Middleware systems

Part 1 of 7

	Beckman Coulter Ellen Storms estorms@beckman.com 200 S. Kraemer Blvd., Brea, CA 92822 714-961-4810 www.beckmancoulter.com	Data Innovations sales@datainnovations.com 120 Kimball Ave., Suite 100, South Burlington, VT 05403 802-264-3470 www.datainnovations.com
Name of system	DL2000 Data Manager with PrepLink	Instrument Manager (IM)
First ever middleware installation/Most recent installation (based on survey deadline of Jan. 2008)	1998/January 2008	1993/2008
Last update of middleware system	February 2007	November 2007
No. of contracts for sites operating middleware	2,700	5,000+
• U.S. contracts/Foreign contracts (In what countries?)	1,500/1,200 (worldwide)	4,500+/500+ (50+ countries)
No. of sites operating middleware	3,000+	—
Percentage of business that is middleware	—	100%
Staff to develop/install and support/other* in entire company	—	16/26/36
Staff to develop/install and support/other* in middleware division	—	16/26/36
Hardware platforms	server, PC based	Windows PC, server
• Proprietary hardware required	yes	no
Smallest hardware platform system can run on	—	Pentium 4 PC with 2.8 GHz, 256 MB RAM, 40 GB hard disk, CD-ROM, SVGA monitor, network card
Largest hardware platform in use	—	IBM server cluster connecting multiple laboratories across the globe
Software platforms	Window XP	Windows 2000, XP, Windows server 2000, 2003
Fault-tolerant solutions/Hardware must be purchased from company	yes/yes	yes/no
Databases used	Microsoft SQL	InterSystems Caché
Storage capacity of standard configuration of hardware	up to 10 GB	—
• No. of results/orders that can be stored	1,500,000/—	unlimited/unlimited
System can interface with instruments from any manufacturer	no (with Beckman Coulter)	yes
Data supported from microbiology instruments	—	numeric, alpha, multi-level, images
Data supported from molecular instruments	—	numeric, alpha, multi-level, images
Data supported from genomics instruments	—	numeric, alpha, multi-level, images
No. of instruments one middleware device can support	3 (9 networked)	unlimited
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments	ASTM, proprietary	HL7, ASTM, XML, proprietary, ODBC
Low-level transport middleware supports to interface to instruments	serial	serial, TCP/IP, ODBC, FTP LAT, files
LIS interfaces for receiving orders	Cerner, Meditech, Sunquest, GE, McKesson, SCC Soft Computer	McKesson, CliniSys, Dairyland, StarLims, Siemens, GE, Impac, others
LIS interfaces for sending results	Cerner, Meditech, Sunquest, GE, McKesson, SCC Soft Computer	McKesson, CliniSys, Dairyland, StarLims, Siemens, GE, Impac, others
No. of diff. host system connections operational at once on one middleware unit	1	no limit
Protocols system supports to interface to other systems	ASTM, proprietary	HL7, ASTM, XML, proprietary, ODBC, files
Human languages middleware supports	English	all known languages (product is user translatable via use of tables)
• 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	2	unlimited (user defined)
Users can write all rules for system	yes	yes
• System supports simple rules/System supports compound rules	yes/yes	yes/yes
• Programming or script language required to write rules	no	no
Full and persistent audit trail of rules/System supports rules testing	yes/yes	yes/yes
QC data used as part of auto-verification or rules process	yes	yes
Results that are entered manually processed by rules	yes	yes
System supports event notification	yes	yes
System user notified of rules-based events/Notification methods supported	yes/pop-up window, color coding, audio for cell counts, message window alerts for critical results	yes/pop-up windows, e-mail, pager, audio/visual device
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	no	yes
Laboratory automation system interfaces	Beckman Coulter Power Processor	Roche, Beckman, Ortho, Abbott, Olympus, Thermo, others
System interfaces with noninstrument automation devices	yes (sorting, centrifuge, decapping, aliquotter, stockyard)	yes (Roche, Beckman, Ortho, Abbott, Olympus, Thermo, AI, others)
Back-end specimen storage and retrieval tracking	yes	yes
System supports management of inst. & automation device maintenance records	no	yes
• System provides alerts when instrument needs maintenance	no	yes
System provides LIS downtime functions/System allows for 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
System interfaces to third-party QC packages	yes	yes (Bio-Rad Unity, Bio-Rad OnCall, Ortho VQAT)
System supports multi-rules	yes	yes
Users can customize screens	yes	yes
• Users define custom fields/Users populate custom fields via user-defined rules	yes/yes	yes/yes
• Screen has image support for any type of image	yes	yes
Users design own reports/Report-generation software used	yes/—	yes/proprietary but with data available to any ODBC-compliant application
• Reports include any data elements in database	no	yes
Around-the-clock customer service in U.S.	yes	yes
System training available/On-site consulting	e-learning, computer-based training, on-site training/yes	classroom, on-site, Web based, self-guided e-learning/yes
Smallest cost for hardware/software/monthly maintenance	—	0/$3,025/$45
Largest cost for hardware/software/monthly maintenance	—	—/$350,000/$5,250
Fee for additional users	lab key operator defines users	$1,400
Distinguishing features of middleware (supplied by vendor)	• proactively alerts operator of critical test results • proactively alerts operator of next step or action	• FDA 510(k) cleared • $20 million+ in sales and 5 offices (not distributors) worldwide • integration of quality control results and instrument events within the processing of results

