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INVENTORY MANAGEMENT PLAN FOR A RESEARCH AND DEVELOPMENT LOCAL AREA NETWORK

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ACRONYMS

DOE	(U.S.) Department of Energy
DSRD	Data Systems Research Division
ICM	inventory control manager
IM	inventory management
IMDB	inventory management database
LAN	local area network
PC	personal computer
PM	project manager
RTM	research team member

1. ABSTRACT

An inventory management plan is presented for the local area network (LAN) for the Security Aspects of Database Management Systems, a Department of Energy (DOE)–sponsored project examining computer and network security in a data management environment. The inventory management plan establishes procedures to ensure that changes in system hardware and software are identified and controlled. Management tools are described, and the roles of the project manager, inventory control manager, and research team members in the implementation of inventory management are defined.

2. INTRODUCTION

2.1 Project Background

The local area network (LAN) (Figure 1) supports a Department of Energy (DOE)–sponsored project, Security Aspects of Database Management Systems. The goal of this project is to perform research on the application of computer and network security procedures in a data management environment. The Data Systems Research Division (DSRD) will install, operate, and maintain the LAN. The research will involve the installation and evaluation of distributed, trusted database systems in a heterogeneous computing environment.

2.2 Objectives of Inventory Management

The objective of the inventory management (IM) plan is to provide mechanisms to ensure that changes in system hardware and software are identified and take place in a controlled manner. The application of IM is critical where network hardware configuration and software evaluation are important elements of the project and where, due to the nature of the research, changes occur frequently. While inventory management measures require some effort, they significantly reduce the potential for hardware and software failure, and network vulnerability.

A primary goal of the IM plan is to establish procedures and guidelines for the proposal, implementation, and documentation of inventory changes. Another goal is to establish individual roles for the program manager, inventory control manager, and research team members, so that it is clear who is responsible for each IM procedure. Specifically, in the following sections we describe (1) project IM tools, (2) procedures for hardware control, (3) procedures for software control, and (4) contingency planning.

3. MANAGEMENT TOOLS

A person having responsibility for inventory management will be designated as the inventory control manager (ICM). The ICM will maintain a set of central IM tools, including an inventory management database (IMDB) and IM notebooks containing documentation developed by research team members (RTMs). A central IM notebook will contain updated tables generated with the IMDB following significant inventory changes.

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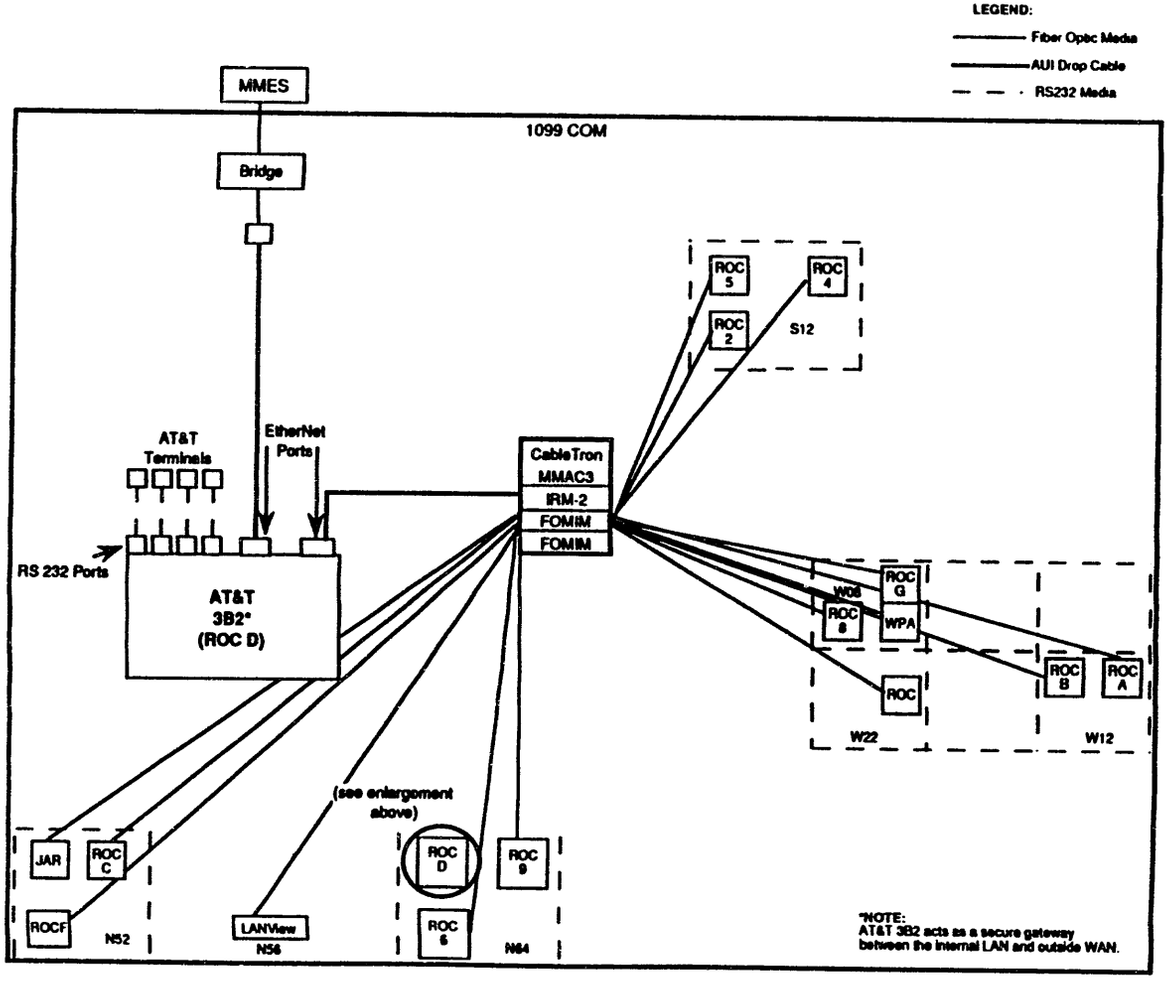

