

## Middleware systems

<i>Part 1 of 8</i>	Abbott Diagnostics Amelia Presley amelia.presley@abbott.com 100 Abbott Park Road, AP6C-5, Abbott Park, IL 60064 847-935-0039 www.abbottdiagnostics.com
Name of middleware system	Instrument Manager (supplied by Data Innovations)
First ever middleware installation/Most recent installation*	2007/2009
Last update of middleware system	2009
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?)	42 25/17 (Argentina, Canada, China, Curacao, Hong Kong, Singapore, Thailand, New Zealand)
• No. of these contracts signed in 2009	9
No. of sites operating middleware/Percent of business that is middleware	35/—
No. of employees in entire company • No. of employees dedicated to middleware development, install, support	72,000 —
Hardware platforms • Proprietary hardware required?	Windows PC, server no
Smallest hardware platform system can run on	Core 2 Duo PC with 2.0 GHz, 512 MB RAM, 80 GB hard disk
Largest hardware platform in use	Core 2 Duo Windows PC/server with 3.4 GHz, 2 GB RAM, 320 GB hard disk
Software platforms	Windows 2000 Professional, XP, Windows 2000 server, Windows 2003 server, Windows 2008 server, Windows Vista
Fault-tolerant solutions/Hardware must be purchased from company?	yes/no
Support virtualization?	yes
Primary databases used/Alternative databases supported	InterSystems Caché/none
Storage capacity of standard configuration of hardware • No. of results that can be stored/No. of orders that can be stored	Core 2 Duo Windows PC/server with 2.0 GHz, 1 GB RAM, 200 GB hard disk unlimited/unlimited
Middleware can interface with instruments from any manufacturer?	yes
Types of data system can receive, store, transmit	alpha numeric, image
No. of instruments one middleware device can support	unlimited
Configuration of middleware device	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7, ASTM, XML, proprietary, ODBC
Low-level transport middleware supports to interface to instruments	serial RS232, serial USB, TCP/IP, ODBC, FTP, LAT
Can middleware send results to and receive orders from reference labs?	yes
LIS/HIS/EMR interfaces for receiving orders	Sunquest, Oasis, Meditech, Healthvision, Cerner, Misys, GE Healthcare, others
LIS/HIS/EMR interfaces for sending results	Sunquest, Oasis, Meditech, Healthvision, Cerner, Misys, GE Healthcare, others
No. of diff. host system connections that can operate at once on middleware	unlimited
Protocols system supports to interface to other systems	HL7, ASTM, XML, proprietary, ODBC
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system?	most languages yes
System supports local date and time formats?	yes
No. of users that can access system at once	unlimited
No. of user security levels system supports	unlimited (user defined)
Users can write all rules for middleware? • System supports simple rules? • System supports compound nested rules with multiple event actions? • Multiple event actions fired from one "if" condition statement?	yes yes yes yes
Full and persistent audit trail of rule execution?/System supports rules testing?	yes/yes
Rule sets applied to individual instruments or connections?	yes
QC data used as part of auto-verification or rules process?	yes
Data from external databases retrieved and incorporated in rules processing?	no
Results that are entered manually processed by rules?	yes
Rules test cases created, saved, used on demand for rules validation testing?	yes
System supports event notification?	yes
System user notified of rules-based events?/Notification methods supported	yes/pop-up windows, e-mail, pager, audio/visual device
Automation routes determined by user-defined rules?	yes
System supports test-based load balancing across instruments?	yes
Events that lead to automation routes being dynamically updated	new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken?	yes
Laboratory automation system interfaces	Abbott
System interfaces with noninstrument automation devices?	yes (pre-analytic automation, tube sorter, decapper, specimen storage and retrieval module, centrifuge, resealer, descaler)
Back-end specimen storage and retrieval tracking?	yes
System allows management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	yes yes
System provides LIS downtime functions?/System allows manual order entry?	yes/yes
System generates downtime specimen ID?/Algorithm user definable?	yes/yes
Orders entered in middleware manually are sent back to LIS automatically?	yes
System supports data collection or data mining?	yes
Quality control module?	yes
Middleware interfaces to third-party QC packages?	yes (Bio-Rad Unity Real Time)
System supports multi-rule QC?	yes
System supports moving averages or average of normals?	no
Users can customize screens?/Users can define custom fields?	yes/yes
Users can populate custom fields via user-defined rules?	yes
Screen has image support for any type of image?	yes
Users can design own reports?/Report-generation software used • Reports can include any data elements in database?	yes/ODBC-compliant applications yes
Around-the-clock customer service in U.S.?	yes
System training available/On-site consulting?	classroom, on site/yes
Smallest cost for hardware/software/monthly maintenance	—
Largest cost for hardware/software/monthly maintenance	—
Fee for additional users	—
Distinguishing features of middleware (supplied by vendor)	<ul style="list-style-type: none"> <li>• integration of quality control results and instrument events within the processing of results</li> <li>• open middleware solution can connect to any vendor's instrumentation and to multiple disciplines inside the laboratory, including immunoassay, clinical chemistry, hematology</li> <li>• connectivity for use in multi-site, multi-LIS, and multi-workstation environments</li> </ul>
<p>*based on December 2009 survey deadline Note: a dash in lieu of an answer means company did not answer question or question is not applicable</p>	