*other = sales, marketing, administration, and other company functions

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Survey editors: Raymond D. Aller, MD, Hal Weiner

Middleware systems

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	Dawning Technologies Jay Sax sales@dawning.com 6140 Mid Metro Drive, Unit 5, Ft. Myers, FL 33966 800-332-0499 www.dawning.com	Dawning Technologies Jay Sax sales@dawning.com 6140 Mid Metro Drive, Unit 5, Ft. Myers, FL 33966 800-332-0499 www.dawning.com
Name of system	JavaLin/300 Clinical Interface	JResultNet Interface Engine Software
First ever middleware installation/Most recent installation (based on survey deadline of Jan. 2008)	2003/January 2008	2001/January 2008
Last update of middleware system	January 2008	January 2008
No. of contracts for sites operating middleware	2,200	1,220
• U.S. contracts/Foreign contracts (In what countries?)	2,000/200 (45+ countries)	1,100/120 (45+ countries)
No. of sites operating middleware	800	1,175
Percentage of business that is middleware	100%	100%
Staff to develop/install and support/other* in entire company	8/7.5/7	8/7.5/7
Staff to develop/install and support/other* in middleware division	8/7.5/7	8/7.5/7
Hardware platforms	Dawning JavaLin/300	platform portable Java-based application, Dawning JavaLin/300, PCs, Macs, servers
• Proprietary hardware required	yes	no
Smallest hardware platform system can run on	Dawning JavaLin/300	Dawning JavaLin/300
Largest hardware platform in use	Dawning JavaLin/300	rack servers
Software platforms	Linux OS, Java-based embedded JResultNet software	Windows 2000, XP Pro or 2003 server, Linux, OS 10
Fault-tolerant solutions/Hardware must be purchased from company	yes/no	yes/no
Databases used	HSQL, Codebase, several external databases, including PostgreSQL, Oracle, 10Ex	HSQL, Codebase, several external databases, including PostgreSQL, Oracle, 10Ex, other SQL compliant
Storage capacity of standard configuration of hardware	256 MB	unlimited
• No. of results/orders that can be stored	1,000+ internal, unlimited external/1,000+ internal, unlimited external	unlimited/unlimited
System can interface with instruments from any manufacturer	yes	yes
Data supported from microbiology instruments	numeric, alpha, multi-level	numeric, alpha, multi-level
Data supported from molecular instruments	numeric, alpha, multi-level	numeric, alpha, multi-level
Data supported from genomics instruments	numeric, alpha, multi-level	numeric, alpha, multi-level
No. of instruments one middleware device can support	up to 3	unlimited
Configuration of middleware device	special-purpose device (no PC involved)	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7, ASTM, XML, proprietary, CSV, flat file, direct database, POCT 1A	HL7, ASTM, XML, proprietary, CSV, flat file, direct database, POCT 1A
Low-level transport middleware supports to interface to instruments	serial, TCP/IP, ODBC, FTP LAT	serial, TCP/IP, ODBC, FTP LAT, flat file
LIS interfaces for receiving orders	Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare Management Systems, Impac, McKesson, Siemens, Sunquest, others	Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare Management Systems, Impac, McKesson, Siemens, Sunquest, others
LIS interfaces for sending results	Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare Management Systems, Impac, McKesson, Siemens, Sunquest, others	Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare Management Systems, Impac, McKesson, Siemens, Sunquest, others
