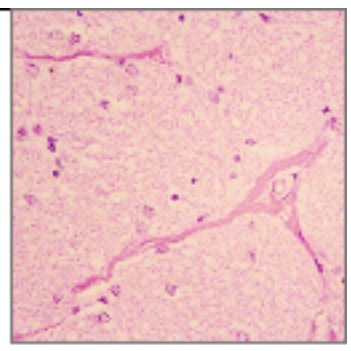

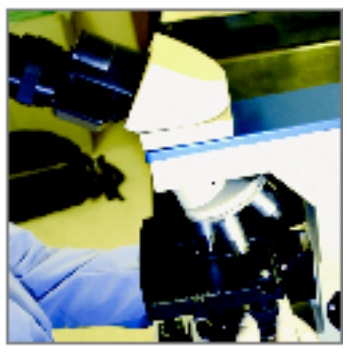

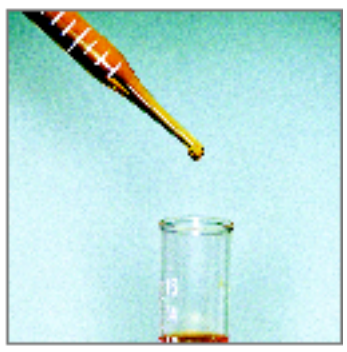

Middleware systems

Part 1 of 7

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A&T Corp.
Akira Igarashi igarashi@alice.aandt.co.jp
549 Cardiff
Irvine, CA 92606
650-346-6543 www.aandt.co.jp

Name of system	**Clinilan**
First ever middleware installation/Most recent installation	**1994/April 2006**
Last update of middleware system	**April 2006**
No. of contracts for sites operating middleware	**—**
• U.S. contracts/Foreign contracts	**—**
No. of sites operating middleware	**11 (in Japan)**
Percentage of business that is middleware	**25%**
Staff to develop/install and support/other* in entire company	**330 total**
Staff to develop/install and support/other* in middleware division	**23/19/4**
Hardware platforms	**—**
• Proprietary hardware required	**no**
Smallest hardware platform system can run on	**—**
Largest hardware platform in use	**—**
Software platforms	**Microsoft Windows XP, 2003 server, Professional**
Fault-tolerant solutions/Hardware must be purchased from company	**yes/no**
Databases used	**Microsoft SQL**
Storage capacity of standard configuration of hardware	**—**
System can interface with instruments from any manufacturer	**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	**no limitation**
Configuration of middleware device	**PC with standard interfaces**
Protocol middleware supports to interface to instruments	**HL7, ASTM, proprietary**
Low-level transport that system supports to interface to instruments	**TCP/IP, FTP LAT**
LIS interfaces for receiving orders	**—**
LIS interfaces for sending results	**—**
No. of diff. host system connections operational at once on one middleware unit	**no limitation**
Protocols system supports to interface to other systems	**HL7, ASTM, proprietary**
Human languages middleware supports	**Japanese (English and Chinese in development)**
• Multiple languages can be used at same time on one system	**—**
System supports local date and time formats	**yes**
No. of users that can access system at once	**no limitation**
No. of user security levels system supports	**4**
Users can write all rules for system	**yes**
• System supports simple rules/System supports compound rules	**yes/yes**
• Programming or script language required to write rules	**—**
Full and persistent audit trail of rules/System supports rules testing	**—**
QC data used as part of auto-verification or rules process	**yes**
Results that are entered manually processed by rules	**—**
System supports event notification	**yes**
System user notified of rules-based events/Notification methods	**yes/pop-up windows, e-mail, pager, others**
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	**A&T, IDS**
System interfaces with noninstrument automation devices	**yes (loading, unloading, storage devices)**
Back-end specimen storage and retrieval tracking	**yes**
System supports management of inst. & automation device maintenance records	**no**
• System provides alerts when instrument needs maintenance	**no**
System provides LIS downtime functions/System allows for 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	**no**
System supports data collection or data mining	**yes**
Quality control module	**yes**
System interfaces to third-party QC packages	**yes**
System supports multi-rules	**yes**
Users can customize screens	**—**
• Users define custom fields/Users populate custom fields via user-defined rules	**yes/—**
• Screen has image support for any type of image	**—**
Users design own reports/Report-generation software used	**yes/proprietary**
• Reports include any data elements in database	**yes**
Around-the-clock customer service in U.S.	**—**
System training available/On-site consulting	**—**
Smallest cost for hardware/software/monthly maintenance	**—**
Largest cost for hardware/software/monthly maintenance	**—**
Fee for additional users	**—**
Distinguishing system features (supplied by vendor)	**• limited menu access by multiple user log-in level • records all logging data for tracking laboratory incident • unique result-verification method using "result appearance zone"**