## Middleware systems

<i>Part 2 of 8</i>	<b>Beckman Coulter</b> Ellen Storms estorms@beckman.com 250 S. Kraemer Blvd., Brea, CA 92886 714-961-4810 www.beckmancoulter.com	<b>Data Innovations</b> sales@datainnovations.com 120 Kimball Ave., Suite 100, South Burlington, VT 05403 802-658-2850 www.datainnovations.com
Name of middleware system	Remisol Advance <sup>†</sup> (supplied by Normand Infomatique)	Instrument Manager
First ever middleware installation/Most recent installation*	1996/December 2009	1993/December 2009
Last update of middleware system	February 2010	June 2009
No. of contracts for sites operating middleware	~1,600	6,000+
• U.S. contracts/Foreign contracts (In what countries?)	~800/~800 (Europe, Canada, New Zealand, Israel, India, Hong Kong)	5,400+/650+ (63 countries)
• No. of these contracts signed in 2009	—	343
No. of sites operating middleware/Percent of business that is middleware	—/3% (United States)	5,000+/100%
No. of employees in entire company	12,400	95
• No. of employees dedicated to middleware development, install, support	—	48
Hardware platforms	dual-core server	Windows PC, server
• Proprietary hardware required?	yes	no
Smallest hardware platform system can run on	PC	P4, 2.8 GHz, 80 GB hard drive, 512 MB RAM
Largest hardware platform in use	dual-core server	1 server cluster connecting multiple laboratories worldwide
Software platforms	Microsoft Windows	Windows 2000 Pro, XP, Windows 2003 server, 2008 server, Vista
Fault-tolerant solutions/Hardware must be purchased from company?	yes/yes	yes/no
Support virtualization?	no	yes
Primary databases used/Alternative databases supported	Microsoft SQL/—	InterSystems Caché/—
Storage capacity of standard configuration of hardware	6 GB	160 GB (any storage size supported)
• No. of results that can be stored/No. of orders that can be stored	4,000,000 chemistry and immunoassay results/160,000 hematology orders without graphics and 80,000 orders with graphics	limited only by storage size/limited only by storage size
Middleware can interface with instruments from any manufacturer?	no (with Beckman Coulter, Instrumentation Laboratory ACL Top)	yes
Types of data system can receive, store, transmit	alpha numeric, image, other binary	alpha numeric, image
No. of instruments one middleware device can support	5	unlimited
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments	ASTM (ASTM 2), proprietary	HL7 (2.2, 2.3, 2.4, 2.5, 3.0), ASTM (1238, 1394), XML, proprietary, ODBC/SQL
Low-level transport middleware supports to interface to instruments	serial RS232, TCP/IP	serial RS232, serial USB, TCP/IP, ODBC, FTP, LAT, files, Web services, http
Can middleware send results to and receive orders from reference labs?	yes	yes (Quest, LabCorp, ARUP, others)
LIS/HIS/EMR interfaces for receiving orders	—	McKesson, Cerner, Siemens, SCC Soft Computer, Sunquest, Meditech, GE, Wyndgate, Epic, CliniSys, Healthland, Eclipsys, Omnitech, others
LIS/HIS/EMR interfaces for sending results	—	McKesson, Cerner, Siemens, SCC Soft Computer, Sunquest, Meditech, GE, Wyndgate, Epic, CliniSys, Healthland, Eclipsys, Omnitech, others
No. of diff. host system connections that can operate at once on middleware	2	unlimited
Protocols system supports to interface to other systems	ASTM (ASTM 2), proprietary	HL7 (2.2, 2.3, 2.4, 2.5, 3.0), ASTM (1238, 1394), XML, proprietary, others
Human languages middleware supports (other than English)	French, German	all known languages
• Multiple languages can be used at same time on one system?	no	yes
System supports local date and time formats?	yes	yes
No. of users that can access system at once	5	unlimited
No. of user security levels system supports	unlimited	unlimited (user defined)
Users can write all rules for middleware?	yes	yes
• System supports simple rules?	yes	yes
• System supports compound nested rules with multiple event actions?	yes	yes
• Multiple event actions fired from one "if" condition statement?	yes	yes
Full and persistent audit trail of rule execution?/System supports rules testing?	no/yes	yes/yes
Rule sets applied to individual instruments or connections?	yes	yes
QC data used as part of auto-verification or rules process?	yes	yes
Data from external databases retrieved and incorporated in rules processing?	no	yes
Results that are entered manually processed by rules?	yes	yes
Rules test cases created, saved, used on demand for rules validation testing?	yes	yes
System supports event notification?	yes	yes
System user notified of rules-based events?/Notification methods supported	yes/pop-up windows, filtered window views, color and flag codes	yes/pop-up windows, e-mail, pager, audio/visual device, data color coding
Automation routes determined by user-defined rules?	yes	yes
System supports test-based load balancing across instruments?	yes	yes
Events that lead to automation routes being dynamically updated	new test requests, reflex test requests, instrument down	new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken?	—	yes
Laboratory automation system interfaces	Beckman Coulter, Olympus America	Beckman Coulter, Ortho, Abbott, Roche, Olympus America, Siemens, others
System interfaces with noninstrument automation devices?	yes (tube sorters, decappers, aliquotters, slide makers, stainers)	yes (sorters, decappers, aliquotters, slide maker/stainers, pipetting, others)
Back-end specimen storage and retrieval tracking?	yes	yes
System allows management of inst. & automation device maintenance records?	no	yes
• System provides alerts when an instrument needs maintenance?	no	yes
System provides LIS downtime functions?/System allows manual order entry?	yes/yes	yes/yes
System generates downtime specimen ID?/Algorithm user definable?	yes/yes	yes/yes
Orders entered in middleware manually are sent back to LIS automatically?	no	yes
System supports data collection or data mining?	yes	yes
Quality control module?	yes	yes
Middleware interfaces to third-party QC packages?	no	yes (Bio-Rad Unity Real Time, Bio-Rad QC OnCall, others)
System supports multi-rule QC?	yes	yes
System supports moving averages or average of normals?	yes	yes
Users can customize screens?/Users can define custom fields?	yes/yes	yes/yes
Users can populate custom fields via user-defined rules?	no	yes
Screen has image support for any type of image?	yes	yes
Users can design own reports?/Report-generation software used	no/SQL compatible	yes/any ODBC-compliant application, internal proprietary program
• Reports can include any data elements in database?	yes	yes
Around-the-clock customer service in U.S.?	yes	yes
System training available/On-site consulting?	classroom, on site, e-learning/no	classroom, on site, e-learning, Web based/yes
Smallest cost for hardware/software/monthly maintenance	—	—/\$3.075k/1.5% of software cost
Largest cost for hardware/software/monthly maintenance	—	—/\$300k/1.5% of software cost
Fee for additional users	—	\$1.65k for each concurrent access
Distinguishing features of middleware (supplied by vendor)	<ul style="list-style-type: none"> <li>extended quality control module monitors the quality of diagnostic system operation using patient moving average data; detects drifts in diagnostic systems between commercial QC runs; provides autoverification procedure to address inspection requirements</li> <li>alerts operator of critical test results; includes dictionary; complex, compound rules can be developed/maintained by lab's key operator</li> <li>on-site customization and implementation services available</li> </ul>	<ul style="list-style-type: none"> <li>IMSolutions provides discipline-specific turnkey autoverification systems; includes a rules package containing a pre-populated set of rules and documented algorithms, data-collection forms to gather parameters, pre-populated test suites, validation templates in support of those rules; includes hardware, software, installation, and training</li> <li>FDA 510(k) cleared; ISO 13485 certification and device licensure for Canada</li> <li>full suite of services, including standard and customized training covering all aspects of the product, on-site consulting, installation options, more</li> </ul>
*based on December 2009 survey deadline Note: a dash in lieu of an answer means company did not answer question or question is not applicable	<sup>†</sup> formerly DL2000 Data Manager	

Tabulation does not represent an endorsement by the College of American Pathologists.

