University of Glasgow

Technical Review Group

Software Audit Tools

Report of Working Group

8th July 2005

Summary

The Working Group investigated 12 currently available software auditing products. These were judged against a set of predefined criteria including cost, ease of deployment, and effectiveness in the University's diverse IT environment. The resulting recommendations are

- for Windows platforms: VisionSoft's Visual Audit Pro (www.visionsoft.com/vap.asp)
- for MacOS installations: Apple's Remote Desktop (www.apple.com/uk/remotedesktop)

For reasons given in the text no recommendation was made for Unix/Linux systems.

The Working Group emphasised the point that use of an audit tool does not of itself constitute an auditing process. Much work is required thereafter to reconcile the discovered software with licences held either locally or centrally by the university.

Introduction

In 2003 the University Court approved a Software Licence Management Policy to ensure that the University fulfils its legal obligations in relation to software licensing. The key statement of policy is:

> "All software on computers owned by the University or attached to the University's network must be properly licensed, and all students, staff and visitors using these computers must comply with the licence terms. Copying of software contrary to licence terms is potentially software piracy and may result in disciplinary or legal action."

Implementing this policy can be broken down to 3 processes:

- Audit of the software on each machine
- Reconciliation of audit records with licences held
- Resolution of discrepancies between the previous 2 processes.

The remit of the working group (see Appendix 2) was to identify a tool to carry out the first process, and assist the second process.

The Software Audit Tools Working Group of the Technical Review Group was set up to investigate and identify a software package to assist in the implementation of the University's software licence management policy. A group of 7 staff, all with an involvement in software audit, was formed (see Appendix 1) and this report is the result of their investigations.

Background

Glasgow University has more than 10,000 computers in use by staff and students. The use of these computers falls into 3 main areas.

- *CSCE clusters*. Computers configured in the Common Student Computing Environment (CSCE) are targeted for use by students. CSCE is a tightly managed environment based on Microsoft Windows and networked using Novell NetWare. The user cannot add software.
- *SSD computers*. The Serviced Staff Desktop (SSD) is a managed environment aimed at staff. Based on Microsoft Windows and Novell NetWare, SSD allows for the user to add software.
- *The rest*. This group makes up the majority of computers in use within the University. A variety of operating systems and versions are in use, including Microsoft Windows, Apple MacOS, Linux plus various flavours of Unix. It is not easy to place these computers in a managed environment, given the mix of operating systems, but also the variety of users, with students and staff using the same computer, all wishing to add software as required. There is also the complication of computers attached to instruments, with the computer supplied by the instrument manufacturer in a set configuration. Most of the computers in this group are networked, but there are also a significant number of stand-alone computers in place.

Whilst user education may ensure that most software is properly licensed, the expectation of users being able to add software in an ad hoc manner places the university at risk of being unable to satisfy itself of compliance with its own software licensing policy. Within the last 4 or 5 years software tools have been developed to assist in the discovery of installed software and to assist record keeping in reconciling the installed software against licences purchased.

It should be recognised that responsibility for licence compliance is delegated to the faculty or department.

Criteria

With the remit of the working group established, the first stage was to define a set of criteria against which to measure the candidate software tools (see Appendix 3)

Discovery

The first set of criteria recognise the requirement to work with a variety of operating systems and the necessity to audit both networked and stand alone systems. The desired solution would enable the software discovery agent to be run on demand from the login script, without requiring a visit to the target computer for installation. The discovery agent must not depend on techniques which may open security holes. The time to complete the discovery has to be recognised, a faster discovery being less likely to result in user complaints.

The method of discovery is important, with the necessity to discover all software on the computer, rather than inspecting only the registry for installations. The requirement to discover all software leads to the desirability to mask out common packages.

Reconciliation

Once the discovery has taken place there is the larger task of reconciling the discovered software with the records of licence purchases. Here there is the necessity to record the different types of licence: site licences, bulk purchases, individual and others such as freeware. The method of matching installation to licence also has to be considered.

Reporting

There is a requirement to produce different types of report from the discovery and reconciliation processes. Consideration has to be given to the ease of modifying the included reports and creating new ones. The ease of distributing centrally created filters and reports also has to be considered.

The ability to report changes since the last audit is a high priority to assist the reconciliation process.

Database

The audit package must use an industry standard database format, rather than any proprietary database which forces dependence on the supplier. Use of a standard format will assist the support and ease the creation and deployment of filters and reports.

