



JCDC Backup and Records Retention: Current Practices and Issues

Author	Systems Administration Group	Simon Medrano, Joan Maltese
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1. Overview

This document describes Job Corps Data Center's program for backing up and retaining data. It is intended to enable managers and system administrators to address such issues as inefficiencies, redundancies, and insufficient storage space in the program. Hence, it focuses on the long-term storage component of the backup system and does not include the continuous replication component that enables recovery from an incident such as a power outage.

2. Status

Servers dedicated to retaining backups in the Austin and Richardson data centers are both overflowing. This is because JCDC's backup and retention requirements are constantly expanding. Data beyond the core requirements (CDSS, SPAMIS, emails, security logs, and user data) is being backed up and retained for anywhere from 2 weeks to 1 year.

Each data center has a media server with a 60-TB capacity, intended to retain backed up data for 6 months. Data is actually expiring every 1–2 months, at which point it must be replicated to tape.

Tape media has 2 disadvantages. One is **space**. Data cannot be deduplicated when it is replicated to tape; in fact, it must be "rehydrated" to its original volume. The other is **expense**; as tapes accumulate at the Austin data center, they must be shipped to Iron Mountain for storage.

3. Requirements

3.1. Data backups

JCDC conducts data backups in compliance with the U.S. Department of Labor (DOL) policies. JCDC system owners must perform daily incremental and weekly full backups of user-level information, system-level information, and system documentation (including security-related documentation).

Other files and databases internal to JCDC are backed up per the directions of the owners or the Systems Administration Group.

3.2. Data retention

E-mails and user files must be retained for 6 months per DOL mandate.

In addition, data and transaction logs on the CDSS and SPAMIS databases and the Job Corps Data Center are retained per internal JCDC retention policies.

Other files and databases internal to JCDC are retained per the directions of the owners or the Systems Administration Group.

3.3. Summary

The following table summarizes JCDC data backup and retention practices.

Data	Backup media*	Retention period	Authority
E-mail	2 copies on disk, 1 on tape	6 months	DOL
User data (held in NDMP environment)	2 copies on disk, 1 on tape	6 months	DOL
Security logs	2 copies on disk, 1 on tape	1 year	Job Corps
CDSS/SPAMIS (Production data and transaction logs)	2 copies on disk, 1 on tape	3 years	Job Corps
CDSS/SPAMIS select backups: <ul style="list-style-type: none"> • End of program year • End of calendar year • W-2 data 	1 on tape	Indefinite	Job Corps
Internal: System and configuration files (TFS, StarTeam, Citrix, AD, etc.) and non-production databases and file servers	Per directions of owner or sys admin	2 weeks to 1 year depending on directions of owner or Sys Admin	Job Corps
IT Manager's PC	2 copies on disk, 1 on tape	1 year	Job Corps