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

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

Middleware systems

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Dade Behring
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Name of system	DL2000	EasyLink Informatics System
First ever middleware installation/Most recent installation	1997/2006	—/November 2006
Last update of middleware system	2006	October 2006
No. of contracts for sites operating middleware	2,700	—
• U.S. contracts/Foreign contracts	1,500/1,200	—
No. of sites operating middleware	—	—
Percentage of business that is middleware	—	—
Staff to develop/install and support/other* in entire company	—	—
Staff to develop/install and support/other* in middleware division	—	—
Hardware platforms	PC based	Windows PC
• Proprietary hardware required	yes	yes
Smallest hardware platform system can run on	—	—
Largest hardware platform in use	—	—
Software platforms	Windows XP	Windows XP
Fault-tolerant solutions/Hardware must be purchased from company	yes/yes	no/yes
Databases used	Microsoft SQL	Firebird
Storage capacity of standard configuration of hardware	up to 10 GB/500,000 orders	120,000 MB (120 GB)
System can interface with instruments from any manufacturer	no (with Beckman Coulter, Bio-Rad Evolis)	no (in development)
Data supported from microbiology instruments	n/a	none
Data supported from molecular instruments	n/a	none
Data supported from genomics instruments	n/a	none
No. of instruments one middleware device can support	3 (9 networked)	8
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocol middleware supports to interface to instruments	ASTM	ASTM, proprietary, HL7 (in development)
Low-level transport that system supports to interface to instruments	serial	TCP/IP, serial
LIS interfaces for receiving orders	Cerner, Meditech, Misys, GE, McKesson	Misys
LIS interfaces for sending results	Cerner, Meditech, Misys, GE, McKesson	Misys
No. of diff. host system connections operational at once on one middleware unit	1	2
Protocols system supports to interface to other systems	ASTM, proprietary	ASTM, proprietary, HL7 (in development)
Human languages middleware supports	English	English, Spanish, German
• 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	25
No. of user security levels system supports	2	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	yes/pop-up windows	yes/visual notifications
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	none†
Audit trail of the route a sample has taken	yes	no†
Laboratory automation system interfaces	Beckman Power Processor	n/a
System interfaces with noninstrument automation devices	yes (sorting, centrifuge, decapping, aliquotter)	no†
Back-end specimen storage and retrieval tracking	yes	yes (optional package)
System supports management of inst. & automation device maintenance records	no	no
• 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	no	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	yes/yes	no/no
• Screen has image support for any type of image	yes	yes
Users design own reports/Report-generation software used	yes/—	yes/—
• 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/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	—	additional fees for more than 25 users
Distinguishing system features (supplied by vendor)	• proactively alerts operator of critical test results • proactively alerts operator of next step or action	• 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

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

†functions handled by company's StreamLab automation system
††list price is $18,450 and includes hardware and software