The devolved responsibility for licence compliance brings the requirement for easy partitioning of the database, and ability for multiple installations if required, so that faculties and departments can look after their own data.

Deployment

The costs of the package have to be considered, with the hope that special education pricing would be available. A variety of pricing models are in use by suppliers, from a cost per computer to site licences. Costs of support have also to be considered, from initial training, to first year support and subsequent support and upgrade costs.

Methodology

After clarification of the remit and setting the criteria, the first stage was to identify which packages to explore. An initial list was prepared from a previous survey, by Liz McAlavey of Computing Service, of software audit tools already in use on campus or had been previously investigated. A second canvas, by email, of suggestions for software, plus a search of the Internet produced a list of likely candidates (see Appendix 4).

Software cannot be evaluated by reading the software developers or retailers publicity material. To gain an impression of the suitability for purpose the only way is to see the software in action, either by downloading trial versions, as well as visits to sites with the software already in use.

Those software packages which could not be seen in action were given no further consideration. The available trial versions were collected and distributed to the group for examination and comment.

The group are grateful to East Dunbartonshire District, and Glasgow City Councils for allowing visits to see their implementation of packages under consideration. The group would also like to acknowledge Ken Murray for his work as convener in the initial period of the process.

Discussion

While discovery of programs on any given machine is straightforward, determining whether they are properly licensed applications is a complex and time consuming task. The diversity of the installed application base on campus does not fit well with the uniform picture of a typical organisation of the University's size where a small set of line of business applications make up the bulk of the installed software. This is mirrored in the devolved software purchasing model with procurement occurring at personal, departmental, faculty and campus level. There are a number of ways to tackle this problem two approaches are discussed and appropriate tools for each are identified.

Responsibility for carrying out software audit can be devolved to the lowest practical organisational unit. This has the potential to produce the best quality of audit with local knowledge ensuring that software is correctly identified and the correct licensing model is adopted for a given application. It should also accommodate instances where the same application is licensed in a different manner depending on its utilisation in multiple locations e.g. an application may be licensed under a teaching license in one department but used for commercial research in another. It is essential that the collected information can be consolidated at campus level for review of existing software commitments and to assist in considering new purchases though it is not essential that there is a high level of automation for this process as it is unlikely these statistics would be called upon frequently. This approach carries with it an element of risk, while the responsibility for the auditing process may be devolved, the corporate responsibility of demonstrating compliance will still lie at campus level. Safeguards should be put in place to ensure that the devolved process is being carried out adequately.

The VisionSoft Visual Audit Pro product fits well with this type of deployment. It is versatile in what it considers to be a licensable application and the type of licenses available but doesn't have as powerful query and reporting capability as some of the other applications. It is also unlikely to scale beyond use in a large department due to its reliance on a file based database. It should be quick to implement as it doesn't have any dependence on specific infrastructure such as database servers or directory services and is one of the more affordable solutions with a site license model keeping the recurrent costs down. The number of people involved in implementation of this solution will be large but the individual training should not be intensive.

The best product to provide this level of solution on the MacOS platform would be the Apple Remote Desktop product which is also available on a site license basis.

Alternatively it would be possible to implement a central audit facility perhaps at faculty or campus level to which every machine reports. The tool selected to do this would either need to allow multiple administrative staff to update the central configuration or a central maintainer would need good links with departmental purchasers/IT support staff to attempt to correctly identify the licensable applications. While a number of applications were a good fit with this type of deployment the Tally TS.Census application had the broadest platform support and presented a good balance between usability and configurability without placing significant demands for new supporting infrastructure nor being tied to existing infrastructure. This approach could be more tightly controlled than the devolved process with consolidated information being readily accessible. The software is significantly more expensive using a per-seat costing model, the start-up time is likely to be longer, a smaller group of staff will be required to be trained to a higher level than in the devolved case above.

Both of the above solutions are suitable for deployment within the existing campus managed desktop environments and both are suitable for use on network connected and standalone systems. Few of the available tools support Unix and Linux platforms and at this time their reporting functionality on these platforms is of the same standard that a system administrator running such platforms could collect with a basic script and so the group felt that investment in such products could not be justified. None of the products considered were flawless in their identification of software, most were confused by mixed installations e.g. Office 2000 + Outlook 2003.

While the correct tool will assist in the process, reconciling licensable applications with number of licences purchased will continue to be time consuming due to the devolved nature of software purchasing/installation and the constant changes introduced by software patches/updates. It is important that appropriate resource is provided to ensure that steps required to comply with the auditing policy can be carried out with minimum impact on the time of the staff involved.