Figure 1
DSRD Security R&D LAN

3.1 Inventory Management Database

The ICM will develop and maintain an IMDB to store and access critical information on project resources. The IMDB will be updated regularly in order to track the status of items under inventory control.

The IMDB is a relational database using the ORACLE database management system and consists of three tables containing information on the state of (1) the network configuration, (2) project hardware, and (3) project software. The IMDB is created, queried, and manipulated using the standard language SQL. This implies a great deal of flexibility, in that the IMDB may be easily ported to different nodes with varying machine architectures and database management systems.

The IMDB contains project-specific information such as purchase data, installation notes, property identification numbers, and network addresses. The SQL tables, relating the elements of hardware and software fields to their network node, are described in Tables 1–3.

3.2 Inventory Notebooks

A central IM notebook will be maintained by the ICM and stored in a locked cabinet in the office of the ICM. The central notebook will contain a copy of the Local Area Network (LAN) plan,[1] including a network description and configuration drawing. The central IM notebook will also contain tables, generated with the IMDB following a significant inventory change, summarizing the present state of network hardware and software.

IM node notebooks, clearly labeled with the network node name (e.g., DSROC6), will be maintained by the ICM and located on a shelf in the office containing the equipment associated with that node. The node notebooks will contain more detailed documentation (e.g., installation notes, defaults taken) specific to that node and will be updated by the RTM who is responsible for a particular hardware or software change.

Table 1. The node table

Column	Field	Name	Format
1	Node name	NODENAME	CHAR(6)
2	Computer type	COMPTYPE	CHAR(20)
3	IP address	IPADDR	CHAR(15)
4	IP name	IPNAME	CHAR(21)
5	Hardware address	HARDADDR	CHAR(12)
6	Registered user	USERNAME	CHAR(20)
7	Registered User ID	USERID	CHAR(12)
8	Location (building)	BLDG	CHAR(12)
9	Room	ROOM	CHAR(6)
10	Operating system	OPER_SYS	CHAR(12)
11	Version number	VERSION	CHAR(12)
12	Memory size	MEMORY	NUMBER(10)
13	Disk space	DISKSIZE	NUMBER(10)
14	System notes	NOTES	CHAR(100)