No. of diff. host system connections operational at once on one middleware unit	3	unlimited
Protocols system supports to interface to other systems	HL7, ASTM, XML, proprietary, CSV, flat file, direct database, POCT 1A	HL7, ASTM, XML, proprietary, CSV, flat file, direct database, POCT 1A
Human languages middleware supports	English	English
• Multiple languages can be used at same time on one system	no	no
System supports local date and time formats	yes	yes
No. of users that can access system at once	unlimited	unlimited
No. of user security levels system supports	3	3
Users can write all rules for system	yes	yes
• System supports simple rules/System supports compound rules	yes/yes	yes/yes
• Programming or script language required to write rules	no	no
Full and persistent audit trail of rules/System supports rules testing	yes/yes	yes/yes
QC data used as part of auto-verification or rules process	yes	yes
Results that are entered manually processed by rules	yes	yes
System supports event notification	yes	yes
System user notified of rules-based events/Notification methods supported	yes/e-mail, message flags, save to file, print	yes/e-mail, message flags, save to file, print
Automation routes determined by user-defined rules	yes	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	new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken	yes	yes
Laboratory automation system interfaces	Beckman Coulter, Dade Behring/Siemens, Roche, Ortho Clinical, Olympus	Beckman Coulter, Dade Behring/Siemens, Roche, Ortho Clinical, Olympus
System interfaces with noninstrument automation devices	yes (Beckman Coulter, Dade Behring/Siemens, Roche, Ortho Clinical, Olympus)	yes (Beckman Coulter, Dade Behring/Siemens, Roche, Ortho Clinical, Olympus)
Back-end specimen storage and retrieval tracking	no	no
System supports management of inst. & automation device maintenance records	no	no
• System provides alerts when instrument needs maintenance	no	no
System provides LIS downtime functions/System allows for 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	no	no
System interfaces to third-party QC packages	yes (Bio-Rad, LAQC Systems)	yes (Bio-Rad, LAQC Systems)
System supports multi-rules	yes	yes
Users can customize screens	no	no
• Users define custom fields/Users populate custom fields via user-defined rules	yes/yes	yes/yes
• Screen has image support for any type of image	no	no
Users design own reports/Report-generation software used	yes/Crystal Reports	yes/Crystal Reports
• Reports 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, Web based/yes	classroom, on-site, Web based/yes
Smallest cost for hardware/software/monthly maintenance	$1,895/included/$18.75	single user PC/$3,595/$36.25
Largest cost for hardware/software/monthly maintenance	$1,895/$2,400/$69	rack servers/$3,595+†/$56.25+†
Fee for additional users	none	$600
Distinguishing features of middleware (supplied by vendor)	• distributed processing—replaces proprietary hardware, such as terminal servers, with an intelligent local device • flexible protocols—supports ASTM, HL7, XML without a PC manager • rules-based processing; no PC required	• Java based and highly modular—can run on a variety of hardware and software platforms • additional features, including instrument and system connection modules, added easily • flexibility and user control—users have complete control over configuring JResultNet to match their workflow
*other = sales, marketing, administration, and other company functions		†*optional modules available for extra charge*