## Middleware systems

Part 3 of 8	Data Innovations Europe—PGP Bob Rothstein europe-sales@datainnovations.com 34 Avenue Jacques Brel, Brussels, Belgium B-1200 +3227706222 www.datainnovations.com	Dawning Technologies Jay Sax sales@dawning.com 8140 College Parkway, Suite 202, Fort Myers, FL 33919 800-322-0499 www.dawning.com
Name of middleware system	Laboratory Production Manager (LPM)	JavaLin interfaces
First ever middleware installation/Most recent installation*	1982/December 2009	1984/2009
Last update of middleware system	October 2009	2009
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?) • No. of these contracts signed in 2009	234 3/231 (Belgium, France, U.K., Netherlands, Luxembourg, many others) 3	~2,600 ~2,300/~300 (45+ countries) ~200
No. of sites operating middleware/Percent of business that is middleware	500+/100%	~2,650/100%
No. of employees in entire company • No. of employees dedicated to middleware development, install, support	95 48	23 19
Hardware platforms • Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Fault-tolerant solutions/Hardware must be purchased from company? Support virtualization? Primary databases used/Alternative databases supported Storage capacity of standard configuration of hardware • No. of results that can be stored/No. of orders that can be stored	PC no P4, 2 GB RAM, 30 GB hard drive 2 redundant systems with 4 dual-core CPUs, shared disk cluster cabinet Windows 2000, 2003, XP yes/no yes Oracle/— 70 GB limited only by storage size/limited only by storage size	Dawning JavaLin/PDI yes JavaLin/PDI JavaLin/300 Linux OS, Java-based embedded JResultNet software yes/yes yes HSQL/Codebase 1 GB 1,000+ internal and unlimited external/1,000+ internal and unlimited external
Middleware can interface with instruments from any manufacturer? Types of data system can receive, store, transmit No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments Can middleware send results to and receive orders from reference labs?	yes alpha numeric, image, sound 250 PC with standard interfaces HL7, ASTM (1238, 1394), XML, proprietary serial RS232, TCP/IP, ODBC, FTP, files, specific .dll no	yes alpha numeric 1 special-purpose device (no PC involved) HL7 (all versions below 3.0), ASTM (NCCLS LIS 1A, 2A), XML, proprietary, others serial RS232, serial USB, TCP/IP, ODBC, FTP, flat file yes (Quest Diagnostics, Specialty Laboratories, AML)
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections that can operate at once on middleware Protocols system supports to interface to other systems	MIPS, Cortex, Molis, Agfa, Medasys, MBC, Seralis, Helios, Hexaflux, others MIPS, Cortex, Molis, Agfa, Medasys, MBC, Seralis, Helios, Hexaflux, others 64 HL7, ASTM (1238, 1394), XML, proprietary	Cerner, CPSI, Custom Software Solutions, GE Healthcare, McKesson, others Cerner, CPSI, Custom Software Solutions, GE Healthcare, McKesson, others 2 HL7 (all versions below 3.0), ASTM (NCCLS LIS 1A, 2A), XML, proprietary, others
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	French, German, Dutch, Hebrew, others yes yes 256 user definable	German, French, Spanish, Portuguese, others yes yes unlimited unlimited
Users can write all rules for middleware? • System supports simple rules? • System supports compound nested rules with multiple event actions? • Multiple event actions fired from one "if" condition statement? Full and persistent audit trail of rule execution?/System supports rules testing? Rule sets applied to individual instruments or connections? QC data used as part of auto-verification or rules process? Data from external databases retrieved and incorporated in rules processing? Results that are entered manually processed by rules? Rules test cases created, saved, used on demand for rules validation testing?	yes yes yes yes yes/yes yes yes yes yes yes	yes yes yes yes yes/yes yes yes yes yes yes
System supports event notification? System user notified of rules-based events?/Notification methods supported	yes yes/pop up, pager, e-mail, phone call, audio/visual devices, others	yes yes/pop-up windows, e-mail, audio alert, message displays, save to file, others
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	yes yes new test requests, reflex test requests, instrument down no Beckman Coulter, Ortho, Abbott, Roche, Siemens, Thermo Scientific, others yes (sorters, centrifuges, decappers, aliquotters, slide makers, stainers)	yes yes new test requests, reflex test requests, instrument down yes Beckman Coulter, Ortho, Abbott, Roche, Olympus America, Siemens, Sysmex yes (slide makers)
Back-end specimen storage and retrieval tracking? System allows management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	no no no	no no no
System provides LIS downtime functions?/System allows manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	yes/yes yes/yes yes yes	yes/yes yes/yes yes yes
Quality control module? Middleware interfaces to third-party QC packages? System supports multi-rule QC? System supports moving averages or average of normals?	yes yes (Bio-Rad, Instrumentation Laboratory, SKML) yes yes	no yes (Bio-Rad) yes no
Users can customize screens?/Users can define custom fields? Users can populate custom fields via user-defined rules? Screen has image support for any type of image? Users can design own reports?/Report-generation software used • Reports can include any data elements in database?	yes/yes yes yes yes/Report Builder no	yes/yes yes no yes/Crystal Reports yes
Around-the-clock customer service in U.S.? System training available/On-site consulting?	no classroom, on site/yes	yes classroom, on site, Web based/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	\$2k/\$4.5k/\$0.068k \$200k/\$300k/\$4.5k \$2.3k	\$2.2k/included/~\$0.018k \$2.2k/\$1.5k/~\$0.032k none
Distinguishing features of middleware (supplied by vendor)	<ul style="list-style-type: none"> <li>• high level of workflow customization meeting customer-specific requirements via a powerful parameterization tool</li> <li>• rules across multiple disparate specimens belonging to the same order</li> <li>• robust multi-site, multi-lab, and multi-LIS implementation support with full LIS downtime management</li> </ul>	<ul style="list-style-type: none"> <li>• distributed processing in a minimal footprint — PC power in a 3-in. x 5-in. footprint unit that runs standard JResultNet middleware; ideal for remote instruments or where the footprint of a PC is costly</li> <li>• minimal impact on existing LIS operations — add a new instrument on a single connection to the LIS using any standard protocol without disturbing existing connections; easily integrated with large-scale middleware implementations</li> <li>• complete message mapping control with instrument and LIS connection</li> </ul>

\*based on December 2009 survey deadline

Note: a dash in lieu of an answer means company did not answer question or question is not applicable

