

In a Virtual World

Real Inventory Issues in a Virtual World: Are Discovery Tools Keeping Up with the Challenges of Virtualization?

As technological change presents new opportunities for organizations, IT Asset Managers are tasked with evaluating those changes from a business perspective. To bridge the gap between technology and the business management of assets, the IT Asset Manager must first understand the new technology well enough to identify the asset elements, the impact on services delivered and the logistical issues involved. With that baseline of information, the IT Asset Manager interviews vendors, colleagues and other resources to understand any implications to contractual and financial management. Fifteen years ago, the technology pushing ITAM practices was mobile phones and PDAs, moving ITAM out of the comfort zone of traditional assets and the data center. Ten years ago, leaps in server capacity and speed were challenging financial management such as departmental “ownership” and chargeback. Today, IT Asset Managers are faced with new complexities from a variety of virtualization technologies and as well as internet-style options aptly labeled cloud computing.

Virtualization is a broad term that is used when an IT environment/function is simulated with an alternative delivery method that acts essentially the same as the original. From an IT Asset Management perspective, virtualization changes the relationship between physical hardware and software. Business practices that rely on that relationship will have to change right along with the implementation of this technology.

Discovery tools are an essential component of inventory management, providing an in-depth snapshot of the hardware and software. How are discovery tools adapting to the changes brought by the adoption of virtualization strategies? Can the IT Asset Manager depend on the information that is being provided? To answer these questions, discovery product providers were invited to address these questions directly. As a first step, five specific virtualization scenarios were selected and defined. The four environments presented here are:

| Virtualization Scenarios | | | |
|---|---|--|--|
| <p>Server Virtualization</p> <p>The ability to run multiple independent virtual servers on a single physical server.</p> | <p>Storage Virtualization</p> <p>The amalgamation of multiple network storage devices into a “single” storage unit, including clustered servers.</p> | <p>Hosted Virtual Desktops</p> <p>Delivery of desktop user environments from a server, typically consolidating multiple users per processor core.</p> | <p>Application Virtualization</p> <p>Isolating an application in a virtual environment to reduce packaging costs and to create application portability.</p> |

The fifth scenario included on the questionnaire was the Virtual Work Space, defined as the separation of user data from the rest of the configuration. This approach enables seamless user roaming from system to system. As Vincent Brasseur, Managesoft’s Director of Product Marketing, points out, “[Virtual Work Space] does not really impact hardware or software discovery and inventory. If the discovery product

supports servers and desktop devices as ECM does, Virtual Work Space technology presents no new issues.”

