

IBM Retail Systems Management
The Critical Component: Remote Management Agent (RMA)

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A technical report by IBM

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What is Systems Management?

Systems Management is the administration, monitoring, maintenance and support of distributed IT systems within the enterprise. It includes the internal IT processes and tools which are used to remotely monitor each IT device, including the hardware, software, applications, networks, and operational elements within the retail environment. Today, systems management is more important than ever for Retailers as they are faced with the daunting task of managing complex store environments which continue to evolve, while reducing IT costs and improving store uptime. An effective systems management solution provides a way for all of the components in a retail environment to share information.

A major component of virtually every systems management solution are the tools which continuously gather systems management information from retail systems in real-time and immediately alert store and/or IT personnel when there are problems. Not only do the tools monitor retail systems, but they have the ability to deploy and update software remotely. The goal of systems management is to provide a way for retailers to standardize retail components such that downtime and redundancy are made visible and can be eliminated. In either a centralized or distributed environment, an effective set of systems management processes enables the retailer to operate efficiently on a day-to-day basis, while planning and managing future needs and competitive business challenges.

IBM offers among the best hardware management tools in the industry and can help save the Retailer valuable time and money by increasing availability, tracking and deploying assets, optimizing performance and leveraging remote maintenance.

IBM Solution

Recognizing this need, the IBM Retail Store Solutions (RSS) Systems Management Team, as subject matter experts in both systems management and retail, set out to define an optimized set of systems management elements to be incorporated into RSS offerings. The resulting IBM Remote Management Agent serves as the back bone of the RSS systems management solution. When combined with management applications from IBM, and our intelligent hardware, RMA provides data which may then be captured to define the end-to-end health for POS and other retail critical systems. This real-time information may then be used by IT Operations Staff to define and achieve store uptime objectives, improve efficiencies, and ultimately reduce IT costs. RMA has been designed to provide store-level configuration, monitoring, event management, asset information, and software distribution from both the datacenter or locally in the store. The RMA and systems management information may then be further integrated up stream with IBM Director Server and Tivoli management tools, to provide a total store management solution which may be leveraged by the corporate IT shop for the enterprise.

Benefits of the IBM Solution

1. A standards-based architecture that gives you the flexibility to quickly and easily manage a variety of retail devices, including non-IBM systems and applications.
2. A hierarchical architecture that provides the flexibility to select which operations are managed at the store vs. the datacenter.
3. A store-level monitoring, configuration, event correlation, software distribution, and asset management solution which cost-effectively helps to improve the efficiency and effectiveness of managing multiple store systems and devices.
4. POS and Retail peripheral device-specific alerts that help maintain store system uptime, and provide asset and problem information to reduce the time and cost of onsite maintenance.
5. Retail system and peripheral device monitoring and event management seamlessly integrated with Tivoli and IBM Director Server that performs these functions at the enterprise level.

Total Cost of Ownership (TCO) Position

As retailers invest to enhance the customer experience, increase employee productivity, and improve operational efficiency, an effective systems management solution can be pivotal in lowering the TCO. IBM POS systems ship with RMA, and are specifically designed for manageability and serviceability to help drive down TCO.

The IBM systems management solution can help lower the TCO for Retailers by:

REDUCE COSTS

- Standards based design (open standards) allows tools to be leveraged without proprietary development.
- Enterprise systems management via RMA single tool from IBM thus less IT resources and skills; IBM and non-IBM devices
- Enforcement of power off policy will extend system/asset life (auto power off by systems management).
- Systems and peripheral monitoring can pinpoint failures and reduce unscheduled downtime, overtime, travel, and operations cost. RMA ships with IBM POS systems free of charge, and the IBM Director application is free of charge as well.
- Asset identification and tracking eliminates asset inventory management expense and the cumbersome manual process.
- Automated SW distribution decreases manual labor costs and deployment and rollout costs.