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Middleware systems

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	Data Innovations Jennifer Wheeler sales@datainnovations.com 120 Kimball Ave., Ste. 100 South Burlington, VT 05403 802-264-3470 www.datainnovations.com	Dawning Technologies sales@dawning.com 6140 Mid Metro Drive, Unit 5 Fort Myers, FL 33966-1274 239-931-6004 www.dawning.com
Name of system	Instrument Manager	JavaLin Clinical Interface
First ever middleware installation/Most recent installation	1993/November 2006	1984/November 2006
Last update of middleware system	December 2006	December 2006
No. of contracts for sites operating middleware	4,300+	1,715
• U.S. contracts/Foreign contracts	3,900+/400+ (in more than 40 countries worldwide)	1,500/215 (in more than a dozen countries worldwide)
No. of sites operating middleware	4,300+	~1,200
Percentage of business that is middleware	100%	100%
Staff to develop/install and support/other* in entire company	10/17/18	9/7/6
Staff to develop/install and support/other* in middleware division	10/17/18	—
Hardware platforms	Windows PC or server	Dawning JavaLin
• Proprietary hardware required	no	yes
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, Windows 2003 connecting laboratories in North America and Asia on one system	—
Software platforms	Windows XP, Windows 2000, Windows 2000 and 2003 server	Linux OS, Dawning JResultNet embedded
Fault-tolerant solutions/Hardware must be purchased from company	yes/no	yes/no
Databases used	InterSystems Caché	PostgeSQL, Codebase, MySQL, SQLite, Oracle, MS SQL (work with any JDBC or ODBC connection)
Storage capacity of standard configuration of hardware	unlimited	128 MB
System can interface with instruments from any manufacturer	yes	yes
Data supported from microbiology instruments	numeric, alpha, multi-level, images	numeric, alpha, multi-level
Data supported from molecular instruments	numeric, alpha, multi-level, images	numeric, alpha, multi-level
Data supported from genomics instruments	numeric, alpha, multi-level, images	numeric, alpha, multi-level
No. of instruments one middleware device can support	no technical restrictions (102 largest live)	3
Configuration of middleware device	PC with standard interfaces	special-purpose device (no PC involved)
Protocol middleware supports to interface to instruments	HL7, ASTM, XML, proprietary	HL7, ASTM, proprietary, XML, ODBC, JDBC, direct database connections
Low-level transport that system supports to interface to instruments	serial, TCP/IP, ODBC, FTP, LAT files	TCP/IP, ODBC, FTP LAT, NFS, flat files
LIS interfaces for receiving orders	Omnitech, Aspyra, Psyche, Vista, Misys, Cerner, McKesson, GE, Orchard, SCC Soft Computer, Siemens, Dairyland, homegrown, proprietary, others	Cerner, McKesson, Misys, Meditech, GE, CPSI, HMS, Dairyland, Siemens, Impac, Telcor, Custom Software Solutions, eTeleNext, others
LIS interfaces for sending results	Omnitech, Aspyra, Psyche, Vista, Misys, Cerner, McKesson, GE, Orchard, SCC Soft Computer, Siemens, Dairyland, homegrown, proprietary, others	Cerner, McKesson, Misys, Meditech, GE, CPSI, HMS, Dairyland, Siemens, Impac, Telcor, eTeleNext, Custom Software Solutions, others
No. of diff. host system connections operational at once on one middleware unit	no limit	unlimited (1 or 2 typical)
Protocols system supports to interface to other systems	HL7, ASTM, XML, ODBC, proprietary	HL7, ASTM, XML, CSV, ODBC, JDBC, direct database, others
Human languages middleware supports	all known languages	English
• 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	unlimited
No. of user security levels system supports	unlimited (user defined)	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	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	yes/pop-up windows, e-mail, pager, audio/visual devices	yes/e-mail, audio/visual devices, local alert 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
Audit trail of the route a sample has taken	yes	no
Laboratory automation system interfaces	Abbott Accelerator, Bayer AUW, Bayer LabCell, Beckman Power Processor, DPC Lab Station, Dade Behring StreamLab, Ortho enGen, Roche CLAS, Roche MPA, Sysmex HST, others	Dade Behring StreamLab; Beckman Coulter; Beckman Coulter Hematology; Ortho enGen; Roche LSM, PSM, Modular; Sysmex Molis WAM
System interfaces with noninstrument automation devices	yes (Olympus OLA 2500, Roche VSII, Roche PSD1, Tecan FE500)	yes (Beckman Coulter PrepLink, DataLink; Olympus OLA 2500; others)
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	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 (LIS dependent)	yes
System supports data collection or data mining	yes	yes
Quality control module	yes	no
System interfaces to third-party QC packages	yes (Bio-Rad Unity series, including Unity Real-Time, Bio-Rad QC OnCall, Ortho VQAT)	yes (Bio-Rad Unity, Unity Pro, QC OnCall, Unity Real-Time)
System supports multi-rules	yes	yes
Users can customize screens	yes	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	yes	yes
Users design own reports/Report-generation software used	yes/proprietary and any ODBC-compliant application	yes/Crystal Reports, etc.
• 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, Web-based training/yes	classroom, on site, Web-based sessions, extensive documentation/yes
Smallest cost for hardware/software/monthly maintenance	0/$3,025/0	$1,895/included/$20
Largest cost for hardware/software/monthly maintenance	$12,000/$176,000/$3,300	—
Fee for additional users	$1,400	no charge
Distinguishing system features (supplied by vendor)	• auto-verification function includes real-time QC processing through a bidirectional interface with third-party QC applications • FDA 510(k) cleared • four offices worldwide	• power and scalability • distributed processing architecture—eliminates the need for terminal servers at the instrument connection point • remote access; multiple host connection support