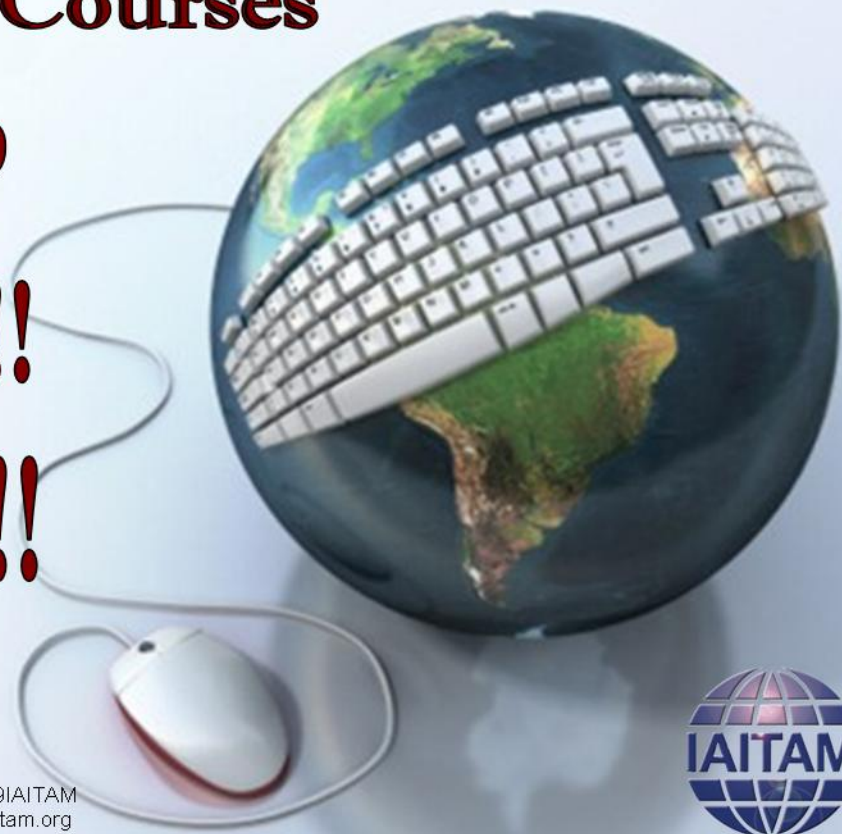
The Respondent’s Products

Software vendors were first asked to identify their products that provide the functionality described in the virtualization scenarios that follow:

| Responding Company | Products Included in Discussion |
|---|---|
| CA, Inc. | CA ITCM (IT Client Manager) CA ITAM (IT Asset Manager) CA Spectrum Infrastructure Manager CA Spectrum Automation Manager CA CMDB (available as part of CA Service Desk Manager) |
| Hewlett-Packard Company (HP) | Discovery and Dependency Mapping Inventory (aka DDMI, ED, Enterprise Discovery) 7.6x |
| International Business Machines Corporation (IBM) | Tivoli Asset Discovery for Distributed Tivoli Asset Discovery for z/OS (Not included: Tivoli Application Discovery and Dependency Manager (TADDM) which is an agent-less discovery service) |
| ManageSoft Corporation | ManageSoft Enterprise Compliance Manager (ECM) 8.0, 8.1, 8.2 (8.2 to be released in January 2010) |
| xAssets, Ltd. | xAssets Network Discovery Version 6.3 xAssets Software Asset Manager 6.3 |

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Each was asked to identify if agent or agent-less discovery was available and to offer any additional notes that will increase understanding details provided for each scenario:

providers for each virtualization scenario are provided, with comments addressing hardware and software inventory separately listed.

In the following five tables, the answers offered by the

| Responding Company | Special Notes re: Agent/Agent-less, Clarifications |
|---|--|
| CA, Inc. | Agent-based. Agent-less inventory alone doesn't consistently reflect all client systems due to the requirement for active and accessible network connectivity - disconnected systems of any kind simply don't show up in discovery/inventory: laptops "on the move" or connected via public/private extranets, virtual environments that are transient, systems on segregated networks |
| Hewlett-Packard Company (HP) | <p>Both agent and agent-less.</p> <p>Additional Information:</p> <p>DDMI Agent – system service; handles server-agent communications and launches scanner for inventory collections.</p> <p>DDMI scanner – executable (does not reside in memory) invoked to collect data. DDMI scanner can work in a "standalone" mode, without a DDMI agent and has the ability to deliver its scan results to a UNC, FTP or HTTP destination. This approach allows use of DDMI scanner with other management agents (such as HP Server Automation) to collect data without increasing the management overhead.</p> <p>DDMI Utilization plug-in, component of the agent, residing in memory to collect software utilization data. Can be deployed without the full DDMI agent to minimize management overhead. Must be installed to collect software utilization data.</p> <p>Agent-based approach, defines the most common approach of deploying a DDMI agent (to communicate with DDMI server) and DDMI scanner (to collect hardware/software inventory data) to the target system on a permanent basis.</p> <p>Agent-less approach does not require a permanent agent/scanner presence. On Windows, uses RPC to log into the system, install agent, execute scanner and uninstall all DDMI components, leaving no trace. On Linux/UNIX/MAC, this approach uses remote shell to execute the scanner.</p> <p>In the future, we will also add Remote, API-based capabilities to collect data from vendor APIs, WBEM and WMI, as an alternative to the current, agent-less approach.</p> |
| International Business Machines Corporation (IBM) | <p>The Discovery Server: Agent control, aggregates agent data, reporting HTTP or HTTPS communications to agents Manage up to 45 agents per server Platforms - Windows, AIX, HP, Sun, Linux and zLinux</p> <p>Tivoli Asset Discovery for Distributed is designed to help customers manage software license usage in virtualized and cloud environments.</p> |
| ManageSoft Corporation | Typically there is an agent, although agent-less discovery and inventory can also work in some scenarios. Note that ManageSoft provides inventory agents for all OS's that run in VMware virtual machines (Windows, Linux, and UNIX). |
| xAssets, Ltd. | xAssets utilizes agent-less technology for most of its customers, but also offers agent based technologies for customers requiring discovery of disconnected systems. Utilizing an agent-less architecture, xAssets Discovery has full access to the BIOS, the Endpoint OS API, and connected devices. This enables hard disk scans for detailed software title discovery and to find hidden executables. xAssets' agent-less technology discovers important information which is not available to many agent-less discovery tools, including software editions, ghost installs and peripheral asset information including serial numbers. |