Table 2. The hardware table

Column	Field	Name	Format
1	Hardware	HARDWARE	CHAR(20)
2	Installed on node (name)	NODENAME	CHAR(6)
3	Manufacturer	MANUFACT	CHAR(20)
4	Model	MODEL	CHAR(12)
5	Serial no.	SERIALNO	CHAR(20)
6	Property no.	PROP_NO	CHAR(8)
7	Capital equipment no.	EQUIP_NO	CHAR(8)
8	Purchase requisition no.	P_REQ_NO	CHAR(12)
9	Purchased from (vendor)	VENDOR	CHAR(20)
10	Date ordered	P_DATE	DATE
11	Date received	R_DATE	DATE
12	Date installed	I_DATE	DATE
13	Price	PRICE	NUMBER(8,2)
14	Comments	NOTES	CHAR(100)

Table 3. The software table

Column	Field	Name	Format
1	Software (name)	SOFTWARE	CHAR(20)
2	Installed on node (name)	NODENAME	CHAR(6)
3	Version	VERSION	CHAR(12)
4	Serial number	SERIALNO	CHAR (20)
5	Developer (internal/commercial)	DEV_NAME	CHAR(20)
6	Media (type/location)	MEDIA	CHAR(40)
7	Location of manuals	DOC_LOC	CHAR(40)
8	Installation date	I_DATE	DATE
9	Modification date	M_DATE	DATE
10	Deinstallation date	D_DATE	DATE
11	Installation path (loc.)	INSTPATH	CHAR(40)
12	Installation instructions (ref. to config. notes)	INST_REF	CHAR(40)
13	Purchase req. no.	P_REQ_NO	CHAR(12)
14	Vendor	VENDOR	CHAR(20)
15	Price	PRICE	CHAR(10,2)
16	License conditions maintenance/upgrade notes (e.g., eligibility, license, when purchased, when performed)	LICENSE	CHAR(40)
17	Comments	NOTES	CHAR(100)

4. HARDWARE CONTROL PROCEDURES

A baseline hardware inventory is defined by the project hardware configuration at the time the LAN plan is implemented. The baseline network node configuration is given in Table 4. Changes to this baseline include, for example, upgrading a workstation architecture, adding a tape drive, or moving a disk from one machine to another. Specific procedures must be followed in order to maintain control over the evolution of the network hardware.

4.1 Hardware Changes

The IM procedure for control of hardware modifications to the network is as follows:

1. Proposals to change the hardware configuration will be reviewed with the project manager (PM) and RTMs.
2. The RTM implementing a change will notify the ICM when the change is made, providing the necessary data for updating the IMDB.
3. The RTM implementing a change will provide the appropriate documentation (e.g., installation notes, property transfer records) in the IM node notebook.
4. The person with responsibility for IM will modify the IMDB, generate and print tables describing the present state of the network hardware, and replace these tables in the central IM notebook.

4.2 Purchased Items

Additional procedures are required to control hardware changes involving new purchases. These procedures will be carried out by the RTM responsible for the purchase:

1. Purchase orders and warranty information will be given to the PM.
2. Copies of purchase orders and warranty information will be given to the ICM, who will retain them in the IM node notebook and use information from them to update the IMDB.
3. The ICM will be notified when the purchased items are received and when they are installed.
4. The ICM will be provided with any available information on product support and/or vendor contacts (e.g., name, phone, date of contact) to include in the IM notebook near the network node.

Table 4. The LAN node configuration				
Node	IP address	Computer	Building	Room
DSROC	128.219.094.001	VAXstation 3100	1099 COM	W22
DSROC2	128.219.094.002	Northgate PC	1099 COM	S12
DSROC4	128.219.094.003	NeXT Computer	1099 COM	S12
DSROC5	128.219.094.004	SUN SPARCstation 2	1099 COM	S12
DSROC6	128.219.094.005	SUN SPARCstation 10	1099 COM	N64
DSROC7	128.219.094.006	SUN SPARCstation 2	FOB	G36
DSROC8	128.219.094.007	Northgate PC	1099 COM	W08
DSROC9	128.219.094.008	IBM PS/2 PC	1099 COM	N64
DSROCA	128.219.094.009	Northgate PC	1099 COM	W12
DSROCB	128.219.094.010	IBM PS/2 PC	1099 COM	W12
DSROCC	128.219.094.011	SUN SPARCstation 2	1099 COM	N52
DSROCD	128.219.094.012	ATT 3B2/600	1099 COM	N64
DSROCE	128.219.094.013	ATT 3B2/600	FOB	G36
DSROCF	128.219.094.014	HP 720	1099 COM	N52
DSROCG	128.219.094.015	IBM AT/PC	1099 COM	W08
DSWPA	128.219.094.016	NeXT Computer	1099 COM	W08
DSJAR	128.219.094.017	Northgate PC	1099 COM	N52