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

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Middleware systems

Part 4 of 7 *See related article, page 16*	**Dawning Technologies** sales@dawning.com **6140 Mid Metro Drive, Unit 5** **Fort Myers, FL 33966-1274** **239-931-6004** www.dawning.com	**Dawning Technologies** sales@dawning.com **6140 Mid Metro Drive, Unit 5** **Fort Myers, FL 33966-1274** **239-931-6004** www.dawning.com
Name of system	**JResultNet Interface Engine Software**	**Secure Network Interface**
First ever middleware installation/Most recent installation	**1984/November 2006**	**1984/November 2006**
Last update of middleware system	**December 2006**	**2004**
No. of contracts for sites operating middleware	**500**	**9,380**
• U.S. contracts/Foreign contracts	**475/25 (U.K., France, Switzerland, Saudi Arabia, Kuwait, Australia)**	**7,775/1,605 (in dozens of countries worldwide)**
No. of sites operating middleware	**~550**	**~2,500**
Percentage of business that is middleware	**100%**	**100%**
Staff to develop/install and support/other* in entire company	**9/7/6**	**9/7/6**
Staff to develop/install and support/other* in middleware division	**—**	**—**
Hardware platforms	**PCs, Dawning JavaLin**	**Dawning Secure Network Interface**
• Proprietary hardware required	**no**	**yes**
Smallest hardware platform system can run on	**Dawning JavaLin interface**	**—**
Largest hardware platform in use	**dual rack-mount Windows 2003 systems†**	**n/a**
Software platforms	**Windows 2003 server, Windows XP, Windows 2000, Linux**	**proprietary, ResultNet PC**
Fault-tolerant solutions/Hardware must be purchased from company	**yes/no**	**yes/no**
Databases used	**PostgeSQL, Codebase, MySQL, SQLite, Oracle, MS SQL (work with any JDBC or ODBC connection)**	**Codebase**
Storage capacity of standard configuration of hardware	**hard drive limited**	**16 MB**
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	**unlimited**	**1**
Configuration of middleware device	**PC with standard interfaces**	**special-purpose device (no PC involved)**
Protocol middleware supports to interface to instruments	**HL7, ASTM, proprietary, XML, ODBC, JDBC, direct database connections**	**ASTM, proprietary**
Low-level transport that system supports to interface to instruments	**TCP/IP, ODBC, FTP LAT, NFS, flat files**	**FTP LAT (other options with JResultNet PC software)**
LIS interfaces for receiving orders	**Cerner, McKesson, Misys, Meditech, GE, CPSI, HMS, Dairyland, Siemens, Impac, Telcor, Custom Software Solutions, eTeleNext, others**	**Cerner, McKesson, Misys, Meditech, GE, CPSI, HMS, Dairyland, Siemens, Impac, Telcor, Custom Software Solutions, others**
LIS interfaces for sending results	**Cerner, McKesson, Misys, Meditech, GE, CPSI, HMS, Dairyland, Siemens, Impac, Telcor, Custom Software Solutions, eTeleNext, others**	**Cerner, McKesson, Misys, Meditech, GE, CPSI, HMS, Dairyland, Siemens, Impac, Telcor, Custom Software Solutions, others**
No. of diff. host system connections operational at once on one middleware unit	**unlimited (1 or 2 typical)**	**1 (more if ResultNet PC is used with SNI)**
Protocols system supports to interface to other systems	**HL7, ASTM, proprietary, XML, CSV, ODBC, JDBC, direct database, flat files, NFS**	**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	**no**	**no**
No. of users that can access system at once	**unlimited**	**1**