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Middleware systems

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	Dawning Technologies Jay Sax sales@dawning.com 6140 Mid Metro Drive, Unit 5, Ft. Myers, FL 33966 800-332-0499 www.dawning.com	Fletcher-Flora Health Care Systems Terry Watson link@fletcher-flora.com 1580 Orangethorpe Way, Anaheim, CA 92801 714-525-0283 www.fletcher-flora.com
Name of system	Secure Network Interface	FFlex eLink
First ever middleware installation/Most recent installation (based on survey deadline of Jan. 2008)	1998/January 2008	2006/January 2008
Last update of middleware system	December 2007	December 2007
No. of contracts for sites operating middleware	12,200	2
• U.S. contracts/Foreign contracts (In what countries?)	11,000/1,200 (45+ countries)	2/0
No. of sites operating middleware	2,500	2
Percentage of business that is middleware	100%	10% (projected for 2008)
Staff to develop/install and support/other* in entire company	8/7.5/7	11/17/17
Staff to develop/install and support/other* in middleware division	8/7.5/7	—
Hardware platforms	Dawning SNI	PC with Windows XP Professional
• Proprietary hardware required	yes	no
Smallest hardware platform system can run on	Dawning SNI	1 GB RAM, 80 GB hard disk
Largest hardware platform in use	Dawning SNI	1 GB RAM, 80 GB hard disk
Software platforms	proprietary, instrument drivers in Basic	Windows XP, Vista, 2000, 2003
Fault-tolerant solutions/Hardware must be purchased from company	yes/no	no/no
Databases used	external JResultNet	Microsoft Express, Microsoft SQL 2000, Microsoft 2003, MySQL
Storage capacity of standard configuration of hardware	16 MB	limited only by disk space: 80 GB
• No. of results/orders that can be stored	500/500	limited by disk space/limited by disk space
System can interface with instruments from any manufacturer	yes	yes
Data supported from microbiology instruments	numeric, alpha, multi-level	numeric
Data supported from molecular instruments	numeric, alpha, multi-level	numeric
Data supported from genomics instruments	numeric, alpha, multi-level	numeric
No. of instruments one middleware device can support	1	up to 6 per license
Configuration of middleware device	special-purpose device (no PC involved)	PC with standard interfaces
Protocols middleware supports to interface to instruments	ASTM, proprietary	HL7, ASTM, proprietary
Low-level transport middleware supports to interface to instruments	serial, FTP LAT	serial, TCP/IP
LIS interfaces for receiving orders	Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare Management Systems, Impac, McKesson, Siemens, Sunquest, others	FFlex eLink manages orders received from such hosts as an electronic medical record or practice management system
LIS interfaces for sending results	Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare Management Systems, Impac, McKesson, Siemens, Sunquest, others	FFlex eLink manages results and sends verified results to such hosts as an electronic medical record or practice management system
No. of diff. host system connections operational at once on one middleware unit	1	1
Protocols system supports to interface to other systems	CDF	HL7, ASTM, proprietary
Human languages middleware supports	English	English
• Multiple languages can be used at same time on one system	no	no
System supports local date and time formats	yes	no
No. of users that can access system at once	1	1
No. of user security levels system supports	2	3
Users can write all rules for system	no	yes
• System supports simple rules/System supports compound rules	no/no	yes/no
• Programming or script language required to write rules	no	no
Full and persistent audit trail of rules/System supports rules testing	no/no	no/no
QC data used as part of auto-verification or rules process	no	no
Results that are entered manually processed by rules	no	yes
System supports event notification	no	no
System user notified of rules-based events/Notification methods supported	no/alerts available via external JResultNet	no/e-mail notification of errors and changes
Automation routes determined by user-defined rules	no	no
System supports test-based load balancing across instruments	no	no
Events that lead to automation routes being dynamically updated	—	—
Audit trail of the route a sample has taken	no	no
Laboratory automation system interfaces	Beckman Coulter, Dade Behring/Siemens, Roche, Ortho Clinical, Olympus	none
System interfaces with noninstrument automation devices	yes (Beckman Coulter, Dade Behring/Siemens, Roche, Ortho Clinical, Olympus)	no
Back-end specimen storage and retrieval tracking	no	no
System supports management of inst. & automation device maintenance records	no	no
• System provides alerts when instrument needs maintenance	no	no
System provides LIS downtime functions/System allows for manual order entry	yes/no	no/yes
System generates downtime specimen ID/Algorithm user definable	no/no	no/no
Orders entered in middleware manually are sent back to LIS automatically	no	yes
System supports data collection or data mining	no	no
Quality control module	no	no
System interfaces to third-party QC packages	no	no
System supports multi-rules	no	no
Users can customize screens	yes	no
• Users define custom fields/Users populate custom fields via user-defined rules	yes/no	no/no
• Screen has image support for any type of image	no	no
Users design own reports/Report-generation software used	no/—	no/none (results are sent to the host system for reporting)
• Reports include any data elements in database	no	no
Around-the-clock customer service in U.S.	yes	yes
System training available/On-site consulting	classroom, on-site, Web based/yes	e-learning (FFlex eLink is used solely to connect instruments to a host in settings where a full LIS may be unnecessary)/yes
Smallest cost for hardware/software/monthly maintenance	$1,495/included/$16.75	—/$4,997/$599
Largest cost for hardware/software/monthly maintenance	$1,495/included/$25	—/$5,991/$718
Fee for additional users	none	none
Distinguishing features of middleware (supplied by vendor)	• very small footprint intelligent device that runs the instrument driver in close proximity to it • units can be reconfigured as needed for new and different instruments • units can connect directly to the customer's network without additional hardware	• a cost-effective way to connect instruments directly to a host • simply manage orders and results to and from an EMR, PMS, or other host system to analyzers • easy to use for small labs that want to minimize manual transcription of results into their host system