Server Virtualization

Server virtualization is the most mature technology and currently widely in use. Software providers answering this section pointed out the importance of being able to identify the virtual as well as physical server.

As explained by Howard Hastings, one of CA’s ITAM Evangelists, “... documenting the relationship between the

logical and physical computers is necessary for establishing compliance for license models beyond simple counts, such as processor, core and model tiers. This is because the software publishers almost always base the license entitlement on the physical hardware due to the customer’s ability to dynamically configure their virtual environments (pricing is set by the ‘largest possible value’ in the applicable configuration attribute).”

Server Virtualization

| Responding Company | Hardware | Software |
|------------------------------|--|--|
| CA, Inc. | <p>CA hardware discovery finds all active devices (logical and physical) on the network, and inventory is reported for each logical and physical computer for which an inventory agent is installed.</p> <p>CA hardware inventory includes all pertinent computer attributes, including installed processor types, counts, cores, etc., as applicable, based on manufacturer conformance to industry standard DMI 2.0 specifications.</p> <p>Identification and “mapping” of the relationship between the logical and physical devices delivers a holistic view of the environment, including dependencies.</p> <p>In this scenario, installation of an inventory agent on each and every instance of the OS is a best practice. Additionally, a unique identification data tag must be recorded as part of the base image for both logical and physical servers. When implemented correctly, these images identification data tags are designed in such a way to minimally provide image creation and deployment dates, image version and a hierarchy of physical to virtual images.</p> | <p>CA software inventory and recognition is reported for each logical and physical computer for which an inventory agent is installed.</p> <p>In this scenario, installation of an inventory agent on each and every instance of the OS is a best practice, ensuring consistent data capture and reporting.</p> |
| Hewlett-Packard Company (HP) | <p>DDMI currently provides complete hardware inventory for all supported OS, including Windows, HP-UX, Solaris, AIX and Linux. Using either agent-based, or “agent-less” approach, DDMI is able to collect detailed hardware information including CPU and Core information. DDMI is working to fill any gaps on specific OS or hardware platforms. DDMI hardware inventory is collected using the above methods on VMware ESX hosts. DDMI is planning to provide remote (API-based) inventory of VMware ESXi hosts in a future release. Similar approaches are planned for other virtualization hosts, including Hyper-V, LPAR and vPar.</p> <p>Virtualized servers are inventoried using standard agent-based and agent-less approaches (available since DDMI 7.50 release) and require a supported operating system. Collected information includes up to 900 data elements, including various CPU characteristics, including (where applicable) type, core, speed and other information.</p> <p>The capabilities include collecting physical host to virtual guest relationships, with VMware and Solaris 10 Zones support available today. Support for Hyper-V, LPAR, vPar and Xen are expected in future releases of DDMI.</p> | <p>DDMI currently uses the same approach as for hardware inventory. In agent-based mode, data is collected using the scanner (this includes OS reported software inventory and file data for use in file and rule-based fingerprinting technology).</p> <p>Agent-less approach uses the same scanner without requiring permanent agent/scanner presence.</p> <p>Once collected, the software inventory data is in one of 3 forms:</p> <ul style="list-style-type: none"> • Recognized Application – result of use of HP fingerprinting technology • OS reported applications – result of OS queries (not reconciled with recognition results) • Residual “unrecognized” files – remaining raw file data (does not include files which are included in recognized applications). |