No. of user security levels system supports	**3**	**1 (more when used with ResultNet PC system)**
Users can write all rules for system	**yes**	**no†**
• System supports simple rules/System supports compound rules	**yes/yes**	**no†/no†**
• Programming or script language required to write rules	**no**	**no**
Full and persistent audit trail of rules/System supports rules testing	**no/yes**	**no/no**
QC data used as part of auto-verification or rules process	**yes**	**no**
Results that are entered manually processed by rules	**yes**	**no**
System supports event notification	**yes**	**yes**
System user notified of rules-based events/Notification methods	**yes/e-mail, audio/visual devices, local alert device**	**no/e-mail**
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**	**—**
Audit trail of the route a sample has taken	**no**	**no**
Laboratory automation system interfaces	**Dade Behring StreamLab; Beckman Coulter PrepLink, DataLink; Beckman Coulter Hematology; Ortho enGen; Roche LSM, PSM, Modular**	**Beckman Coulter PrepLink, DataLink; Roche LSM, PSM, Modular**
System interfaces with noninstrument automation devices	**yes (Beckman Coulter PrepLink, Olympus OLA 2500, Roche PSM, others)**	**yes (Beckman Coulter PrepLink; Roche LSM, PSM, Modular)**
Back-end specimen storage and retrieval tracking	**no**	**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/no**
System generates downtime specimen ID/Algorithm user definable	**yes/yes**	**no/no**
Orders entered in middleware manually are sent back to LIS automatically	**yes**	**no**
System supports data collection or data mining	**yes**	**no**
Quality control module	**no**	**no**
System interfaces to third-party QC packages	**yes (Bio-Rad Unity, Unity Pro, QC OnCall, Unity Real-Time)**	**yes–via external ResultNet PC (Bio-Rad)**
System supports multi-rules	**yes**	**no**
Users can customize screens	**no**	**yes**
• Users define custom fields/Users populate custom fields via user-defined rules	**yes/yes**	**yes/no**
• Screen has image support for any type of image	**yes**	**no**
Users design own reports/Report-generation software used	**yes/Crystal Reports, others**	**no/—**
• 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 sessions, extensive documentation/yes**	**classroom, on site, Web-based sessions, extensive documentation/yes**
Smallest cost for hardware/software/monthly maintenance	**0/$1,595/$20**	**$400/included/$20**
Largest cost for hardware/software/monthly maintenance	**$6,000/$50,000+/specific to system**	**$1,495 per unit/included/specific to system**
Fee for additional users	**no charge**	**no charge**
Distinguishing system features (supplied by vendor)	**• flexibility and scalability—can be implemented in a mixed environment with other middleware solutions • flexible rules—the user interface to JResultNet's rules provides a simple way to write very complex rules that can be loaded, saved, and edited easily • customers can choose the databases they wish to use**	**• direct network compatibility—allows instruments to be connected directly to the LIS network without terminal servers • distributed processing—provides a dedicated CPU and memory to each instrument connection, running the communication driver program local to the instrument • scalability**
***other = sales, marketing, administration, and other company functions**	***†handling system-to-system connections for more than 12 hospitals***	***†only with JResultNet PC added***