One of the organisations visited by the group said that corporate membership of FAST had been beneficial to them in reaching their software auditing goals. They felt the organisation was approachable and helpful in guiding them with their efforts to define and implement software auditing policy and solution. This had a mixed reception from the group but may be worth considering if a formal audit certification process was felt to be desirable.

Recommendations

Given that the policy devolves the responsibility for the audit process across campus and the current absence of a common campus directory against which to implement the infrastructure to support an enterprise level solution, the recommendation is that the campus should adopt the VisualAudit Pro software as it’s recommended tool to assist the audit process for the Windows platform and Apple Remote Desktop to cover MacOS installations, as discussed above there is currently no recommendation for Unix/Linux platforms. To maximise the value obtained from the use of the software it would be recommended to purchase the software with a maintenance/subscription agreement allowing updating of both the software and the product fingerprint database.

Appendices

Appendix 1 – Membership

The membership of the group was chosen from across the University

Aileen Dickinson, Computing Service

Liz McAlavey, Computing Service

Barbara Wiseman, Computing Science

Kenny Stevenson, Aerospace/Mechanical Engineering (convener)

Mike Black, Arts

Mark Temple, Administration and Information Management Services

Ken Murray, IBLS

Appendix 2 – Remit

The remit of the group is

(1) To identify candidate packages for campus wide deployment in accordance with the following criteria.

- Cross platform capability (failing this, suitable packages for each of the common platforms on campus)
- Usability across network for remote scanning
- Usability in stand alone mode for non networked machines
- Filtering capability to allow option of excluding known licensed packages from reports
- Ability to initiate audits, tailor reports and filters at faculty/departmental level
- Licensing/Pricing
- Potential for integration with common campus staff/student desktops
- Incremental auditing capability
- Backend database recognisable and supportable

(2) To clarify the following related issues.

- Total cost of deployment to university
- Likely timescale for deployment
- How a filter file service should be provided and maintained

11th May 2004

Ken Murray, Working Group Convenor

Iain Logan, Deputy Director (Distributed Support) Computing Service.

Appendix 3 – Criteria

At a meeting of the working group the remit (appendix 2) was clarified into the following criteria:

Discovery:

- which platforms covered?
- run on demand
- run on schedule
- run via login script
- run on standalone
- does it use an installed agent? (security issues?)
- does it require admin privileges?
- filter out common windows packages at discovery
- time to complete a discovery
- use a signature database?
- must not use windows file & print sharing (or remote registry or any remote windows feature)

Reconciliation:

- does it record OS separately from applications?
- does it allow recording individual registration of licences purchased?
- does it record a licence to an installation?

Reporting:

- reporting changes since last audit
- report on last use of package
- ease of filter definition and modification (customisation)
- ease of report definition and modification (customisation)
- ease of filter deployment
- ease of report deployment

Database:

- does it use a standard recognised and supportable format (not proprietary)
- can it be partitioned for departmental use
- does licence allow multiple installations (for those that want to run their own server)
- ODBC connection

Deployment:

- price for site licence

- priced per node?
- timescale of rollout
- is training available for setup and use?

Appendix 4 – Software Explored

Supplier	Package	Platform	Notes
Alloy	Asset Navigator	Win32	www.alloy-software.com
Alloy	Network Inventory Navigator	Win 32	www.alloy-software.com
Apple	Remote Desktop	MacOs 8 or later	www.apple.com/uk/remotedesktop
Centennial	Discovery	DOS, Windows, MacOS X, Linux, Unix	www.centennial-software.com
iInventory	LANauditor (including MacAuditor)	Win 32 + Mac	www.iinventory.com
Lavalys	Everest Pro	Win 32	www.lavalys.com
Microsoft	Systems Management Server	Win 32	www.microsoft.com/smsserver
Novell	ZenWorks for Desktops, WS inventory	Win 32	www.novell.com
Sassafras	KeyServer (KeyAudit)	Win 32, Mac	www.lanmarque.co.uk
SoftTrack	SoftTrack	Win 32, Mac	www.softwaremetering.com
Tally Systems	TS.Census		
VisionSoft	Visual Audit Pro	DOS + Win 32	www.visionsoft.com/vap.asp

Appendix 5 – Commentary

Alloy Asset Navigator

Intended to be an overall asset management tool rather than being targeted specifically at software audit, this product contains help-desk and hardware asset modules. The inventory data is collected by an agent and written back to a configured network location from which it is periodically bulk loaded into a Microsoft Access database. The interface allows input of information relating to software/hardware purchases in addition to the information collected by the scanning agent.