| | | |
|--|---|--|
| <p>International Business Machines Corporation (IBM)</p> | <p>An agent is deployed to the host system that will provide detailed hardware data including processor, processor type, number of cores, USB devices, HDD information, partition information, and more.</p> | <p>Agents discover installed software leveraging primarily a hard drive scan and can also leverage registry scans as an option. It leverages a software catalog to identify discovered software.</p> |
| <p>ManageSoft Corporation</p> | <p>ECM supports discovery and inventory of physical and virtual servers. For instance, in VMware ESX server environments, it collects hardware information using the VMware API and identifies virtual machines hosted on each physical server. The inventory for both physical and virtual servers includes hardware details such as the number and type of processors and cores. This hardware information is often required to determine license compliance in virtual environments (see software section).</p> | <p>ECM supports discovery and inventory of software on physical and virtual servers. For VMware virtual server environments, it identifies virtual machines hosted on each physical server and collects software inventory data. In addition, ECM understands virtual environment license rules to determine license compliance in these environments. These license rules are built-in to the product. Hardware details are also used to determine license compliance depending on the license model in effect (e.g. processor/core/PVU licenses).</p> |
| <p>xAssets, Ltd.</p> | <p>xAssets Network Discovery Version 6.3 collects detailed hardware and software asset information for all logical and physical devices, regardless of the virtualization technology deployed. The relationship between the virtual host and the virtual guest is also discovered and is mapped into the CMDB using parent-child inter-asset relationships, enabling a holistic view of the network. The browser-based GUI enables users to visualize the hierarchical relationships between assets and this includes virtual machines and their hosts. Hyper-V, Microsoft Virtual Server, VMWare and other virtualization technologies are fully supported. The endpoint information discovered is the same regardless of whether the endpoint is virtual or physical, xAssets Network Discovery will run a complete inventory of all software, hardware and machine specifications to the CMDB.</p> | <p>xAssets Software Asset Management discovers and reports on a wide range of software types that are running or installed on virtualized servers. The solution identifies the Operating System Versions and Editions that are part of the server environment, the SQL Server Instance Licensing Model Identification, and all AutoRun entries from Local User and System Registry. Software is discovered and identified from executable file headers and from registry entries. Services, including those running on virtualized servers and desktops, are discovered and classified, as are all instances of antivirus software. In addition, configuration options allow customers to add new WMI and Registry attributes to the discovery engine.</p> |

Storage Virtualization

Technology opportunities to utilize storage more efficiently have been grouped with virtualization and included in this dialog with discovery providers.

Hosted Virtual Desktops

Reaching out to change the desktop configuration in a major way, hosted virtual desktop technology opens up savings from “dumb” terminals by placing the user’s configuration and software on a server. Often these environments are shared between users and will require concurrent licensing for “inside” the environment. Multiple approaches to virtualized desktops are available and are presently non- standardized.

“Given the limitless variations on how any given Hosted Virtual Desktop platform could be developed to manage active user accounts (read: no standard method) it is unreasonable to expect any 3rd-party tool vendor to develop and maintain this kind of capability for all potentially available applications,” Hastings stated.

Application Virtualization

The value of application virtualization is evident to anyone who has experienced problems such as overwritten specifications for an application by a second application. Instead of an expensive physical server to provide isolation, application virtualization reduces the wasted server capacity and provides the solo environment another way.