## Middleware systems

Part 4 of 8	Dawning Technologies Jay Sax sales@dawning.com 8140 College Parkway, Suite 202, Fort Myers, FL 33919 800-322-0499 www.dawning.com	Fletcher-Flora Healthcare Systems Terry Watson fflexlinksales@fletcher-flora.com 1580 Orangethorpe Way, Anaheim, CA 92801 800-777-1471 www.fletcher-flora.com
Name of middleware system	JResultNet Interface Engine Software	FFlex eLink Middleware
First ever middleware installation/Most recent installation*	1984/2009	2006/November 2010
Last update of middleware system	2009	July 2009
No. of contracts for sites operating middleware	~1,450	12
• U.S. contracts/Foreign contracts (In what countries?)	~1,275/~175 (45+ countries)	12/0
• No. of these contracts signed in 2009	~100	5
No. of sites operating middleware/Percent of business that is middleware	~1,500/100%	15/5%
No. of employees in entire company	23	45
• No. of employees dedicated to middleware development, install, support	19	5
Hardware platforms	platform-portable Java-based application, JavaLin interfaces, PCs, Macintosh, servers	PC running Windows XP Professional, Vista
• Proprietary hardware required?	no	no
Smallest hardware platform system can run on	JavaLin/PDI	1 GB RAM, 80 GB hard disk
Largest hardware platform in use	rack servers connecting multiple remote sites	1 GB RAM, 80 GB hard disk
Software platforms	Windows Vista, 2000, XP Pro or 2003 server, Linux, OS X	Windows XP, Vista, 2000, 2003
Fault-tolerant solutions/Hardware must be purchased from company?	yes/no	no/no
Support virtualization?	yes	no
Primary databases used/Alternative databases supported	Postgre SQL/HSQL, Codebase, several external databases	Microsoft Express, Microsoft SQL 2000, Microsoft 2003, MySQL/—
Storage capacity of standard configuration of hardware	unlimited	80 GB (limited only by disk space)
• No. of results that can be stored/No. of orders that can be stored	unlimited/unlimited	limited only by disk space/limited only by disk space
Middleware can interface with instruments from any manufacturer?	yes	yes
Types of data system can receive, store, transmit	alpha numeric	alpha numeric
No. of instruments one middleware device can support	unlimited	6
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7 (all versions below 3.0), ASTM (NCCLS LIS 1A, 2A), XML, proprietary, others	HL7, ASTM, proprietary
Low-level transport middleware supports to interface to instruments	serial RS232, serial USB, TCP/IP, ODBC, FTP, flat file	serial RS232, serial USB, TCP/IP
Can middleware send results to and receive orders from reference labs?	yes (Quest Diagnostics, Specialty Laboratories, AML)	no
LIS/HIS/EMR interfaces for receiving orders	Cerner, CPSI, Custom Software Solutions, GE Healthcare, others	OncoEMR, eClinicalWorks, others
LIS/HIS/EMR interfaces for sending results	Cerner, CPSI, Custom Software Solutions, GE Healthcare, others	Noteworthy, OncoEMR, eClinicalWorks, Misys, others
No. of diff. host system connections that can operate at once on middleware	unlimited	1
Protocols system supports to interface to other systems	HL7 (all versions below 3.0), ASTM (NCCLS LIS 1A, 2A), XML, proprietary, CSV, flat file, direct database, HPRIM, others	HL7, ASTM, proprietary
Human languages middleware supports (other than English)	German, French, Spanish, Portuguese, others	none
• Multiple languages can be used at same time on one system?	yes	no
System supports local date and time formats?	yes	no
No. of users that can access system at once	unlimited	1
No. of user security levels system supports	unlimited	3
Users can write all rules for middleware?	yes	yes
• System supports simple rules?	yes	yes
• System supports compound nested rules with multiple event actions?	yes	no
• Multiple event actions fired from one "if" condition statement?	yes	no
Full and persistent audit trail of rule execution/System supports rules testing?	yes/yes	no/no
Rule sets applied to individual instruments or connections?	yes	yes
QC data used as part of auto-verification or rules process?	yes	no
Data from external databases retrieved and incorporated in rules processing?	yes	no
Results that are entered manually processed by rules?	yes	no
Rules test cases created, saved, used on demand for rules validation testing?	yes	yes
System supports event notification?	yes	no
System user notified of rules-based events?/Notification methods supported	yes/pop-up windows, e-mail, audio alert, message displays, save to file, others	no/result flags
Automation routes determined by user-defined rules?	yes	no
System supports test-based load balancing across instruments?	yes	no
Events that lead to automation routes being dynamically updated	new test requests, reflex test requests, instrument down	—
Audit trail of the route a sample has taken?	yes	no
Laboratory automation system interfaces	Beckman Coulter, Ortho, Abbott, Roche, Olympus America, Siemens, Sysmex, others	—
System interfaces with noninstrument automation devices?	yes (slide makers)	no
Back-end specimen storage and retrieval tracking?	no	no
System allows management of inst. & automation device maintenance records?	no	no
• System provides alerts when an instrument needs maintenance?	no	no
System provides LIS downtime functions?/System allows manual order entry?	yes/yes	no/yes
System generates downtime specimen ID?/Algorithm user definable?	yes/yes	no/no
Orders entered in middleware manually are sent back to LIS automatically?	yes	yes
System supports data collection or data mining?	yes	no
Quality control module?	no	no
Middleware interfaces to third-party QC packages?	yes (Bio-Rad)	no
System supports multi-rule QC?	yes	no
System supports moving averages or average of normals?	no	no
Users can customize screens?/Users can define custom fields?	yes/yes	no/no
Users can populate custom fields via user-defined rules?	yes	no
Screen has image support for any type of image?	no	no
Users can design own reports?/Report-generation software used	yes/Crystal Reports	no/results sent to EMR, EHR, practice management system for reporting
• Reports can include any data elements in database?	yes	no
Around-the-clock customer service in U.S.?	yes	yes
System training available/On-site consulting?	classroom, on site, Web based/yes	online, on site/yes
Smallest cost for hardware/software/monthly maintenance	—/\$1.9k/~\$0.019k	—/—/\$0.031k
Largest cost for hardware/software/monthly maintenance	—/\$4k+/~\$0.036k	—/—/\$0.34k
Fee for additional users	\$0.6k	none
Distinguishing features of middleware (supplied by vendor)	<ul style="list-style-type: none"> <li>• JResultNet Rules Development Kit allows middleware rules to be developed, tested, validated, and saved offline or online; offline rules development allows the process to occur with no interruption of the middleware operating</li> <li>• Dawning DataMiner — a U.S. patent-pending advanced data mining application that is part of Dawning's database rules option</li> <li>• JResultNet rules organization features — develop nested "if" and "then" rules statements for more efficient rules in fewer steps; organize rules by specific instrument, connection, or lab area</li> </ul>	<ul style="list-style-type: none"> <li>• cost-effective solution that connects laboratory instruments directly to a host system</li> <li>• simply manages orders and results to and from an EMR, practice management system, or other host system to analyzers</li> <li>• easy to use for small labs that want to minimize manual transcription of results into their host system</li> </ul>
<p>*based on December 2009 survey deadline  <i>Note: a dash in lieu of an answer means company did not answer question or question is not applicable</i></p>		