REDUCE DOWNTIME for increased sales, loyalty

- Proactive monitoring reduces hardware downtime
- Lightpath reduces diagnostics, problem determination, and trouble shooting, making maintenance quicker

LONGER LIFE spreads out costs, e.g. depreciation

- Usage tracking to balance workload and extend useful life of all products
- Asset tracking helps better manage capital and identify old system units for replacement

OTHER:

- Fewer IT skills at the central site

System Management Capabilities:

IBM Retail systems management concentrates on five key areas of systems management:

1. Asset tracking (inventory)

Automatically collect hardware inventory information at regular intervals across your enterprise.

- Memory size
- Serial numbers
- CPU types and speeds
- Disk type and size
- NIC information
- Retail Peripheral
 - Manufacturers
 - Models
 - Serial numbers

All data is collected at intervals you specify, and is stored in a centrally located SQL database, allowing you to create reports on a regular basis that matter to you and your business. For example:

- Do you know how many of your systems have enough memory to support the next software upgrade?
- Do you know what firmware levels are installed on your printers?

Inventory Management

The screenshot displays the IBM Inventory Management interface. On the left, a tree view shows 'Groups' including '4690 Controllers', '4690 Terminals', 'Anyplace Kiosk Clients', and 'Hardware Status Critical'. The main window shows a list of 'SurePOS 700 Clients' with columns for Name, TCP/IP Address, Name, Version, Serial Number, and Version. Below this, an 'Inventory Query Browser' window is open, showing 'Available Queries' on the left and 'Query Results: Component ID(6)' on the right. The query results table is as follows:

Name (Sys...)	Manufacturer (Com...)	Product (Component ID)	Version...	Serial N...	UUID (Compon...
CC (555)	IBM CORPORATION	4800743	4800743	41AABB8	FFFFFFFFFFFFFFFF000000
SI (555)	IBM	IBM BladeCenter HS20 -[8...	<null>	KPCFL32	40F364D7FE1AB601E75800
44 (555)	IBM CORPORATION	4800783	4800783	41AABR0	FFFFFFFFFFFFFFFF000000
POS2 (555)	IBM CORPORATION	4800783	4800783	41AABP4	FFFFFFFF-FFFF-FFFF-0000-
POS1 (555)	IBM CORPORATION	4800723	4800723	41AAAK1	FFFFFFFF-FFFF-FFFF-FFFF-
11 (555)	IBM CORPORATION	4800743	4800743	41AABB8	FFFFFFFFFFFFFFFF000000

2. Event Management

All IBM Retail hardware emits events for significant device occurrences. What do you do with those events today? With the IBM solution, everything from simple responses to complex actions can be performed automatically both in the store or at the enterprise. Both IBM Director and Tivoli TEC provide the power to automate responses of your choosing.

- A system is offline – page the store manager
- A printer is out of paper – page the manager
- A store server is indicating an impending disk failure – send a service request.

3. Proactive Monitoring

Events are interesting, but don't always represent the trigger points you are interested in. Proactive monitoring with the ability to set thresholds against any of the hundreds of attributes maintained by and RMA enabled system gives you the power to define the types of events that are important to you.

- Notify me when a disk reaches 70% of its capacity
- Tell me when a CPU is running at more than 85% utilization
- Let me know when the CPU is running too hot
- How about when the NIC is using more than 40% of the available bandwidth.

Once you create these monitors, they run on the target device, and will only issue an event when the defined conditions are met. Conditions you specify. Once those events are emitted, they can be responded to using the same event automation described above, giving you not only the ability to define the responses to actions, but actually to define the action itself...