*other = sales, marketing, administration, and other company functions

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Middleware systems

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	Ortho-Clinical Diagnostics Beth A. Slavic bslavic@ocdus.jnj.com 1001 U.S. Highway 202, Raritan, NJ 08869 908-218-8144 www.orthoclinical.com	P.G.P. (a Data Innovations subsidiary) Pierre Hermans phermans@datainnovations.com Avenue Jacques Brel, 34, Brussels, Belgium, B 1200 +3227706222 www.pgp.be
Name of system	Instrument Manager (supplied by Data Innovations)	Laboratory Production Manager (LPM)
First ever middleware installation/Most recent installation (based on survey deadline of Jan. 2008)	2005/November 2007	1982/January 2008
Last update of middleware system	September 2006	September 2007
No. of contracts for sites operating middleware	162+	601
• U.S. contracts/Foreign contracts (In what countries?)	62/100+ (France, U.K., Germany, Spain, Australia, Hong Kong, Thailand, Brazil)	1/600 (Benelux, France, U.K., Sweden, Austria, Singapore, Switzerland, Finland, Norway, Italy)
No. of sites operating middleware	75+	650
Percentage of business that is middleware	1%	100%
Staff to develop/install and support/other* in entire company	11/12/7	7/9/8
Staff to develop/install and support/other* in middleware division	11/12/7	7/9/8
Hardware platforms	Dell Optiplex	PC
• Proprietary hardware required	yes	no
Smallest hardware platform system can run on	Pentium 4 2.8 GHz, 256 MB RAM, 40 GB hard disk	PC P4, 2 GB RAM, 30 GB HD
Largest hardware platform in use	Pentium 4 3 GHz, 1 GB RAM, 120 GB hard disk	8 CPU server
Software platforms	Windows 2000, XP	Windows 2000 and above
Fault-tolerant solutions/Hardware must be purchased from company	yes/yes	yes/no
Databases used	InterSystems Caché	Oracle
Storage capacity of standard configuration of hardware	40,000 MB	70 GB
• No. of results/orders that can be stored	—	50,000,000/500,000
System can interface with instruments from any manufacturer	yes (with limitations)	yes
Data supported from microbiology instruments	—	numeric, alpha, multi-level, images
Data supported from molecular instruments	—	numeric, alpha, multi-level, images
Data supported from genomics instruments	—	numeric, alpha, multi-level, images
No. of instruments one middleware device can support	128	250
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7, ASTM	HL7, ASTM, XML, proprietary
Low-level transport middleware supports to interface to instruments	serial, TCP/IP, ODBC	serial, TCP/IP, ODBC, FTP LAT
LIS interfaces for receiving orders	Cerner, Misys, Meditech, Cortex, others	any LIS
LIS interfaces for sending results	Cerner, Misys, Meditech, Cortex, others	any LIS
No. of diff. host system connections operational at once on one middleware unit	4	64
Protocols system supports to interface to other systems	HL7, ASTM	HL7, ASTM, XML, proprietary
Human languages middleware supports	English, French, Spanish, German, Portuguese, Thai, Chinese	English, French, German, Dutch, others
• 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	10–128 (operating system dependent)	256
No. of user security levels system supports	multiple (function/connection driven)	user definable
Users can write all rules for system	yes	yes
• System supports simple rules/System supports compound rules	yes/yes	yes/yes
• Programming or script language required to write rules	no	yes
Full and persistent audit trail of rules/System supports rules testing	yes/yes	yes/no
QC data used as part of auto-verification or rules process	yes	yes
Results that are entered manually processed by rules	yes	yes
System supports event notification	yes	yes
System user notified of rules-based events/Notification methods supported	yes/pop-up windows, e-mail, pager, lightpole	yes/pop-up, pager, e-mail, phone call, fax
Automation routes determined by user-defined rules	yes	yes
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	new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken	yes	no
Laboratory automation system interfaces	enGen (Ortho and Thermo Fisher Scientific)	Beckman, Thermo, Abbott APS, Lab-Interlink, others
System interfaces with noninstrument automation devices	yes (sorters, centrifuges, decappers, aliquotters)	yes (Tecan, Hamilton, ScanLab, others)
Back-end specimen storage and retrieval tracking	yes	no
System supports management of inst. & automation device maintenance records	yes	no
• System provides alerts when instrument needs maintenance	yes	no
System provides LIS downtime functions/System allows for 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
System interfaces to third-party QC packages	yes (Bio-Rad QC OnCall, Ortho VQAT)	yes (NVKC, Bio-Rad, IL, others)
System supports multi-rules	yes	yes
Users can customize screens	yes	yes
• Users define custom fields/Users populate custom fields via user-defined rules	yes/yes	yes/yes
• Screen has image support for any type of image	yes	yes
Users design own reports/Report-generation software used	yes/built-in report designer, optional Crystal Reports	yes/Report Builder
• Reports include any data elements in database	yes	no
Around-the-clock customer service in U.S.	yes	no
System training available/On-site consulting	on-site training/yes	classroom, on-site/yes
Smallest cost for hardware/software/monthly maintenance	—	$2,355/$4,525/$62
Largest cost for hardware/software/monthly maintenance	—	$155,000/$270,000/$2,927
Fee for additional users	—	$2,928
Distinguishing features of middleware (supplied by vendor)	• traceability and integration of user-defined autoverification with Vitros' unique technologies • custom configuration and rule design, verification and validation, configuration control for automation • flexible request- and result-based routing for automation	• fully integrated and flexible system supporting hundreds of users and years of data • computation across multiple specimens within the same order • monitoring of physical parameters, such as temperature