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Middleware systems

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	Ortho-Clinical Diagnostics Dominique Fuzier dfuzier2@ocdus.jnj.com 1001 U.S. Highway 202 Raritan, NJ 08869 908-704-3191 www.orthoclinical.com	Roche Diagnostics Jon Wearly jon.wearly@roche.com 9115 Hague Rd. Indianapolis, IN 46250 317-521-3027 www.roche-diagnostics.us
Name of system	Instrument Manager (supplied by Data Innovations)	Middleware Solutions (supplied by Data Innovations)
First ever middleware installation/Most recent installation	2005/November 2006	1998/November 2006
Last update of middleware system	September 2006	February 2006
No. of contracts for sites operating middleware	72†	420
• U.S. contracts/Foreign contracts	33/39 (France, U.K., Germany, Spain, Australia, Hong Kong, Thailand, Brazil)	400+ (including Puerto Rico)/0
No. of sites operating middleware	40	400+
Percentage of business that is middleware	<1%	<1%
Staff to develop/install and support/other* in entire company	—	—
Staff to develop/install and support/other* in middleware division	11/12/7	24+ total
Hardware platforms	Dell Optiplex	Dell Optiplex, PowerEdge Towers
• Proprietary hardware required	yes	yes
Smallest hardware platform system can run on	Pentium 4 2.8 GHz, 256 MB RAM, 40-GB hard disk	Dell Optiplex–Pentium 4 2.8 GHz, 80-GB hard drive
Largest hardware platform in use	Pentium 4 3 GHz, 1 GB RAM, 120-GB hard disk	Dell PowerEdge server–3 hard drives, Pentium 4 2.8-GHz redundant hard drives
Software platforms	Windows 2000, Windows XP	Windows 2000 Professional, Windows 2000 server
Fault-tolerant solutions/Hardware must be purchased from company	yes/yes (hot-backup)	yes/yes
Databases used	InterSystems Caché	Caché
Storage capacity of standard configuration of hardware	40,000 MB	80 GB/1,000,000+ orders/results
System can interface with instruments from any manufacturer	yes (with limitations)	no (with Roche CC/IA, Point of Care Omni, Urisys 1800/2400, Integra 800/400, Elecsys 2010/1010, others)
Data supported from microbiology instruments	—	—
Data supported from molecular instruments	—	—
Data supported from genomics instruments	—	—
No. of instruments one middleware device can support	128	128
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocol middleware supports to interface to instruments	HL7, ASTM	HL7, ASTM, proprietary, Vista HL7
Low-level transport that system supports to interface to instruments	serial, TCP/IP, ODBC	serial, TCP/IP
LIS interfaces for receiving orders	Cerner, Misys, Meditech, Cortex, others	Aspyra, Cerner, ClinLab, Comp Pro Med, Lab Soft, McKesson, Misys, Meditech, others
LIS interfaces for sending results	Cerner, Meditech, Misys, Cortex, others	Aspyra, Cerner, ClinLab, Comp Pro Med, Lab Soft, McKesson, Misys, Meditech, others
No. of diff. host system connections operational at once on one middleware unit	4	4
Protocols system supports to interface to other systems	HL7, ASTM	HL7, ASTM, proprietary, Vista HL7
Human languages middleware supports	English, French, Spanish, German, Portuguese, Thai, Chinese	English
• Multiple languages can be used at same time on one system	yes	n/a
System supports local date and time formats	yes	—
No. of users that can access system at once	10/128 (operating system dependent)	100
No. of user security levels system supports	multiple (function/connection driven)	—
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	yes/pop-up windows, e-mail, pager, lightpole	limited/e-mail
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	enGen (Ortho and Thermo Electron Corp.)	Modular Pre-Analytics
System interfaces with noninstrument automation devices	yes (sorters, centrifuges, decappers, aliquotters)	yes (RSD 800, VSII for sample sorting and aliquotting)
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	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 (Bio-Rad QC OnCall, Unity Real-Time)
System supports multi-rules	yes	yes
Users can customize screens	yes (specimen management)	limited
• 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	no
Users design own reports/Report-generation software used	yes/built-in report designer, optional Crystal 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	on-site training/yes	3-step process: Webex for basics, classroom for advanced rules training, and on site for system fundamentals/yes
Smallest cost for hardware/software/monthly maintenance	$3,000/$10,000/$350	—
Largest cost for hardware/software/monthly maintenance	n/a	—
Fee for additional users	$1,500 for license	none
Distinguishing system features (supplied by vendor)	• traceability and integration of auto-verification with Vitros' unique technologies—for example, sample integrity • custom configuration and rule design, verification and validation, configuration control for automation • flexible request- and result-based routing for automation	• aggressive 3-step training process • peer training delivered via Webex—best practices sharing • national service replacement plan complemented by 24/7/365 IT support hotline, as well as on-site IT support, service, IT project management