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## Middleware systems

Part 5 of 8	Pathagility Mark McCuin mark@pathagility.com 1125 Oak Street, Suite 303, Conway, AR 72032 501-327-7700 ext. 0 www.pathagility.com	PVT LabSystems Miriam Hoelzel info@pvtlabsystems.com 300 Town Park Drive, Suite 190, Kennesaw, GA 30144 877-788-5227 www.pvtlabsystems.com
Name of middleware system	AgilityEngine	Silver Server
First ever middleware installation/Most recent installation*	January 2008/October 2009	1997/2009
Last update of middleware system	October 2009	—
No. of contracts for sites operating middleware	3	45
• U.S. contracts/Foreign contracts (In what countries?)	3/0	5/40 (Germany, Belgium, Netherlands)
• No. of these contracts signed in 2009	1	12
No. of sites operating middleware/Percent of business that is middleware	3/30%	45/—
No. of employees in entire company	6	17
• No. of employees dedicated to middleware development, install, support	3	—
Hardware platforms	hosted virtualized servers (partnership with BlueLock)	IBM PC-compatible x86 computer
• Proprietary hardware required?	no	no
Smallest hardware platform system can run on	infrastructure as a service	x86 Intel Pentium 4
Largest hardware platform in use	infrastructure as a service	network of 7 to 8 standard computers
Software platforms	Windows 2003 server, SQL server 2005, BizTalk 2005	QNX
Fault-tolerant solutions/Hardware must be purchased from company?	yes/no	yes/yes
Support virtualization?	yes	yes
Primary databases used/Alternative databases supported	Microsoft SQL server 2005/—	SAM database/—
Storage capacity of standard configuration of hardware	unlimited	20 GB
• No. of results that can be stored/No. of orders that can be stored	unlimited/unlimited	1,000,000+/1,000,000+
Middleware can interface with instruments from any manufacturer?	—	yes
Types of data system can receive, store, transmit	—	alpha numeric
No. of instruments one middleware device can support	—	16
Configuration of middleware device	—	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7	ASTM, proprietary
Low-level transport middleware supports to interface to instruments	serial RS232, serial USB, TCP/IP, ODBC, FTP	serial RS232, TCP/IP, FTP
Can middleware send results to and receive orders from reference labs?	—	no
LIS/HIS/EMR interfaces for receiving orders	Impac, eMDs, proprietary system interfaces	—
LIS/HIS/EMR interfaces for sending results	Impac, eMDs, proprietary system interfaces	—
No. of diff. host system connections that can operate at once on middleware	unlimited	2
Protocols system supports to interface to other systems	HL7 (2.x, 3), XML, proprietary	ASTM, proprietary
Human languages middleware supports (other than English)	—	German
• Multiple languages can be used at same time on one system?	no	no
System supports local date and time formats?	no	yes
No. of users that can access system at once	unlimited	20+
No. of user security levels system supports	~5	—
Users can write all rules for middleware?	no	yes
• System supports simple rules?	yes	yes
• System supports compound nested rules with multiple event actions?	yes	—
• Multiple event actions fired from one "if" condition statement?	yes	—
Full and persistent audit trail of rule execution?/System supports rules testing?	—/yes	yes/yes
Rule sets applied to individual instruments or connections?	yes	—
QC data used as part of auto-verification or rules process?	yes	—
Data from external databases retrieved and incorporated in rules processing?	—	—
Results that are entered manually processed by rules?	yes	yes
Rules test cases created, saved, used on demand for rules validation testing?	—	—
System supports event notification?	yes	—
System user notified of rules-based events?/Notification methods supported	yes/e-mail, fax	—
Automation routes determined by user-defined rules?	no	yes
System supports test-based load balancing across instruments?	—	no
Events that lead to automation routes being dynamically updated	—	new test requests
Audit trail of the route a sample has taken?	—	yes
Laboratory automation system interfaces	—	PVT Probenverteiltechnik GmbH, Sarstedt
System interfaces with noninstrument automation devices?	—	yes (sorters, decappers, recappers, aliquotters)
Back-end specimen storage and retrieval tracking?	no	yes
System allows management of inst. & automation device maintenance records?	no	—
• System provides alerts when an instrument needs maintenance?	no	—
System provides LIS downtime functions?/System allows manual order entry?	no/yes	yes/yes
System generates downtime specimen ID?/Algorithm user definable?	no/no	—
Orders entered in middleware manually are sent back to LIS automatically?	yes	no
System supports data collection or data mining?	yes	—
Quality control module?	yes	no
Middleware interfaces to third-party QC packages?	no	no
System supports multi-rule QC?	no	—
System supports moving averages or average of normals?	no	—
Users can customize screens?/Users can define custom fields?	no/no	no/no
Users can populate custom fields via user-defined rules?	no	—
Screen has image support for any type of image?	yes	no
Users can design own reports?/Report-generation software used	no/—	—
• Reports can include any data elements in database?	yes	—
Around-the-clock customer service in U.S.?	yes	yes
System training available/On-site consulting?	—/yes	on site/yes
Smallest cost for hardware/software/monthly maintenance	—/—/\$.25k	—
Largest cost for hardware/software/monthly maintenance	—/—/\$5.5k	—
Fee for additional users	—	—
Distinguishing features of middleware (supplied by vendor)	<ul style="list-style-type: none"> <li>• software-as-a-service platform that provides infrastructure savings to clients</li> <li>• provides a blend of interoperability and customized workflow solution potential; company involved in the short- and long-term business strategies of clients</li> <li>• Web-based collaboration portal and multi-channel report distribution management tool can enhance the capabilities and extend the lifespan of technology investments and anatomic pathology lab systems</li> </ul>	<ul style="list-style-type: none"> <li>• flexible and can be adapted to customer needs</li> <li>• efficient and effective; improves and expedites workflow</li> <li>• simplifies handling and coordination of various tests for samples</li> </ul>

\*based on December 2009 survey deadline

Note: a dash in lieu of an answer means company did not answer question or question is not applicable