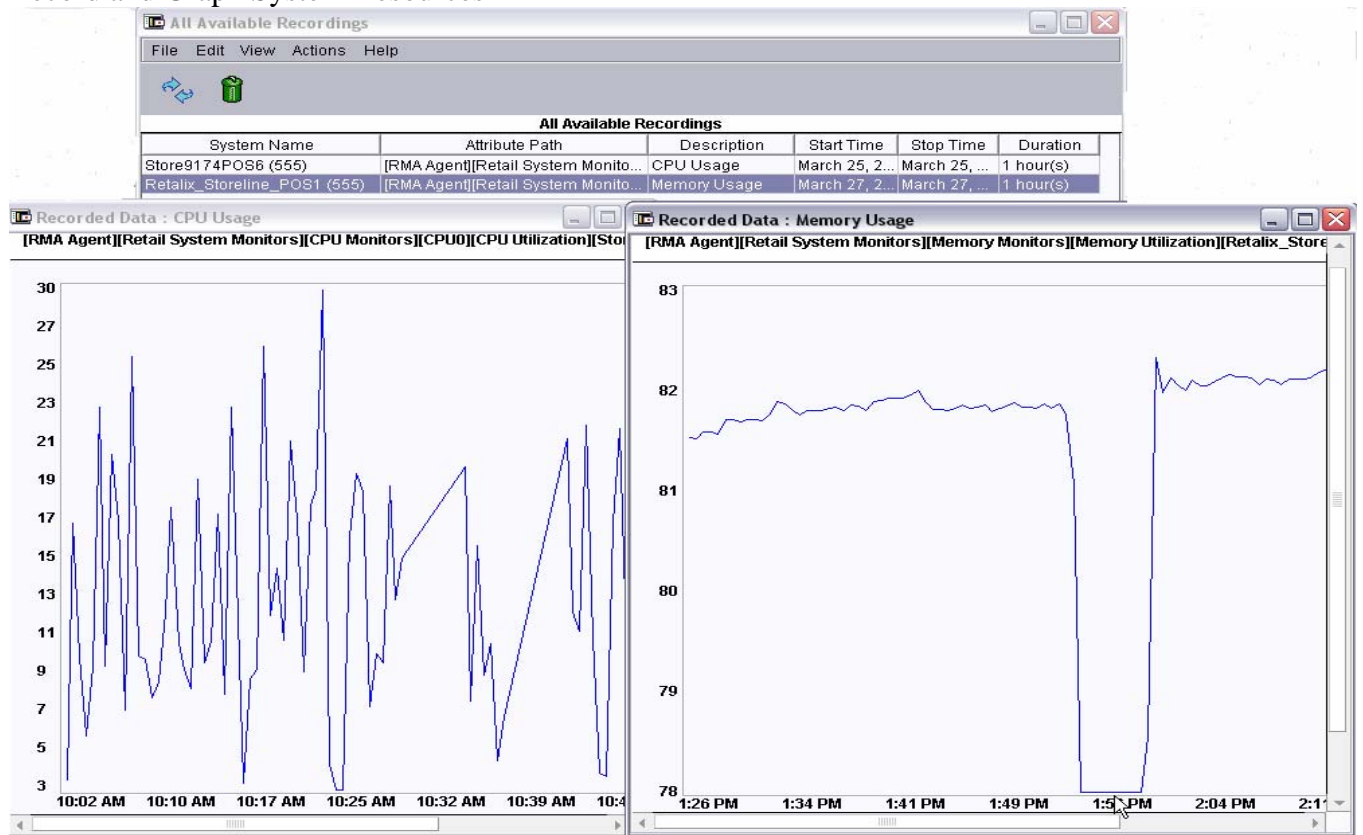
Proactive Monitoring

The screenshot shows the 'Resource Monitors: POS2 (555), POS1 (555)' application window. The interface is divided into two main sections: 'Available Resources' on the left and 'Selected Resources' on the right. The 'Available Resources' section shows a tree view under 'RMA Agent' with various monitor categories like 'Retail Peripheral Monitors', 'Retail System Monitors', and 'User-defined Monitors'. The 'Selected Resources' section displays a table of monitoring data for two devices, POS1 (555) and POS2 (555).