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

†not including previous versions

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Middleware systems

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	Siemens Medical Solutions Diagnostics **Sepehr Seyedzadeh** sepehr.seyedzadeh.b@bayer.com **511 Benedict Ave.** **Tarrytown, NY 10603** **914-524-3827** www.siemens.com/diagnostics	Sysmex communications@sysmex.com **1 Nelson C. White Parkway** **Mundelein, IL 60060** **800-379-7639** www.sysmex.com/usa
Name of system	**Advia CentraLink**	**Molis WAM**
First ever middleware installation/Most recent installation	**2001/ December 2006**	**2003/October 2006**
Last update of middleware system	**June 2006**	**October 2006**
No. of contracts for sites operating middleware	**—**	**47**
• U.S. contracts/Foreign contracts	**—**	**47/0**
No. of sites operating middleware	**400+**	**22**
Percentage of business that is middleware	**<10%**	**2%**
Staff to develop/install and support/other* in entire company	**—**	**9/160/190**
Staff to develop/install and support/other* in middleware division	**—**	**3/11/3**
Hardware platforms	**Dell server systems (PowerEdge 2800, 1800)**	**Intel, Linux interfacing to Windows XP**
• Proprietary hardware required	**yes**	**no**
Smallest hardware platform system can run on	**Dell PowerEdge 1800**	**Intel, Linux interfacing to Windows XP**
Largest hardware platform in use	**Dell PowerEdge 2800**	**IBM RS/6000 (Unix)**
Software platforms	**Windows server 2003, Windows XP**	**Linux**
Fault-tolerant solutions/Hardware must be purchased from company	**yes/yes**	**yes/no**
Databases used	**Progress**	**Oracle**
Storage capacity of standard configuration of hardware	**184,320 MB/40,000,000+ results**	**1,500,000 MB/1,250,000 orders and results**
System can interface with instruments from any manufacturer	**yes**	**no**
Data supported from microbiology instruments	**numeric**	**n/a**
Data supported from molecular instruments	**numeric**	**n/a**
Data supported from genomics instruments	**numeric**	**n/a**
No. of instruments one middleware device can support	**32**	**120**
Configuration of middleware device	**PC with standard interfaces**	**PC with standard interfaces**
Protocol middleware supports to interface to instruments	**HL7, ASTM, proprietary**	**HL7, ASTM, proprietary**
Low-level transport that system supports to interface to instruments	**serial, TCP/IP, FTP LAT**	**serial, TCP/IP**
LIS interfaces for receiving orders	**Aspyra, Cerner, GE, McKesson, Meditech, Misys, Orchard, Schuyler House, others**	**Misys, Cerner, SCC, Meditech, McKesson**
LIS interfaces for sending results	**Aspyra, Cerner, GE, McKesson, Meditech, Misys, Orchard, Schuyler House, others**	**Misys, Cerner, SCC, Meditech, McKesson**
No. of diff. host system connections operational at once on one middleware unit	**1**	**15**
Protocols system supports to interface to other systems	**HL7, ASTM, proprietary**	**HL7, ASTM, proprietary**
Human languages middleware supports	**English, Spanish, French, Italian, German, Portuguese**	**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	**15**	**250**
No. of user security levels system supports	**4**	**60**
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	**depends on complexity of rule**	**no**
Full and persistent audit trail of rules/System supports rules testing	**no/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	**yes/visual, e-mail**	**yes/pop-up, 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	**Advia LabCell, Advia WorkCell**	**Sysmex HST-N automation system, HST Alpha**
System interfaces with noninstrument automation devices	**yes (Advia LabCell, Advia WorkCell)**	**yes (PVT LabSystems TS-1000, TS-500 tube sorting system, CellaVision digital cell image device)**
Back-end specimen storage and retrieval tracking	**yes**	**yes**
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	**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**
System interfaces to third-party QC packages	**yes (export-only feature to third-party software, such as Bio-Rad)**	**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	**yes/yes**	**yes/yes**
• Screen has image support for any type of image	**yes**	**yes**
Users design own reports/Report-generation software used	**yes/Advia CentraLink internal software**	**no/n/a**
• Reports include any data elements in database	**no**	**n/a**
Around-the-clock customer service in U.S.	**yes**	**yes**
System training available/On-site consulting	**on-site training, e-learning, on-line training/yes**	**classroom, on site, e-learning/yes**
Smallest cost for hardware/software/monthly maintenance	**—**	**$10,000/$40,000/$878**
Largest cost for hardware/software/monthly maintenance	**—**	**$40,000/$80,000/$1,104**
Fee for additional users	**—**	**0**
Distinguishing system features (supplied by vendor)	**• true multi-discipline data-management and networking solution • comprehensive and integrated QC package—patient moving averages used in QC and auto-verification • market-leading automation system controller**	**• can support orders and results from multiple LISs and multiple sites for managing patient and QC results • flexible rule engine with extensive rule-variable combinations for building rules for auto-validation, reflexing, add-on testing, generation of manual differential smears, and sample routing • QC module has advanced graphing capability for reviewing up to 6 instruments' data by test or control material on one graph using superimpose graphing functionality**