Pros

- Able to merge family of products to allow coverage under a single license
- Customisable scan allows optional collection of data from end-user
- Exceptions/filters are exportable for use in other installations

Cons

- No obvious provision for uncounted/concurrent usage licenses in reporting
- Win32 platform only

Alloy Network Inventory Navigator

An entry level version of the above application, this uses a similar scanning agent but doesn't incorporate the help-desk applications nor many of the tools related to organising the collected data. Unfortunately it also loses the software asset tracking functionality and is therefore only suitable for producing small scale reports.

Pros

- Low cost

Cons

- Basic inventory capability

Apple Remote Desktop

Aimed as a remote administration application for networks of MacOS clients the audit functionality is little more than a dump of the list of hardware and applications registered on each machine.

Pros

- MacOS support
- Relatively low cost/site licensable

Cons

- Basic inventory capability
- Networked machines only

Centennial Discovery

As the name suggests this application contains tools to attempt to discover all networked equipment within an organisation. It achieves this using various network scanning methods including SNMP and WMI probing. It scans using a resident auditing agent which transfers it's findings back to a central server using TCP/IP and the data is then saved in a MS SQL database. The agent periodically checks in to see if an audit has been requested.

Pros

- Automatic discovery of hardware assets
- Change reporting for both hardware and software

Cons

- No concept of a site/floating/uncounted license
- No way to group products to be covered by a single license so minor revisions appear as new products

iInventory LANauditor (including MacAuditor)

This application collects hardware/software inventory data via a non-resident scanning agent which can write its results back to a network folder. It can be run via a login script, standalone from a floppy or by e-mail delivery. It supports scanning on Win32, Mac and Linux platforms though the software audit functionality is only for the Win32 platform.

Results are imported into an Access database or SQL/MSDE server (not tested). Unknown software resolution can be achieved via iInventory web site or manually.

Pros:

- Understands site/freeware/concurrent licenses
- User questionnaire: useful for determining location/asset tag on first run

Cons:

- 50% hits on software resolution
- Mac/Linux clients have to be created via the iInventory web site
- Documentation is poor, click on help when trying to add a license and it takes you to information about Licensing and registration for iInventory
- No obvious way to export the license rules.
- Unresolved software hits need to be uploaded to iInventory to allow future matching
- Unrefined interface

Lavalys Everest Pro

The scanning agent for this application can either be run during a login script, standalone or started automatically to allow remote connections and thus on demand scanning. The report data can be bulk loaded into many database backends and the software appears to be able to collect license information in the form of Product ID numbers from current Microsoft applications. It has change reporting functionality and some remote management features though the use of these is optional.

Pros

- Large variety of backend databases supported
- Remote connections to resident agent can be limited to specific hosts/networks if used
- Can report on application usage

Cons

- Documentation is poor with demo
- Only counts application installations

Microsoft Systems Management Server

Microsoft Systems Management Server (SMS) is a versatile and scaleable solution for many aspects of computer maintenance ranging from application deployment and patch management to user rights management and policy control. A resident management agent returns information which is stored in an MS SQL server (or MSDE) database. The inventory capability appears to be a secondary area of functionality for this product aimed more at reporting on the software deployed via the suite's other mechanisms than for the discovery and reconciliation cycle expected on Campus. Given the complexity of deployment the inventory capability would not be sufficient justification for a recommendation.

It is likely other aspects of the suite such as policy controlled patch roll-out will be desirable in the future maintenance of Campus systems.

Pros:

- Likely to be a low cost addition to the current Microsoft Campus Agreement
- Broad platform support

Cons:

- No asset tracking, inventory only
- Win32 clients only
- Requires ADS/NT4 Domains which are not currently widespread on Campus

Novell ZenWorks for Desktops, WS inventory

The inventory component of Zenworks for Desktops is part of a desktop management suite. It utilises Novell's eDirectory to control the schedule and scope of inventory collection and the destination of the details collected. It can facilitate enterprise roll-up of inventory data, enabling departmental, organisational unit or enterprise wide reporting.

It is only able to generate reports on installed software, it doesn't perform any asset tracking, change reporting, reconciliation. It may be possible to develop something like an Access database template in-house to do this. Novell have recently purchased Tally Systems and it is highly likely that the inventory technology will be incorporated into a future ZenWorks product.