Storage Virtualization

| Responding Company | Hardware | Software |
|---|---|---|
| CA, Inc. | CA hardware discovery finds all active devices (logical and physical) on the network, and inventory is reported for each Storage Subsystem that properly supports the SNMP protocol with conforming MIBs. Obviously, the detail of the inventory reported is completely dependent upon the detail contained in hardware manufacturer’s provided MIB. CA hardware inventory is reported for each logical and physical server for which an inventory agent is installed. Identification and “mapping” of the relationship between the logical and physical devices delivers a holistic view of the environment, including dependencies. | |
| International Business Machines Corporation (IBM) | An agent is deployed to the host system that will provide detailed hardware data including processor, processor type, number of cores, USB devices, HDD information, partition information, and more. | Agents discover installed software leveraging primarily a hard drive scan and can also leverage registry scans as an option. It leverages a software catalog to identify discovered software. |
| ManageSoft Corporation | On the roadmap to enable collection of virtualized network storage devices in ECM. | |
| xAssets, Ltd. | xAssets Network Discovery collects detailed hardware asset information including multiple storage devices associated with single servers or clustered servers | xAssets Software Asset Management discovers and reports applications specific to the operation of including multiple storage devices associated with single servers or clustered servers. |



Hosted Virtual Desktops

| Responding Company | Hardware | Software |
|---|--|---|
| CA, Inc. | <p>CA hardware discovery finds all active devices (logical and physical) on the network, and inventory with detailed configuration data is reported for each logical and physical computer for which an inventory agent is installed. Identification and “mapping” of the relationship between the logical and physical devices delivers a holistic view of the environment, including dependencies.</p> <p>In this scenario, hardware configuration attributes (processor type/counts, etc.) may impact software licensing for the applications provisioned via a Hosted Virtual Desktop environment since by definition they are installed and executed on a server and licensing models could be based on the physical server hardware attributes (processor type/counts, etc.).</p> <p>Identification and “mapping” of the relationship between users’ computers and the server(s) on which the Hosted Virtual Desktop platform is supported will be required for most license models.</p> | <p>CA software inventory and recognition is reported for each logical and physical computer for which an inventory agent is installed.</p> <p>In this scenario, the software provisioned via a Hosted Virtual Desktop environment will typically either be licensed by (a) total number of users that are defined for access to the applications OR (b) concurrent user access.</p> |
| Hewlett-Packard Company (HP) | <p>DDMI provides physical host inventory using the same capabilities and mechanisms as for Server Virtualization. Both agent-based and agent-less approaches are available and HP is investing in remote API-based approaches to collect required data in future releases.</p> <p>Collected information includes CPU attributes, such as Type, core and speed.</p> <p>Tracking physical host to virtual guest relationship information is considered a key requirement and is available for VMware and Solaris 10 Zones today, with support for Hyper-V, Xen, LPAR and vPar expected in future releases of DDMI.</p> | <p>DDMI uses same approaches and capabilities as described Server Virtualization. Of additional relevance when collecting software inventory for Virtual Desktops is DDMI Express Teaching interface, allowing administrators to add Windows software fingerprinting entries using an intuitive wizard-driven interface.</p> |
| International Business Machines Corporation (IBM) | <p>An agent is deployed to the host system that will provide detailed hardware data including processor, processor type, number of cores, USB devices, HDD information, partition information, and more.</p> | <p>Agents discover installed software leveraging primarily a hard drive scan and can also leverage registry scans as an option. It leverages a software catalog to identify discovered software.</p> |
| ManageSoft Corporation | <p>ECM Supports discovery and inventory of servers and desktop/laptop devices. In the case of thin clients, limited hardware inventory is performed; however ManageSoft has an ECM roadmap plan to improve this capability.</p> | <p>In a hosted virtual desktop environment, the software inventory data is collected on the server. Since the applications are not actually installed on the desktop device, there is no inventory data/evidence to collect on the desktop (for these hosted apps). And since the applications are running on the server and not the desktop, there are no client-side executables to track either.</p> |
| xAssets, Ltd. | <p>xAssets Network Discovery collects detailed hardware asset information for dedicated or virtualized servers providing services to virtualized desktops.</p> | <p>xAssets Software Asset Management discovers and reports applications and services installed on dedicated or virtualized servers providing services to virtualized desktops.</p> |