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

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Middleware systems

Part 7 of 7 *See related article, page 16*	Technidata America Medical Software **Jacques Baudin** jacques.baudin@technidata-web.com 1760 E. River Rd., Ste. 302 Tucson, AZ 85718 520-577-2872 www.technidata-web.us	Technidata America Medical Software **Jacques Baudin** jacques.baudin@technidata-web.com 1760 E. River Rd., Ste. 302 Tucson, AZ 85718 520-577-2872 www.technidata-web.us
Name of system	TD-Middleware Suite: TD-IDM/TD-WAM (Alias, TD-C)	TD-Middleware Suite: TD-LPM
First ever middleware installation/Most recent installation	1991/November 2006	1993/March 2006
Last update of middleware system	December 2006	February 2006
No. of contracts for sites operating middleware	300	12
• U.S. contracts/Foreign contracts	100/200 (Latin America, Europe, Asia Pacific, South Africa)	0/12 (Canada, France, Italy, U.K.)
No. of sites operating middleware	300	15
Percentage of business that is middleware	80% for U.S. subsidiary	80% for U.S. subsidiary
Staff to develop/install and support/other* in entire company	49/21/22	49/21/22
Staff to develop/install and support/other* in middleware division	12/5/6	12/5/6
Hardware platforms	hardware independent (any compliant compatible PC)	hardware independent–typically HP, SUN, IBM, standard servers
• Proprietary hardware required	no	no
Smallest hardware platform system can run on	1 Windows-based PC	2 Windows-based PCs
Largest hardware platform in use	5 PCs	fault-tolerant system supporting 25 concurrent users
Software platforms	Windows 2000, Windows XP, older versions of Windows	Linux, Windows 2000 server, Windows 2003 server
Fault-tolerant solutions/Hardware must be purchased from company	no/no	yes/no
Databases used	Microsoft Access, proprietary	Oracle, SQL Server Express, SQL Server 2000, SQL Server 2005
Storage capacity of standard configuration of hardware	200,000 orders	unlimited
System can interface with instruments from any manufacturer	yes	yes
Data supported from microbiology instruments	alpha†	numeric, alpha, multi-level
Data supported from molecular instruments	numeric†, multi-level†	multi-level
Data supported from genomics instruments	—	—
No. of instruments one middleware device can support	6 per PC	200
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocol middleware supports to interface to instruments	HL7, ASTM, proprietary	HL7, ASTM, proprietary
Low-level transport that system supports to interface to instruments	serial, TCP/IP, FTP	serial, TCP/IP, FTP
LIS interfaces for receiving orders	major LIS vendors	homegrown, Meditech, Misys, others
LIS interfaces for sending results	major LIS vendors	homegrown, Meditech, Misys, others
No. of diff. host system connections operational at once on one middleware unit	1	8
Protocols system supports to interface to other systems	ASTM, proprietary	H7, ASTM, proprietary
Human languages middleware supports	English, Spanish, French, German, Korean, Greek, Japanese, others††	English, Spanish, French, German, Korean, Greek, Japanese, others†
• 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)	hardware and license dependent
No. of user security levels system supports	3	8
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	no/no	yes/yes
QC data used as part of auto-verification or rules process	yes	—
Results that are entered manually processed by rules	yes	yes
System supports event notification	no	yes
System user notified of rules-based events/Notification methods	no/—	yes/—
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	Sysmex HST, Alpha; Roche Modular, PSM, LSM; A&T Clinilog; Tecan robotic sample processor; Thermo Konelab	Sysmex, Roche, A&T, Tecan, Thermo, Beckman Coulter, Bayer
System interfaces with noninstrument automation devices	no	yes (Beckman, Tecan, Diamed)
Back-end specimen storage and retrieval tracking	no	yes
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	yes	yes
System interfaces to third-party QC packages	yes (Bio-Rad Unity QC)	yes (Bio-Rad Unity QC)
System supports multi-rules	yes	yes
Users can customize screens	limited	limited
• 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	yes/proprietary, Crystal Reports, others
• 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 system features (supplied by vendor)	• ergonomics: ease of use, fast access, switching functions without losing context • checking reproducibility of results with unknown result materials to minimize QC cost • automatic real-time processes and alerts	• ergonomics; user-friendly rules-based system • patient and production audit trail; automatic real-time processes • open system; scalability; specialized microbiology module
*other = sales, marketing, administration, and other company functions	*†limited to detection tests* *††21 languages supported*	*†21 languages supported*

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