## Middleware systems

Part 6 of 8	Roche Diagnostics Aime Chidester aime.chidester@roche.com 9115 Hague Rd., Indianapolis, IN 46250 317-521-2000 www.roche-diagnostics.us	Siemens Healthcare Diagnostics Sepehr Seyedzadeh sepehr.seyedzadeh@siemens.com 511 Benedict Ave., Tarrytown, NY 10591 914-524-3827 www.siemens.com/diagnostics
Name of middleware system	Roche Middleware Solution (supplied by Data Innovations)	Advia CentraLink (supplied by MIPS)
First ever middleware installation/Most recent installation*	1998/December 2009	2001/December 2009
Last update of middleware system	March 2009	September 2009
No. of contracts for sites operating middleware	670	—
• U.S. contracts/Foreign contracts (In what countries?)	670/—	—
• No. of these contracts signed in 2009	50	—
No. of sites operating middleware/Percent of business that is middleware	670/—	—
No. of employees in entire company	4,200 (U.S. centralized diagnostics)	—
• No. of employees dedicated to middleware development, install, support	61	—
Hardware platforms	Dell OptiPlex 760, Dell PowerEdge T610, Dell PowerEdge R610	Dell server systems (PowerEdge 2900 III, PowerEdge 1800)
• Proprietary hardware required?	yes	yes
Smallest hardware platform system can run on	Dell OptiPlex 760, 80 GB hard drive, SATA 3.0 GB/s, 8 MB Databurst Caché	Dell PowerEdge 1800
Largest hardware platform in use	multiple Roche middleware server classes connecting 20 geographically dispersed, networked customer locations	Dell PowerEdge 2900
Software platforms	Windows XP, Windows 2003 server	Windows-based operating system (Windows 2003 server, XP)
Fault-tolerant solutions/Hardware must be purchased from company?	yes/yes	no/yes
Support virtualization?	no	no
Primary databases used/Alternative databases supported	InterSystems Caché/—	OpenEdge/—
Storage capacity of standard configuration of hardware	80 GB/three 146 GB RAID	226 GB
• No. of results that can be stored/No. of orders that can be stored	limited only by storage size/limited only by storage size	40,000,000/960,000
Middleware can interface with instruments from any manufacturer?	no (with Siemens Centaur, specified Stago coagulation instruments, specified Sysmex and Beckman Coulter hematology drivers)	yes (third-party manufacturers' instruments can be interfaced upon Siemens' approval)
Types of data system can receive, store, transmit	alpha numeric, image, multi level	alpha numeric, image
No. of instruments one middleware device can support	128	32
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7, ASTM, XML, proprietary, ODBC/SQL	HL7 (2.5), ASTM (1394), proprietary
Low-level transport middleware supports to interface to instruments	serial RS232, TCP/IP	serial RS232, TCP/IP, FTP
Can middleware send results to and receive orders from reference labs?	no	yes
LIS/HIS/EMR interfaces for receiving orders	McKesson, SCC Soft Computer, Cerner, Meditech, Sunquest, homegrown LIS, others	Siemens, McKesson, Aspyra, Cerner, SCC Soft Computer, GE Healthcare, Meditech, Sunquest, Orchard, Schuyler House, Multidata, others
LIS/HIS/EMR interfaces for sending results	McKesson, SCC Soft Computer, Cerner, Meditech, Sunquest, homegrown LIS, others	Siemens, McKesson, Aspyra, Cerner, SCC Soft Computer, GE Healthcare, Meditech, Sunquest, Orchard, Schuyler House, Multidata, others
No. of diff. host system connections that can operate at once on middleware	unlimited	1
Protocols system supports to interface to other systems	HL7, ASTM	HL7 (2.5), ASTM (1394), proprietary, Technidata LMX 6.0
Human languages middleware supports (other than English)	none	Spanish, French, Italian, German, Dutch
• Multiple languages can be used at same time on one system?	no	yes
System supports local date and time formats?	no	yes
No. of users that can access system at once	operating system dependent	15
No. of user security levels system supports	unlimited	4
Users can write all rules for middleware?	yes	yes
• System supports simple rules?	yes	yes
• System supports compound nested rules with multiple event actions?	yes	yes
• Multiple event actions fired from one "if" condition statement?	yes	yes
Full and persistent audit trail of rule execution?/System supports rules testing?	yes/yes	yes/yes
Rule sets applied to individual instruments or connections?	yes	yes
QC data used as part of auto-verification or rules process?	yes	yes
Data from external databases retrieved and incorporated in rules processing?	yes	no
Results that are entered manually processed by rules?	yes	yes
Rules test cases created, saved, used on demand for rules validation testing?	yes	no
System supports event notification?	yes	yes
System user notified of rules-based events?/Notification methods supported	yes/pop-up windows, e-mail, audio/visual devices	yes/visual, trace logs
Automation routes determined by user-defined rules?	yes	yes
System supports test-based load balancing across instruments?	yes	yes
Events that lead to automation routes being dynamically updated	new test requests, reflex test requests, instrument down	new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken?	yes	yes
Laboratory automation system interfaces	Roche, Sysmex, Stago, PVT LabSystems, TTA	Siemens
System interfaces with noninstrument automation devices?	yes (Roche Modular Pre-Analytics, PVT RSD and RSA products for sample sorting and aliquotting, Roche p501/701 postanalytic storage)	yes (Siemens' Advia LabCell, Advia WorkCell, VersaCell system)
Back-end specimen storage and retrieval tracking?	yes	yes
System allows management of inst. & automation device maintenance records?	yes	no
• System provides alerts when an instrument needs maintenance?	yes	no
System provides LIS downtime functions?/System allows manual order entry?	yes/yes	yes/yes
System generates downtime specimen ID?/Algorithm user definable?	yes/yes	no/no
Orders entered in middleware manually are sent back to LIS automatically?	yes	yes
System supports data collection or data mining?	yes	yes
Quality control module?	no	yes
Middleware interfaces to third-party QC packages?	yes (Bio-Rad Unity Real Time, Bio-Rad OnCall)	yes (export-only feature into Bio-Rad)
System supports multi-rule QC?	yes	yes
System supports moving averages or average of normals?	no	yes
Users can customize screens?/Users can define custom fields?	yes/yes	yes/yes
Users can populate custom fields via user-defined rules?	yes	yes
Screen has image support for any type of image?	yes	yes
Users can design own reports?/Report-generation software used	yes/any ODBC-compliant reporting application (Crystal Reports, MySQL, Excel, others)	yes/Advia CentraLink's internal software
• Reports can include any data elements in database?	yes	no
Around-the-clock customer service in U.S.?	yes	yes
System training available/On-site consulting?	classroom, on site, Webinar/yes	e-learning, on site/yes
Smallest cost for hardware/software/monthly maintenance	—	—
Largest cost for hardware/software/monthly maintenance	—	—
Fee for additional users	—	—
Distinguishing features of middleware (supplied by vendor)	<ul style="list-style-type: none"> <li>• supports third-party connectivity to specific high-volume instruments, hematology and coagulation analyzers</li> <li>• more than a decade-long supplier partnership with Data Innovations as well as the highest placement volume partner in the U.S.</li> <li>• dedicated resource pool of information technology sales consultants, project managers, and installation consultants</li> </ul>	<ul style="list-style-type: none"> <li>• robust and mature multi-discipline data-management and networking solution with proven record</li> <li>• comprehensive and integrated quality control package—patient moving averages used in quality control and autoverification</li> <li>• market-leading automation system controller</li> </ul>

\*based on December 2009 survey deadline

Note: a dash in lieu of an answer means company did not answer question or question is not applicable