Selected Resources	POS1 (555)	POS2 (555)
[CPU Utilization]	0%	33%
[Memory Utilization]	84%	26%
[Disk Utilization]	9%	4%
[Current Reading]	3360	3300
[Alarm State]	Off (LED is Off)	Off (LED is Off)
[Cover Open]	False	False
[Receipt Character Printed Count]	394687734	3572897669

At the bottom of the window, the status bar shows 'Ready' and 'Last updated: 9:40:52 AM'.

Record and Graph System Resources



4. Software Distribution

We all know that systems are not static, and from time to time it becomes necessary to update them. The IBM combination of management applications and RMA give you the tools to define packages, schedule their distribution and execution to one or many devices with a few simple clicks.

The Retail Extensions for IBM Director (a component of RMA) includes a package building wizard that allows you to include files, specify distribution locations, and event script the execution to be run on the target devices. Once those packages are built, Director gives the tooling to deploy those packages immediately, or schedule when you wish them to be deployed. It will even handle those devices that are not currently on-line at that point in time when they finally do get turned on.

Software Distribution and Scheduler



Scheduler

File Selected Help

Month Calendar Week Calendar Day Calendar Jobs

March

Sun	Mon	Tue	Wed	Thu	Fri	Sat
24	25	26	27	28	29	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15

Scheduler

File Selected Help

Month Calendar Week Calendar Day Calendar Jobs

Jobs	Status
<ul style="list-style-type: none">Reboot POS<ul style="list-style-type: none">3/27/2008 at 10:12 AM3/27/2008 at 5:17 PM3/28/2008 at 8:33 AMUpdate Application<ul style="list-style-type: none">3/28/2008 at 9:02 AM3/28/2008 at 9:59 AM	3/28/2008 at 9:02 AM : Update Application Status : Complete Pending : 0 In progress : 0 Suspended : 0 Complete : 1 Failed : 0 Unavailable : 0 Skipped : 0
<ul style="list-style-type: none">Complete<ul style="list-style-type: none">POS1 (555)	

5. Configuration

IBM Retail offerings all offer the ability to configure aspects of their operation through the combination of Management application and RMA.

The implementation cuts across all of the Retail offerings: Not all components of the total system have the same level of capabilities; some are more capable of management than others. Here is an idea as to how the functionality discussed above can be seen across the IBM Retail offerings:

System Units

All of our system units comply to not only the required implementation of SMBIOS (an industry standard for board level management, giving you information like serial number, model number, build dates,...) but we go beyond that implementing more. For example we provide a full set of environmental sensors on our new systems, giving you the ability to monitor:

- CPU Temperature
- Fan speed
- Board voltages

Operating Systems

IBM supports three operating systems on our system units. Each one possessing different levels of instrumentation for management. Both Linux and Windows are compliant with the widely implemented CIM standards, and we take full advantage of that to provide you with hundreds of pieces of information provided by the OS.

- Memory size
- Memory utilization
- CPU utilization
- Process information – loaded, running,...
- Peripheral information

Peripherals

IBM retail peripherals are all built around the UPOS driver standard, and those standards allow for management through the industry standard CIM. IBM's drivers are fully compliant with the latest UPOS drafts, and present a long list of management elements for use in the above mentioned tasks.

- Cash drawer open
- Firmware levels
- Firmware update
- Scanner battery level
- Device Operation Status
- Scanner good/bad read counts
- Cash Drawer Open/Close state
- MICR Good/bad reads

- Power state
- MSR Track to read
- Keyboard cap lock state
- Printer:
- Form insertion count
- Home error count
- Paper cut count
- Failed paper cut count
- Fault count
- Side change count
- Cover open
- Journal empty
- Journal near end
- Cover open
- Out of paper

Peripheral Management

The screenshot displays the 'Retail Peripheral Management : All Managed Objects' application. It features a tree view of peripheral types on the left, a central pane showing systems with point-of-sale printers, and a right pane for peripheral tasks. An 'Inventory Query Browser' window is open, showing a table of selected resources and their status.