Pros:

- Possible to deploy in Windows only, Netware only and mixed environment.
- Database backend can be Sybase/MS-SQL/Oracle
- Scanning works across firewall and from offsite via HTTP gateway (middle tier server)
- Standalone scan possible
- Portions of required agent already deployed in CSCE/SSD and others
- Enterprise roll-up of data
- Covered under our Novell Master Licence Agreement so no additional cost

Cons:

- No asset tracking, inventory only

- Win32 clients only, Linux in Zenworks 6.6
- Asking departments to deploy eDir when they don't currently use it
- Would be better if it could run against any LDAP/database backend with the appropriate schema e.g. ADS/OpenLDAP & JDBC/ODBC
- Only way to filter output is by clever query strings on reports or using custom scan which can miss too much

Sassafras KeyServer (KeyAudit)

This application is probably the most authoritarian of all the applications being considered and this stems from it's background as a licenses compliance suite rather than a software auditing tool. It's configuration involves the launching of every application on client computers being controlled/recorded by a central server. While the application can provide accurate usage information and if correctly configured guaranteed license compliance it does seem a very intrusive means of collecting software audit information.

Pros

- Guaranteed compliance if desired

Cons

- Intrusive
- Only suitable for networked machines

SoftTrack SoftTrack

Like the Sassafras product above SoftTrack has it's roots in licensing compliance/metering technology. By installing an agent on every machine it is able to control launching, creation and renaming of all executable files on a system. While this application can produce counts of the location and number of instances of a particular product and their usage it doesn't provide any means of recording whether a product is licensable or licensed.

Pros

- Guaranteed compliance if desired
- Fine grained control and audit capabilities

Cons

- Intrusive

Tally Systems TS.Census

Collecting information via an installed scanning agent the audit process for this application can be triggered via a login script or on demand in appropriate environments. The data is returned to a MS SQL database and can be reviewed using two mechanisms, a web interface on a MS IIS server and an administrative application running on a Windows PC. The vendor provided application signature database proved accurate at identifying products. The strength of this application lay in it's reconciliation and license management capabilities. Licenses can be entered with purchase order details and and these licences can be allocated to a group, dept or more importantly to an individual PC. It is therefore possible to drill down to a particular installation of a piece of software and pull out licence details and purchase order details for that instance. The system can be configured to run in an enterprise environment with multiple collections servers feeding into a central database. Tally Systems recommend a 3 day training course for administrators of a devolved system. Novell have recently aquired Tally Systems

and though they will continue to support an sell TS.Census it is likely that the inventory technology will be incorporated into a future ZenWorks version.

Pros

- Broad platform support
- Deals well with minor revisions/upgrades
- Doesn't report on core OS applications but will report on upgradeable components e.g. IE/Windows Media Player
- Web interface

Cons

- Dedicated infrastructure required: IIS/MS SQL
- Cost

VisionSoft Visual Audit Pro

This is a straightforward application which offers good application identification via a combination of a vendor supplied application signature database and manually created signatures. Updates to the vendor supplied database are offered via a subscription. Though it is possible to install a scan on demand agent the most likely implementation for machines on campus would be to invoke a scan via a login script or scheduler. On networked machines the application writes results back to a shared folder and this is bulk loaded into a file based database on an administrative workstation. Licences can be allocated as covering a whole site, a specific location/dept, a specific number of users at a site, a specific number of users at a location, a specific pc, or entered as freeware. Thus the reporting facilities reflect this, providing information on software/hardware/licences at global down to individual PC level.

Pros

- Cost
- Able to merge identified products to be covered by a single license
- Understands site/floating licenses

Cons

- Scalability

Appendix 6 – Features checklist

	Alloy Assett Navigator	Alloy Network Inventory Navigator	Apple Remote Desktop	Centennial Discovery	iInventory LANauditor	Lavalys Everest Pro	MS SMS	Novell Zenworks	Sassafras Keyserver	SoftTrack	Tally TS.Census	VisionSoft Visual Audit Pro
Discovery:												
which platforms covered?	Win32	Win32	MacOS ≥ 8	Win32, MacOS ≥ 8, HP-UX, Solaris/SPARC, Linux/x86	Win32, MacOS ≥ 8, Linux/x86	Win32	Win32	Win32	Win32, MacOS ≥ 7.5, Linux/x86	Win32	Win32, MacOS ≥ 8, Linux/x86	Win32
run on demand	✓	✓	✓	✓	×	✓	×	×	N/A	N/A	✓	✓
run on schedule	✓	✓	×	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
run via login script	✓	✓	×	✓	✓	✓	×	×	N/A	N/A	✓	✓
run on standalone	✓	✓	×	✓	✓	✓	×	✓	×	×	✓	✓
does it use an installed agent? (security issues?)	✓ optional	✓ optional	✓	✓ client push	×	✓ optional, can be configured to accept remote connections	✓ various components	✓ client push for audit component	✓	✓	✓	✓ optional
does it require admin privileges?[1]	×	×	×	×	×	×	×	×	×	×	×	×