## Middleware systems

Part 7 of 8	Siemens Healthcare Diagnostics Sepehr Seyedzadeh sepehr.seyedzadeh@siemens.com 511 Benedict Ave., Tarrytown, NY 10591 914-524-3827 www.siemens.com/diagnostics	Sysmex America Tammy Kutz communications@sysmex.com 1 Nelson C. White Parkway, Mundelein, IL 60060 847-996-4500 www.sysmex.com
Name of middleware system	EasyLink Informatics System	Sysmex WAM†
First ever middleware installation/Most recent installation*	2001/December 2009	2003/December 2009
Last update of middleware system	August 2009	November 2009
No. of contracts for sites operating middleware	—	136
• U.S. contracts/Foreign contracts (In what countries?)	—	130/6 (Canada)
• No. of these contracts signed in 2009	—	30
No. of sites operating middleware/Percent of business that is middleware	—	333/5%
No. of employees in entire company	—	451
• No. of employees dedicated to middleware development, install, support	—	96
Hardware platforms	Windows-based PC	Red Hat Linux
• Proprietary hardware required?	yes	no
Smallest hardware platform system can run on	Windows-based PC	Linux
Largest hardware platform in use	Windows-based PC	Unix
Software platforms	Windows XP Pro	Compuware Uniface
Fault-tolerant solutions/Hardware must be purchased from company?	no/yes	yes/no
Support virtualization?	no	no
Primary databases used/Alternative databases supported	Firebird/—	Oracle/—
Storage capacity of standard configuration of hardware	120 GB	sized for 2 years of data storage
• No. of results that can be stored/No. of orders that can be stored	34,000,000/7,000,000	2 years worth/2 years worth
Middleware can interface with instruments from any manufacturer?	yes (third-party manufacturers' instruments can be interfaced upon Siemens' approval)	no (with Sysmex hematology analyzers and automation, including SP1000i slidemaker/stainer, TS-500 tube sorter, others)
Types of data system can receive, store, transmit	alpha numeric, image (non-patient related)	alpha numeric, image
No. of instruments one middleware device can support	8	unlimited across multiple sites
Configuration of middleware device	PC with standard interfaces	—
Protocols middleware supports to interface to instruments	ASTM (NCCLS LIS 1A, 2A [old standard E1394-97]), proprietary	HL7 (2.3), ASTM (E1394), proprietary
Low-level transport middleware supports to interface to instruments	serial RS232, serial USB, TCP/IP, FTP	serial RS232, serial USB, TCP/IP
Can middleware send results to and receive orders from reference labs?	yes	—
LIS/HIS/EMR interfaces for receiving orders	Siemens, Cerner, Meditech, Sunquest, SCC Soft Computer, others	Data Innovations, Sunquest, Cerner, Meditech, McKesson, SCC Soft Computer, Siemens, Dawning, others
LIS/HIS/EMR interfaces for sending results	Siemens, Cerner, Meditech, Sunquest, SCC Soft Computer, others	Data Innovations, Sunquest, Cerner, Meditech, McKesson, SCC Soft Computer, Siemens, Dawning, others
No. of diff. host system connections that can operate at once on middleware	2	unlimited
Protocols system supports to interface to other systems	ASTM (NCCLS LIS 1A, 2A [old standard E 1394-97]), proprietary	HL7 (2.3), ASTM (E1394), proprietary
Human languages middleware supports (other than English)	Spanish, French, Italian, German, Portuguese, Japanese, Greek	none
• Multiple languages can be used at same time on one system?	yes	no
System supports local date and time formats?	yes	yes
No. of users that can access system at once	25	unlimited
No. of user security levels system supports	3	unlimited
Users can write all rules for middleware?	yes	yes
• System supports simple rules?	yes	yes
• System supports compound nested rules with multiple event actions?	yes	yes
• Multiple event actions fired from one "if" condition statement?	yes	yes
Full and persistent audit trail of rule execution/System supports rules testing?	yes/yes	yes/yes
Rule sets applied to individual instruments or connections?	yes	yes
QC data used as part of auto-verification or rules process?	yes	yes
Data from external databases retrieved and incorporated in rules processing?	no	no
Results that are entered manually processed by rules?	yes	yes
Rules test cases created, saved, used on demand for rules validation testing?	yes	no
System supports event notification?	yes	yes
System user notified of rules-based events?/Notification methods supported	yes/visual notifications	yes/pop-up, audio/visual
Automation routes determined by user-defined rules?	yes	yes
System supports test-based load balancing across instruments?	yes	yes
Events that lead to automation routes being dynamically updated	new test requests, reflex test requests, instrument down	new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken?	yes	yes
Laboratory automation system interfaces	Siemens	Sysmex
System interfaces with noninstrument automation devices?	no	yes (Sysmex SP1000i slidemaker/stainer, TS-500 tube sorter, CellaVision digital cell morphology)
Back-end specimen storage and retrieval tracking?	yes	yes
System allows management of inst. & automation device maintenance records?	no	no
• System provides alerts when an instrument needs maintenance?	no	no
System provides LIS downtime functions?/System allows manual order entry?	yes/yes	yes/yes
System generates downtime specimen ID?/Algorithm user definable?	no/no	no/yes
Orders entered in middleware manually are sent back to LIS automatically?	yes	yes
System supports data collection or data mining?	yes	yes
Quality control module?	yes	yes
Middleware interfaces to third-party QC packages?	yes (export-only feature into Bio-Rad)	no
System supports multi-rule QC?	yes	yes
System supports moving averages or average of normals?	yes	yes
Users can customize screens?/Users can define custom fields?	no/no	no/yes
Users can populate custom fields via user-defined rules?	no	yes
Screen has image support for any type of image?	no	yes
Users can design own reports?/Report-generation software used	yes/Jasper Reports	no/—
• Reports can include any data elements in database?	yes	yes
Around-the-clock customer service in U.S.?	yes	yes
System training available/On-site consulting?	e-learning, on site, classroom/yes	classroom, on site, e-learning/yes
Smallest cost for hardware/software/monthly maintenance	—	—
Largest cost for hardware/software/monthly maintenance	—	—
Fee for additional users	—	—
Distinguishing features of middleware (supplied by vendor)	<ul style="list-style-type: none"> <li>• browser-based system utilizing standard Internet browser for access to patient results, QC data, and specimen information across multiple network locations</li> <li>• comprehensive and integrated QC package—patient median calculation, customizable rules, audit trail and reporting</li> <li>• supports preventative maintenance and remote diagnosis/access of connected instruments</li> </ul>	<ul style="list-style-type: none"> <li>• flexible rule engine with extensive rule-variable combinations for building rules for autovalidation, reflexing, add-on testing, generation of manual differential smears, and sample routing</li> <li>• ability to support orders and results from multiple LISs and multiple sites</li> <li>• proactive alert monitoring system to notify user of system server alerts, instrument and LIS interface alerts, and QC alerts</li> </ul>
*based on December 2009 survey deadline Note: a dash in lieu of an answer means company did not answer question or question is not applicable		†formerly Molis WAM

Tabulation does not represent an endorsement by the College of American Pathologists.