*other = sales, marketing, administration, and other company functions

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Middleware systems

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	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 system	**Roche Middleware Solutions (supplied by Data Innovations)**	**Advia CentraLink (supplied by MIPS)**
First ever middleware installation/Most recent installation (based on survey deadline of Jan. 2008)	1998/January 2008	2001/January 2008
Last update of middleware system	December 2007 (updated to Instrument Manager 8.06)	January 2008
No. of contracts for sites operating middleware	550	—
• U.S. contracts/Foreign contracts (In what countries?)	550/0	—
No. of sites operating middleware	550	—
Percentage of business that is middleware	15%	—
Staff to develop/install and support/other* in entire company	—	—
Staff to develop/install and support/other* in middleware division	0/30/10	—
Hardware platforms	Dell Optiplex, PowerEdge Towers	Dell server systems (PowerEdge 2900, PowerEdge 1800)
• Proprietary hardware required	yes	yes
Smallest hardware platform system can run on	Dell Optiplex-Pentium 4 2.8 GHz, 80 GB hard drive	Dell PowerEdge 1800
Largest hardware platform in use	Dell PowerEdge server—3 hard drives, Pentium 4 2.8 GHz redundant hard drives	Dell PowerEdge 2900
Software platforms	Windows XP Professional, 2003 server	Windows-based operating system (Windows server 2003, Windows XP)
Fault-tolerant solutions/Hardware must be purchased from company	yes/yes	yes/yes
Databases used	Caché	Progress
Storage capacity of standard configuration of hardware	80 GB	180 GB
• No. of results/orders that can be stored	1,000,000+/1,000,000+	40,000,000/960,000 sample records
System can interface with instruments from any manufacturer	no (with Roche CC/IA, MPA, Modular, Urisys 1800/2400, Point of Care Cardiac Readers, Cobas 6000, Integra 800/400, Elecsys 2010/1010, other Roche centralized diagnostic equipment)	yes (third-party manufacturer instrument may be interfaced upon Siemens' approval)
Data supported from microbiology instruments	—	—
Data supported from molecular instruments	—	numeric
Data supported from genomics instruments	—	—
No. of instruments one middleware device can support	128	up to 32
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7, ASTM, proprietary, Vista HL7	HL7, ASTM, proprietary
Low-level transport middleware supports to interface to instruments	serial, TCP/IP	serial, TCP/IP, FTP LAT
LIS interfaces for receiving orders	Aspyra, Cerner, Lab Soft, Meditech, Sunquest, McKesson, others	Siemens, Aspyra, Cerner, CHCS, CIS, Meditech, Multidata, Orchard, SchuyLab, SCC Soft Computer, Sunquest, GE, others
LIS interfaces for sending results	Aspyra, Cerner, Lab Soft, Meditech, Sunquest, McKesson, others	Siemens, Aspyra, Cerner, CHCS, CIS, Meditech, Multidata, Orchard, SchuyLab, SCC Soft Computer, Sunquest, GE, others
No. of diff. host system connections operational at once on one middleware unit	4	1
Protocols system supports to interface to other systems	HL7, ASTM, proprietary, Vista HL7	HL7, ASTM, proprietary
Human languages middleware supports	English	English, Spanish, French, Italian, German, Portuguese, Norwegian
• 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	100	15
No. of user security levels system supports	unlimited (user defined)	4
Users can write all rules for system	yes	yes
• System supports simple rules/System supports compound rules	yes/yes	yes/yes
• Programming or script language required to write rules	no	no
Full and persistent audit trail of rules/System supports rules testing	yes/yes	yes/yes
QC data used as part of auto-verification or rules process	yes	yes
Results that are entered manually processed by rules	yes	yes
System supports event notification	yes	yes
System user notified of rules-based events/Notification methods supported	yes/e-mail, pop-up windows, audio-visual devices	yes/visual notifications
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 Modular Pre-Analytics	Advia LabCell, Advia WorkCell CDX automation solutions
System interfaces with noninstrument automation devices	yes (RSD 800, VSII for sample sorting and aliquotting)	yes (Advia LabCell, Advia WorkCell CDX automation solutions)
Back-end specimen storage and retrieval tracking	yes	yes
System supports management of inst. & automation device maintenance records	yes	no
• System provides alerts when instrument needs maintenance	yes	no
System provides LIS downtime functions/System allows for 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	—	yes
System interfaces to third-party QC packages	yes (Bio-Rad QC OnCall, Bio-Rad Unity Real-Time, Bio-Rad Unity series)	yes (export-only feature into third-party system available, such as Bio-Rad)
System supports multi-rules	yes	yes
Users can customize screens	yes	yes
• Users define custom fields/Users populate custom fields via user-defined rules	yes/yes	yes/yes
• Screen has image support for any type of image	no	yes
Users design own reports/Report-generation software used	yes/any ODBC-compliant reporting application (Excel, Crystal Reports, others)	yes/Advia CentraLink internal software
• Reports include any data elements in database	yes	no
Around-the-clock customer service in U.S.	yes	yes
System training available/On-site consulting	Webex for basic connectivity, on-site for system functionality, classroom training for advanced rules writing/yes	on-site training, e-learning, on-line training/yes
Smallest cost for hardware/software/monthly maintenance	—	—
Largest cost for hardware/software/monthly maintenance	—	—
Fee for additional users	none	—
Distinguishing features of middleware (supplied by vendor)	• autoverification function includes real-time QC processing through a bidirectional interface with third-party QC application • in-depth, 3-step training program that includes advanced rules writing • strong resource set to provide tier 1, 2, and 3 level support	• true multi-discipline data-management and networking solution • comprehensive and integrated QC package—patient moving averages used in QC and autoverification • a market-leading automation system controller

