimum configuration:

IBM 4252E1U - IBM System x3250 M3 - Intel® Xeon™ Processor X3450 4C Quad Core, 4G RAM, No HDD ($1395.00)

200G 3.5" Hot Swap SATA HDD ($179.00)

**It is imperative that a thorough scope of work is performed before deciding on the final configuration. Organizations may contact their account representative to request a hardware configuration recommendation tailored to their needs.*

DEFINING THE APPROPRIATE 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. The following diagrams provide examples of possible configurations.

FIGURE 1: Local Area Network

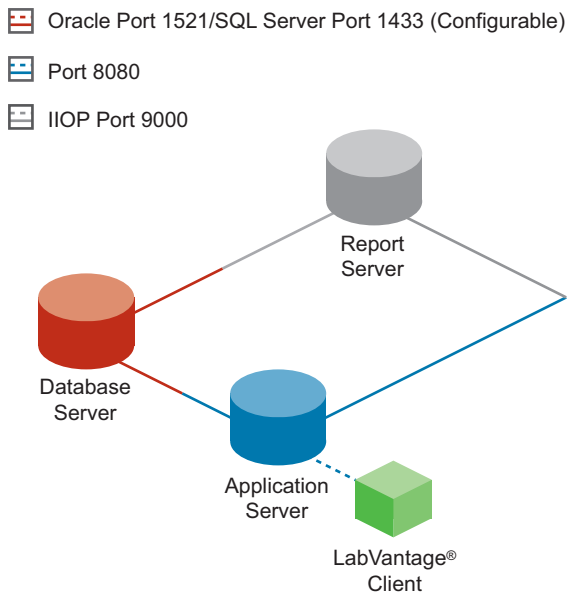


FIGURE 2: Wide Area Network (via Internet)

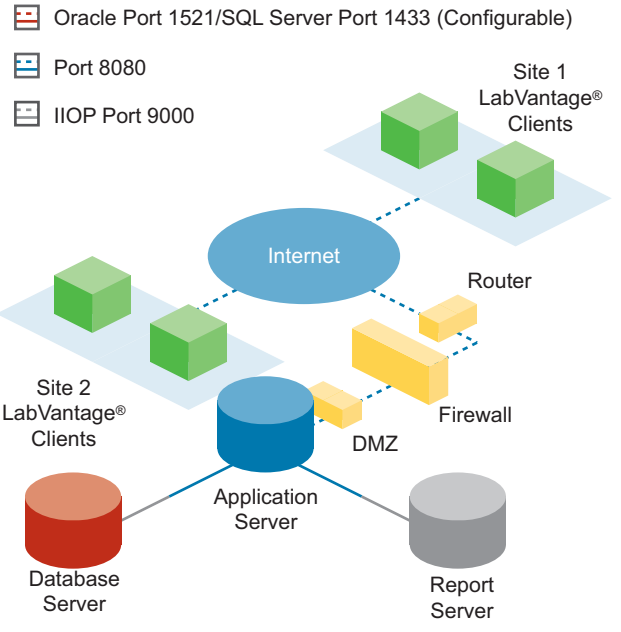
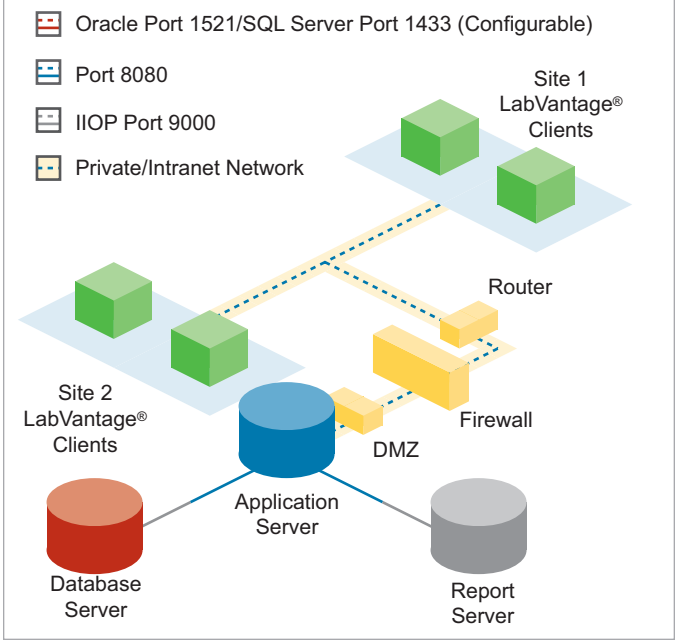


FIGURE 3: Private Wide Area Network



LABVANTAGE Release Compatibility Table

	LABVANTAGE Release	6.0.x	R5.2	R5.1	R5	R4.7	R4.6
Application Server	Sybase EA Server[1]	NA[3]	5.5	5.5	5.5	5.5	5.5
	Oracle/BEA WebLogic[2]	10.3/11g	10.2 MP2	10.2 MP2	9.2 MP2	9.2 MP2	NA
	IBM WebSphere[2]	7.0.0.19, 8.0.0.2[5]	6.10.25 (ND1)	6.1.0.25	6.1.0.7	6.1.0.7	NA
	Redhat JBoss[2]	EAP 5.1.0, EAP 5.1.1[5], EAP 5.1.2[5]	EAP 4.3.0.GA-CP06	EAP 4.3.0.GA-CP06	NA	NA	NA
Database Server	Oracle[2]	11g R2	11g R2/11g R1/10g R2	10g R2/ 11g R1	9i/10g R1/ 10g R2	9i/10g R1/ 10g R2	9i/10g R1/ 10g R2
	Microsoft SQL Server[1]	2008 R2	2005/2008	2005/2008	2005	2000/2005	2000/2005
Report Server	Business Objects	BO X1 R3.1	BO XI R2	BO XI R2	BO XI R2	BO XI R2/ BO 6.5.4	BO XI R2/ BO 6.5.4
Bartender	Seagull Scientific	9.4.x, 7.7.x	7.7.x	7.7.x	7.7.x	NA	NA
Browsers	Internet Explorer	9.0/8.0/7.0[4]	8.0/7.0	7.0 +	6.0	6.0	6.0
	Safari	5.1	NA	NA	NA	NA	NA
	Chrome	16.0[6]	NA	NA	NA	NA	NA

[1]Windows only
[2]Any operating system supported by the vendor
[3]Not supported in this version
[4]Limited support
[5]LABVANTAGE 6.0.1 adds in support for JBoss 5.1.1, 5.1.2 and WebSphere 8.0
[6]LABVANTAGE 6.0.1 adds in support for Chrome 16.0 or greater

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