Application Virtualization

| Responding Company | Hardware | Software |
|---|---|--|
| CA, Inc. | <p>CA hardware discovery finds all active devices (logical and physical) on the network, and inventory is reported for each logical and physical computer for which an inventory agent is installed.</p> <p>In this scenario, hardware configuration attributes (processor type/counts, etc.) may impact software licensing for the virtualized applications.</p> | <p>CA software inventory and recognition is reported for each logical and physical computer for which an inventory agent is installed.</p> |
| Hewlett-Packard Company (HP) | <p>DDMI collects general hardware information using both agent-based and agent-less mechanisms as described in the Server Virtualization section above.</p> | <p>DDMI does not today have specific functionality for application virtualization products (such as App-V and Thin App). DDMI can provide identification of virtualized software using either OS collected data or using our fingerprinting technology with user-created application recognition entry.</p> |
| International Business Machines Corporation (IBM) | | <p>Agents discover installed software leveraging primarily a hard drive scan and can also leverage registry scans as an option. It leverages a software catalog to identify discovered software.</p> <p>The virtualization server would be responsible for management of this type of scenario. It's not possible for an agent or external process to look into what is happening within the virtualization server running in memory, so we rely on the virtualization server to keep the software usage statistics.</p> |
| ManageSoft Corporation | <p>This does not really impact hardware discovery and inventory. ECM Supports discovery and inventory of servers and desktop devices.</p> | <p>For Citrix application virtualization, ECM has a connector that allows it to read all the necessary data on the server that identifies what applications have been delivered to what users and devices. And since there are application executables running on the client device (desktop), ECM can also track that to determine not only software inventory, but also license compliance. This applies to the case of fully encapsulated application delivery, as well as to application streaming, where the executables are delivered in pieces as needed.</p> |
| xAssets, Ltd. | <p>xAssets Network Discovery collects detailed hardware asset information for dedicated or virtualized servers providing access to applications by virtualized desktops.</p> | <p>xAssets Software Asset Management discovers and reports applications installed on dedicated or virtualized servers providing access to the application by virtualized desktops.</p> |



According to these responses, discovering information about these virtual environments is not the largest issue for ITAM.

“The impact of virtualization on discovery and inventory is relatively small compared to its impact on license management,” said Vincent Brasseur of ManageSoft. “ECM enables organizations to manage licenses in VMware and Citrix virtual environments.”

Keeping Ahead of Software Licensing

The next step towards making good decisions about software licensing is to examine the licensing choices and to ask more questions from the virtualization vendors regarding what information of software is available to discovery tools or to other reporting tools. Discovery, monitoring and reporting are the business elements of technology change often neglected during assessment of IT choices. IT Asset Managers either get involved in understanding these changes or risk making poor decisions about software licensing choices.

The virtualization scenarios discussed here are only a few of the types currently available and more are expected in 2010. Additionally, cloud computing opportunities offer even more choices.

Tim McCrimmon, Program Director and Product Manager for Tivoli IT Asset Management products, explains that “[the] cloud represents the next step in virtualization that needs to be addressed. My particular interest is keeping track of license

metrics within virtual machines and clouds such that customers are aware of cost associated with this technology. While virtualization represents a very nice way to provide new service to customers and improve overall operational effectiveness, it does bring to the table new challenges with respect to license management.”

Discovery products will have to keep pace, as will IT asset management suites in general. Some are already moving away from traditional application models so as not only to keep up with change but to be part of the change.

“At xAssets, we strive to meet the future needs of our customers. Our software is available as a hosted service or as an installed enterprise software product. Either of these approaches discovers, inventories and reports on hardware and software operating in a virtualized environment or on a physical device,” stated Paul Lambert, CTO of xAssets.

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