*other = sales, marketing, administration, and other company functions

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Middleware systems

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	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 system	**EasyLink Informatics System**	**Molis WAM**
First ever middleware installation/Most recent installation (based on survey deadline of Jan. 2008)	2006/—	2003/December 2007
Last update of middleware system	December 2007	November 2006
No. of contracts for sites operating middleware	—	76
• U.S. contracts/Foreign contracts (In what countries?)	— (installed in U.S., France, Germany, Spain, Italy, Japan)	76/0
no. of sites operating middleware	—	132
Percentage of business that is middleware	—	5%
Staff to develop/install and support/other* in entire company	—	40/157/189
Staff to develop/install and support/other* in middleware division	—	10/14/46
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	Compuware Uniface
Fault-tolerant solutions/Hardware must be purchased from company	no/yes	yes/no
Databases used	Firebird	Oracle
Storage capacity of standard configuration of hardware	120 GB	sized for 2 years of data regardless of size
• no. of results/orders that can be stored	34,000,000/7,000,000	2 years on-line/2 years on-line
System can interface with instruments from any manufacturer	yes (third-party manufacturer instrument may be interfaced upon Siemens' approval)	no (with Sysmex hematology analyzers, Sysmex hematology automation systems, Bio-Rad for HbA1c testing, CellaVision digital cell morphology system)
Data supported from microbiology instruments	—	—
Data supported from molecular instruments	—	—
Data supported from genomics instruments	—	—
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, proprietary, HL7 in development	HL7, ASTM, proprietary
Low-level transport middleware supports to interface to instruments	serial, TCP/IP	serial, TCP/IP
LIS interfaces for receiving orders	Cerner, McKesson, Meditech, Misys, SCC Soft Computer	Sunquest, Cerner, McKesson, Meditech, SCC Soft Computer, GE, others
LIS interfaces for sending results	Cerner, McKesson, Meditech, Misys, SCC Soft Computer	Sunquest, Cerner, McKesson, Meditech, SCC Soft Computer, GE, others
no. of diff. host system connections operational at once on one middleware unit	2	no limit
Protocols system supports to interface to other systems	ASTM, proprietary	HL7, ASTM, proprietary
Human languages middleware supports	French, German, Italian, Spanish, Japanese	English
• 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 system	yes	yes
• System supports simple rules/System supports compound rules	yes/yes	yes/yes
• Programming or script language required to write rules	no	no
Full and persistent audit trail of rules/System supports rules testing	yes/yes	yes/yes
QC data used as part of auto-verification or rules process	yes	no
Results that are entered manually processed by rules	yes	yes
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	StreamLab Analytical Workcell	Sysmex
System interfaces with noninstrument automation devices	no	yes (SP1000i slidemaker/stainer, TS-500 and TS-1000 tube sorters, CellaVision digital cell morphology system)
Back-end specimen storage and retrieval tracking	yes	yes
System supports management of inst. & automation device maintenance records	yes	no
• System provides alerts when instrument needs maintenance	yes	no
System provides LIS downtime functions/System allows for manual order entry	yes/yes	yes/yes
System generates downtime specimen ID/Algorithm user definable	yes/yes	no/yes
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	yes	yes
System interfaces to third-party QC packages	no (in development)	no
System supports multi-rules	yes	yes
Users can customize screens	yes	no
• Users define custom fields/Users populate custom fields via user-defined rules	no/yes	yes/yes
• Screen has image support for any type of image	yes	yes
Users design own reports/Report-generation software used	yes/Jasper Reports	no/—
• Reports 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, e-learning/yes	classroom, on-site, e-learning/yes
Smallest cost for hardware/software/monthly maintenance	—	$5,000/$16,000/$300
Largest cost for hardware/software/monthly maintenance	—	$40,000/$165,000/$1,790
Fee for additional users	none	$1,500
Distinguishing features of middleware (supplied by vendor)	• integration of QC and result management with predefined rules packages and rule wizards • robust sample-management capabilities, offering multiple instrument connectivity, LIS backup, specimen tracking, results history, customizable chartable reports • supports preventative maintenance and remote diagnosis of connected instruments and remote access	• flexible rule engine with extensive rule-variable combinations for which to build rules for autovalidation, reflexing, add-on testing, generation of manual differential smears, sample routing • can support orders and results from multiple LISs and multiple sites for managing patient and QC results • advanced graphing capability