## Middleware systems

Part 8 of 8	Technidata America Medical Software Ricardo Nunez ricardo.nunez@technidata-web.com 1760 E. River Rd., Suite 302, Tucson, AZ 85718 520-577-2872 www.technidata-web.com/americas	Technidata America Medical Software Ricardo Nunez ricardo.nunez@technidata-web.com 1760 E. River Rd., Suite 302, Tucson, AZ 85718 520-577-2872 www.technidata-web.com/americas
Name of middleware system	TD-Harmony suite: TD-IDM/TD-WAM (instrument and work area manager)	TD-Harmony suite: TD-LPM
First ever middleware installation/Most recent installation*	1991/December 2009	1991/October 2009
Last update of middleware system	December 2009	October 2009
No. of contracts for sites operating middleware	599	43
• U.S. contracts/Foreign contracts (In what countries?)	220/379 (Europe, Middle East, Asia-Pacific, Latin America, Africa, Canada)	5/38 (Canada, France, Netherlands, Italy, U.K., Greece, United Arab Emirates, others)
• No. of these contracts signed in 2009	159	19
No. of sites operating middleware/Percent of business that is middleware	690 (primarily via OEM and distributors)/25% corporate office; 75% subsidiary	43+ (primarily via OEM and distributors)/25% corporate office; 75% subsidiary
No. of employees in entire company	170+	170+
• No. of employees dedicated to middleware development, install, support	40	40
Hardware platforms	hardware independent	hardware independent
• Proprietary hardware required?	no	no
Smallest hardware platform system can run on	1 Windows-based PC	1 Windows-based server/PC
Largest hardware platform in use	5 PCs	fault-tolerant system supporting 25 concurrent users
Software platforms	Windows 2003, XP, Vista (older versions of Windows on previous versions of TD-IDM/TD-WAM)	Linux, Windows 2003 server, VMWare ESX
Fault-tolerant solutions/Hardware must be purchased from company?	no/no	yes/no
Support virtualization?	yes	yes
Primary databases used/Alternative databases supported	Microsoft Access, proprietary/none	Oracle, SQL server/none
Storage capacity of standard configuration of hardware	hardware and site dependent; 40 GB	hardware and site dependent; up to 10 years of data (not limited in size)
• No. of results that can be stored/No. of orders that can be stored	500,000/500,000	unlimited/unlimited
Middleware can interface with instruments from any manufacturer?	yes	yes
Types of data system can receive, store, transmit	alpha numeric, image	alpha numeric, image
No. of instruments one middleware device can support	6 per PC	200
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7 (2.3), ASTM (1394), XML, proprietary, POCT1-A	HL7 (2.3), ASTM (1394), XML, proprietary, POCT1-A
Low-level transport middleware supports to interface to instruments	serial RS232, serial USB, TCP/IP, FTP	serial RS232, serial USB, TCP/IP, FTP, LAT
Can middleware send results to and receive orders from reference labs?	no	yes
LIS/HIS/EMR interfaces for receiving orders	Cerner, Dawning, Data Innovations, McKesson, Sunquest, Meditech, SCC Soft Computer, Technidata, homegrown, proprietary, others	homegrown, Technidata, Meditech, Sysmex, MIPS, Sunquest, others
LIS/HIS/EMR interfaces for sending results	Cerner, Dawning, Data Innovations, McKesson, Sunquest, Meditech, SCC Soft Computer, Technidata, homegrown, proprietary, others	homegrown, Technidata, Meditech, Sysmex, MIPS, Misys, others
No. of diff. host system connections that can operate at once on middleware	1	8
Protocols system supports to interface to other systems	HL7 (2.3), ASTM (1238, 1394), proprietary	HL7 (2.3), ASTM (1238), proprietary
Human languages middleware supports (other than English)	Spanish, French, German, Greek, Italian, others (21 languages)	Spanish, French, German, Greek, Italian, others (21 languages)
• Multiple languages can be used at same time on one system?	no	yes
System supports local date and time formats?	yes	yes
No. of users that can access system at once	5 (requires Windows 2003 server)	unlimited; hardware and licensing dependent
No. of user security levels system supports	5	8
Users can write all rules for middleware?	yes	yes
• System supports simple rules?	yes	yes
• System supports compound nested rules with multiple event actions?	yes	yes
• Multiple event actions fired from one "if" condition statement?	yes	yes
Full and persistent audit trail of rule execution?/System supports rules testing?	no/yes	yes/yes
Rule sets applied to individual instruments or connections?	yes	yes
QC data used as part of auto-verification or rules process?	yes	yes
Data from external databases retrieved and incorporated in rules processing?	no	no
Results that are entered manually processed by rules?	yes	yes
Rules test cases created, saved, used on demand for rules validation testing?	yes	yes
System supports event notification?	yes	yes
System user notified of rules-based events?/Notification methods supported	yes/background color, review status	yes/e-mail, ISMS (pager), POP/VP, visual coloring
Automation routes determined by user-defined rules?	no	yes
System supports test-based load balancing across instruments?	no	no
Events that lead to automation routes being dynamically updated	—	new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken?	no	no
Laboratory automation system interfaces	Roche, Siemens, Sysmex, A&T Corp.	Beckman Coulter, Abbott, Roche, Siemens, Thermo Scientific, Sysmex, A&T Corp., Tecan
System interfaces with noninstrument automation devices?	no	yes (any)
Back-end specimen storage and retrieval tracking?	no	yes
System allows management of inst. & automation device maintenance records?	yes	yes
• System provides alerts when an instrument needs maintenance?	no	no
System provides LIS downtime functions?/System allows manual order entry?	yes/yes	yes/yes
System generates downtime specimen ID?/Algorithm user definable?	yes/yes	yes/yes
Orders entered in middleware manually are sent back to LIS automatically?	yes	yes
System supports data collection or data mining?	yes	yes
Quality control module?	yes	yes
Middleware interfaces to third-party QC packages?	yes (export to Microsoft Excel)	yes (Bio-Rad Unity, export to Microsoft Excel)
System supports multi-rule QC?	yes	yes
System supports moving averages or average of normals?	yes	yes
Users can customize screens?/Users can define custom fields?	yes/no	yes/no
Users can populate custom fields via user-defined rules?	no	no
Screen has image support for any type of image?	yes	yes
Users can design own reports?/Report-generation software used	yes/proprietary, export to Excel	yes/proprietary, Crystal Reports, others
• Reports can include any data elements in database?	no	yes
Around-the-clock customer service in U.S.?	yes	yes
System training available/On-site consulting?	classroom, on site, e-learning/yes	classroom, on site, e-training/yes
Smallest cost for hardware/software/monthly maintenance	—/—/1.5% of software cost	—/—/1.5% of software cost
Largest cost for hardware/software/monthly maintenance	—/—/1.5% of software cost	—/—/1.5% of software cost
Fee for additional users	Windows terminal server license	—
Distinguishing features of middleware (supplied by vendor)	<ul style="list-style-type: none"> <li>remote QC function allows users to view the QC values from multiple instruments and generate QC reports from remote locations</li> <li>offers a dashboard approach to sample results management, with the same user interface for all instruments in the clinical laboratory</li> <li>easy to install and simple to use; offers robust functionality to the clinical laboratory</li> </ul>	<ul style="list-style-type: none"> <li>general lab module: user-friendly and powerful rules editor; production and operational audit trail; customizable automatic real-time processes; comprehensive management tools and reports</li> <li>specialized microbiology module: paperless microbiology workflow; real-time rule-based system; epidemiology analysis and threshold alerting; results entry via worksheets, card reader devices, batch, or by request</li> <li>six subsidiaries on three continents; ISO 9001-2000/ISO 13485 certified; solutions available in 25 countries through 18 partners</li> </ul>

\*based on December 2009 survey deadline

Note: a dash in lieu of an answer means company did not answer question or question is not applicable