[1] The completeness of a scan may be dictated by file system/registry permissions if the scan is performed with the rights of the user, those applications which install a resident agent typically have a complete view of the system

	Alloy Assett Navigator	Alloy Network Inventory Navigator	Apple Remote Desktop	Centennial Discovery	iInventory LANauditor	Lavalys Everest Pro	MS SMS	Novell Zenworks	Sassafras Keyserver	SoftTrack	Tally TS.Census	VisionSoft Visual Audit Pro
Filter out common windows packages at discovery	×	×	N/A	×	✓	N/A	✓	×	×	×	×	×
time to complete a discovery[2]												
use a signature database?	✓[3]	×	×	✓	✓	×	×	×	×	×	✓	✓
must not use windows file & print sharing (or remote registry or any remote windows feature)	✓	✓	N/A	✓	✓	✓	×	✓	✓	✓	✓	✓
Reconcilliation:												
does it record OS separately from apps?	✓	×	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
does it allow recording individual registration of licences purchased?	✓	×	×	✓	×	×	✓	×	✓	✓	✓	✓
does it record a licence to an installation?	✓	×	✓	✓	×	×	✓	×	✓	✓	✓	✓
Reporting:												

[2] This criteria was not considered as it is dictated by the depth of scan requested which is configurable on many products and is also dependent on client hardware

[3] Standard/Professional/Enterprise verions

	Alloy Assett Navigator	Alloy Network Inventory Navigator	Apple Remote Desktop	Centennial Discovery	iInventory LANauditor	Lavalys Everest Pro	MS SMS	Novell Zenworks	Sassafras Keyserver	SoftTrack	Tally TS.Census	VisionSoft Visual Audit Pro
reporting changes since last audit	×	×	×	✓	✓	✓	×	×	×	×	✓	✓
report on last use of package	×	×	×	✓	×	×	✓	×	✓	✓	✓	×
ease of filter definition and modification (customisation)	✓	✓	N/A	✓	✓	✓	✓	✓	✓	✓	✓	✓
ease of report definition and modification (customisation)	✓	✓	N/A	✓	✓	✓	✓	✓	✓	✓	✓	✓
ease of filter deployment	✓	✓	N/A	✓	✓	✓	✓	✓	✓	✓	✓	✓
ease of report deployment	✓	✓	N/A	✓	✓	✓	✓	✓	✓	✓	✓	✓
Database:												
Does it use a standard recognised and supportable format (not proprietary)	MS Access	MS Access	N/A	MS SQL	MS Access	MS Access, MS SQL, MySQL, PostreSQL, Oracle, Interbase	MS SQL	Sybase, Oracle, MS SQL	Proprietary	Proprietary	MS SQL	FoxPro Database
can it be partitioned for dept use	×	×	×	×	×	×	✓	✓	×	×	✓	×

	Alloy Assett Navigator	Alloy Network Inventory Navigator	Apple Remote Desktop	Centennial Discovery	iInventory LANauditor	Lavalys Everest Pro	MS SMS	Novell Zenworks	Sassafras Keyserver	SoftTrack	Tally TS.Census	VisionSoft Visual Audit Pro
does licence allow multiple installations (for those that want to run their own server)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ODBC connection	✓	✓	N/A	✓	✓	✓	✓	✓	×	×	✓	✓
Deployment:												
price for site licence[4]	~40K	~15K	212	~40K	~40K	~25K	Varies between agreements	Covered under current MLA	~20K	~20K	~5K	~5K
priced per node?			N/A				✓	✓	✓	✓	×	
Timescale of rollout	<3 months	immediate	immediate	3-6 months	3-6 months	<3 months	9-12 months	3 months	3 months	3 months	6-9 months	<3 months
is training available for setup and use?			no				yes	yes			yes	yes

[4] vendors were unable to give a commitment to pricing preferring to negotiate once a decision was made on which product was to be purchased