Peripheral Monitors: POS2 (555), APK-SysMgmt (555), POS1 (555)

Selected Resources	APK-SysM...	POS1 (555)	POS2 (555)
[Cover Open]	False	False	False
[Paper Cut Count]	15925	15744	15616
[Receipt Character Printed ...]	394784984	394687734	3572897669
[Receipt Line Feed Count]	701582	692162	688500

Inventory Query Browser: POS2 (555), APK-SysMgmt (555), POS1 (555)

Available Queries:	Query Results: General Properties(3)							
All	Name (System)	Device Na...	Model N...	Manuf...	Serial Number...	Firmwar...	Interf...	D
Point-of-Sale Printer	POS2 (555)	IBM 4610 S...	4610-T19	IBM	41-ZXDB2	0x66	USB	IBM 4610 Suret
General Properties	APK-SysMgmt (555)	IBM 4610 S...	4610-T19	IBM	41-WMDK1	0x6A	RS232	IBM 4610 Suret
Journal Station Capabilities	POS1 (555)	IBM 4610 S...	4610-T19	IBM	41-ZXCH1	0x6D	USB	IBM 4610 Suret

IBM Ready

Middleware

The IBM middleware for retail, SI, DIF, AEF, POSBC, and ACE, are all players in the management strategy, and present levels of information that can be used with all of the tooling discussed above.

Powerful integration capabilities:

Allows for integration of third party applications providing them with full access to the power and flexibility of the IBM management tools. RMA provides a framework for coupling third party applications and/or hardware to the IBM Management Applications, either IBM Director, or Tivoli. The RMA Agent provides a full toolkit for integrating applications using existing open standards. Depending on the level of integration selected by the ISV/IHV the automation provided by IBM Director or Tivoli can be used to perform complex and unattended management operations.

- Event integration
- Monitoring
- Configuration

Third path vendors can readily integrate events into the RMA management stream in one of two ways. Depending on the type of element they are they can implement to either CIM, or to JMX. Both are industry management standards. If you are a hardware vendor, then implementing to CIM makes the most sense for you, while JMX allows applications a much simpler path for integration. Either way allows the same level of integration at RMA, and use of all of the tooling described above in both IBM Director and Tivoli.

The type and depth of integration chosen by an ISV/IHV is entirely dependant on the type of element to be managed, and the depth to which the integrator wishes to integrate. For most IHV, the integration equation is simple, as standards exist to describe the needed management of most systems and peripherals, and the IHV need only implement to those standards.

Application integration and in fact most ISV activity is more open ended. Since very few standards exist around application management, the ISV will have to decide what it is about their application that is pertinent to manage. There are several levels of integration for them to choose from, starting with the simplest and least powerful – events. At a very basic level, the ISV could implement a bridge into RMA of any key application events. These vary wildly from application to application, so specific examples may not apply, but could be hard operation occurrences such as store open and store close. As the ISV becomes more complex, and wishes for more integration, then they may chose to begin exposing application attributes. These are elements, counters, state, and configuration data that may change or be changed as a normal part of operation. Once exposed by the application, the RMA infrastructure can be used to create monitors against these, so that it is possible to look for thresholds or state changes, and trigger events based on those. These are VERY powerful in that rather than providing hard events – defined by the ISV, the customer can decide what is important. This type of monitoring activity is capable of providing proactive condition information, whereas most simple events are reactive.

Going deeper, the ISV could choose to expose configuration information, such that the application could be configured remotely through the management tooling, but more importantly, this allows the ability to alter configurations based on automated responses to events. (either hard events or threshold driven events). The most complex integration would be for the application to also expose methods that can be used to perform complex operations within the application. These could then also be used to automate responses to events.