*other = sales, marketing, administration, and other company functions

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Middleware systems

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Name of system	TD-Middleware, TD-LPM	TD-Middleware Suite: TD-IDM/TD-WAM (alias, TDC)
First ever middleware installation/Most recent installation (based on survey deadline of Jan. 2008)	1993/October 2007	1991/January 2008
Last update of middleware system	2008	2008
No. of contracts for sites operating middleware	14	400
• U.S. contracts/Foreign contracts (In what countries?)	0/14 (Canada, France, Italy, U.K.)	150 OEM and distributors/250 OEM and distributors (Latin America, Europe, Asia-Pacific, South Africa)
No. of sites operating middleware	18	400
Percentage of business that is middleware	25% for corporate office; 80% for U.S. subsidiary	25% for corporate office; 80% for U.S. subsidiary
Staff to develop/install and support/other* in entire company	48/36/39	48/36/39
Staff to develop/install and support/other* in middleware division	12/10/9	12/10/9
Hardware platforms	hardware independent—typically HP, Sun, IBM, standard servers	hardware independent (any compliant, compatible PC)—typically HP, Dell, IBM
• Proprietary hardware required	no	no
Smallest hardware platform system can run on	2 Windows-based PCs	1 Windows-based PC
Largest hardware platform in use	fault-tolerant system supporting 25 concurrent users	5 PCs
Software platforms	Linux, Windows 2000 server, 2003 server, VMWare	Windows 2000, XP Vista, older versions of Windows with older versions of TD-IDM/TD-WAM
Fault-tolerant solutions/Hardware must be purchased from company	yes/no	no/no
Databases used	Oracle, SQL server	Microsoft Access, proprietary
Storage capacity of standard configuration of hardware	hardware and site dependent; MB: unlimited	hardware and site dependent; 40 GB
• No. of results/orders that can be stored	unlimited/unlimited	500,000/500,000
System can interface with instruments from any manufacturer	yes	yes
Data supported from microbiology instruments	numeric, alpha, multi-level	numeric, alpha, multi-level
Data supported from molecular instruments	numeric, alpha, multi-level	numeric, alpha, multi-level
Data supported from genomics instruments	—	—
No. of instruments one middleware device can support	200 maximum	6 per PC
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7, ASTM, proprietary	HL7, ASTM, proprietary
Low-level transport middleware supports to interface to instruments	serial, TCP/IP, FTP LAT	serial, TCP/IP, FTP LAT
LIS interfaces for receiving orders	homegrown, Meditech, Molis, MIPS, Misys, Telepath, others	major LIS vendors
LIS interfaces for sending results	homegrown, Meditech, Molis, MIPS, Misys, Telepath, others	major LIS vendors
No. of diff. host system connections operational at once on one middleware unit	8	1
Protocols system supports to interface to other systems	HL7, ASTM, proprietary	HL7, ASTM, proprietary
Human languages middleware supports	21 languages, including English, Spanish, French, German, Korean, Greek, Japanese	21 languages, including English, Spanish, French, German, Korean, Greek, Japanese
• 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	hardware and license dependent	5 (requires Windows 2003 server)
No. of user security levels system supports	8	5
Users can write all rules for system	yes	yes
• System supports simple rules/System supports compound rules	yes/yes	yes/yes
• Programming or script language required to write rules	no	no
Full and persistent audit trail of rules/System supports rules testing	yes/yes	no/yes
QC data used as part of auto-verification or rules process	yes	yes
Results that are entered manually processed by rules	yes	yes
System supports event notification	yes	yes
System user notified of rules-based events/Notification methods supported	yes/e-mail, ISMS (pager), POP/VP, visual (background color)	yes/background color, review status
Automation routes determined by user-defined rules	yes	no
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	Sysmex, Roche, A&T, Tecan, Thermo, Beckman Coulter, Bayer	Sysmex HST/Alpha (LASC), Roche Modular/PSM/LSM, A&T Clinilog, Tecan robotic sampler processor, Thermo Konelab
System interfaces with noninstrument automation devices	yes (Beckman, Tecan, Diamed)	no
Back-end specimen storage and retrieval tracking	yes	no
System supports management of inst. & automation device maintenance records	yes	yes
• System provides alerts when instrument needs maintenance	no	no
System provides LIS downtime functions/System allows for 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
System interfaces to third-party QC packages	yes (Bio-Rad Unity QC, export to Excel)	yes (Bio-Rad Unity QC, export to Excel)
System supports multi-rules	yes	yes
Users can customize screens	yes	yes
• Users define custom fields/Users populate custom fields via user-defined rules	no/no	no/no
• Screen has image support for any type of image	yes	yes
Users design own reports/Report-generation software used	yes/proprietary and Crystal Reports (others can be used)	yes/proprietary, export to Excel
• Reports 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/yes	classroom, on-site/yes
Smallest cost for hardware/software/monthly maintenance	—/—/1.5%	—/—/1.5%
Largest cost for hardware/software/monthly maintenance	—/—/1.5%	—/—/1.5%
Fee for additional users	—	Windows TSE license
Distinguishing features of middleware (supplied by vendor)	• ergonomic, user-friendly rule-based system with powerful and friendly rules editor • patient and production audit trail, automatic real-time processes • open system; scalability; specialized microbiology module	• ergonomics: ease of use, fast access, switching functions without losing context • checking reproducibility of results with unknown results materials to minimize QC costs • automatic real-time processes and alerts; powerful rules-based editor; on-line maintenance, service, and reagent logging

*other = sales, marketing, administration, and other company functions