5. SOFTWARE CONTROL PROCEDURES

The baseline software inventory is defined as the system and application software at the time the LAN plan is implemented. Changes will occur frequently and may include, for example, the installation of a new operating system, operating system security patches, a new version of the database management system, or changes in the network backup software. The software inventory includes internally developed tools, shareware, and commercial software products.

5.1 Software Changes

In general, the procedures listed here apply to commercial products and system software, and not to temporary routines developed and used by individuals in their user directories. The procedure for software inventory control is as follows:

1. Proposals to install or deinstall commercial and/or system software will be reviewed by the PM and RTMs.
2. The RTM implementing a software change will notify the ICM when the change is completed, providing the necessary data for updating the IMDB.
3. The person implementing the change will log detailed instructions for the installation and use of the software, including references to existing documentation, in the IM node notebook, and sign and date the log. Installation media will be placed in a locked cabinet.
4. The ICM will update the IMDB, generate and print tables reflecting the present state of the network software, and replace those tables in the central IM notebook.

5.2 Commercial Software

Additional procedures are required to control changes involving commercial software. These procedures will be carried out by the RTM responsible for the purchase:

1. Purchase orders and license documentation will be given to the PM.
2. Copies of purchase orders and license agreements will be given to the ICM, who will place them in the IM node notebook and use the purchase information to update the IMDB.
3. The ICM will be notified when the purchased items are received and when they are installed.
4. The ICM will be given any available information on product support and/or vendor contacts to include in the IM node notebook.

5.3 PC Software

1. Personal computer (PC) self-audit software will be used to check network PCs for software license compliance. PCs will be audited by the ICM at least four times per year. PCs assigned to an individual RTM are subject to inspection at any time, and the RTM is responsible for license compliance. PC software license information and/or documentation will be stored in a cabinet in the same office as the equipment.
2. Prior to the installation of PC executable software, a virus check will be made.

6. CONTINGENCY PLANNING

A fireproof and waterproof project safe is used to store system backup tapes and logs. In addition, copies of critical and non-replacable installation notes and procedures from the node notebooks will be retained in the safe. Software and files can be restored to existing or alternate hardware in the case of file destruction or if disaster recovery is necessary.

Specific workstation file systems are backed up according to a designated schedule. A network backup script, running the UNIX **dump** utility remotely under **rsh**, is executed by the **cron** utility five nights per week. An example of the backup schedule, an input file for the backup script, is given in Table 5. Backup tapes will be replaced daily, and backup tapes and logs will be stored in the project safe on a daily basis, by a designated RTM.

Table 5. The schedule file for the network backup script

local	SUN5X	/dev/rdsk/c0t3d0s0	Fri	# /
		/dev/rdsk/c0t3d0s5	Fri	# /opt
		/dev/rdsk/c0t3d0s6	Fri	# /usr
		/dev/rdsk/c0t1d0s2	Tue	# /data5
		/export/home	*	# /export/home
dsroc4	NEXT	/dev/sd0a	*	# /
dsroc6	SUN4X	/dev/rsd0a	Fri	# /
		/dev/rsd0g	Fri	# /usr
		/dev/rsd1g	Mon	# /data1
		/dev/rsd1h	Mon	# /data2
		/dev/rsd3g	*	# /home1
		/dev/rsd3h	Wed	# /home2
dsrocf	HP	/dev/dsk/6s0	*	# /
dsroc5	SUN4X	/dev/rsd0a	Fri	# /
		/dev/rsd0g	Fri	# /usr
		/dev/rsd3g	*	# /home 1
		/dev/rsd3h	Wed	# /home2
dswpa	NEXT	/dev/sd0a	*	# /

7. SUMMARY

An inventory management plan has been developed to identify and control LAN system changes. Procedures are designed to provide inventory management in a dynamic research and development network environment. The roles of project members in the implementation of inventory control are defined.

8. REFERENCES

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