*Does not include master copy

4. Architecture and flow

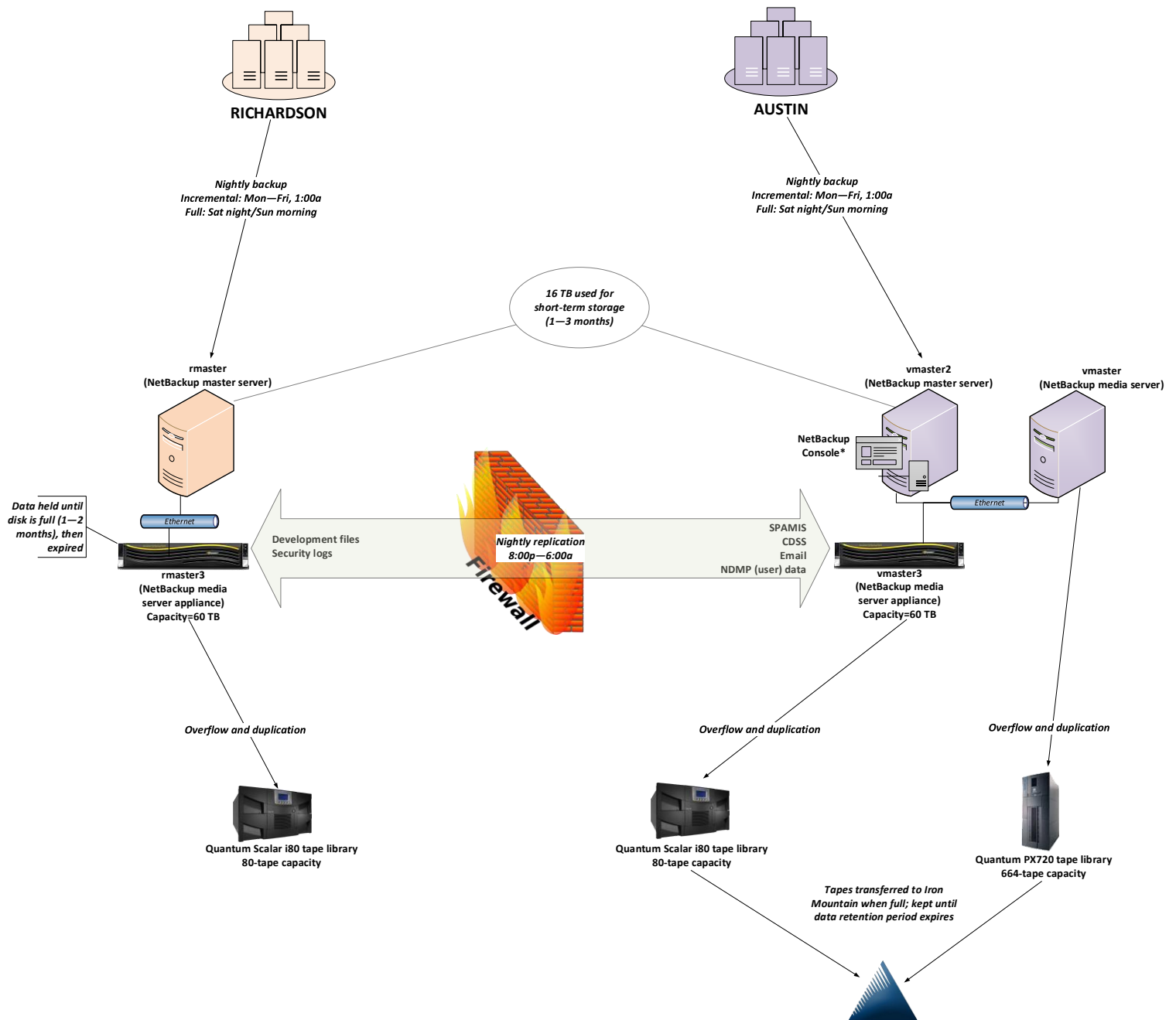
JCDC backup and retention architecture is a tiered system that consists of:

Tier 1	Tier 2	Tier 3
VNX Snapshot and Replication technologies	Disk space managed by Veritas NetBackup v. 7.6	Quantum PX720 tape library (640-tape capacity: LT03 tapes, 800GB capacity each, up to 1.2 TB with compression) Quantum Scalar i80 tape library (80-tape capacity: LT04 tapes, 1.2 TB capacity each, up to 1.6 TB with compression)

This document is concerned with Tiers 2 and 3.

The Veritas NetBackup environment is shown in Figure 1.

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*Can provide GUI for Richardson

Figure 1 – Veritas NetBackup environment

4.1. NetBackup policies and clients

All backups are scheduled via the NetBackup Administration console. Thirty-six (36) policies define the schedules, clients, and backup selections; 2 additional policies are defined to back up the NetBackup catalog itself (the database of information about backups and configuration) and any data set or client that must be backed up on the fly. A basic rule for most clients is daily differential/incremental backups Monday through Friday and weekly full backups from Saturday night to Sunday morning.

Data is backed up to disk first. The most critical data—Job Corps production data (SPAMIS and CDSS), email, user data originating at the Richardson data center, and development files and security logs originating at the Austin data center—is then replicated nightly to another disk copy in the opposite data center. This replicated data is then duplicated to tape on a nightly basis.

4.2. Iron Mountain

At the Austin data center, taped copies of full backups are held onsite until the tapes are full, at which time the tapes are transferred to a fireproof safe onsite. Once a week, the full tapes are sent to the Iron Mountain repository on 6600 Metropolis Drive in Austin. They are kept at Iron Mountain until the retention period for the data they contain expires; they are then sent back to the Austin data center for reuse.

5. Backup volumes

The following table details the volume of data backed up and retained, based on backups performed in December 2015.

Business Purpose	No. of clients	Retention	Backup volume: full	Deduplication	Backup volume: incremental	Deduplication
CDSS/SPAMIS	2	3 years full 3 years incremental	1.07 TB	47.19 GB	513.39 GB	47.19 GB
End of PY End of CY W-2	*2	<i>Full: indefinite</i>	<i>1.07 TB</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
Email	1	6 months full 6 months incremental	2.208 TB	1.66 GB	105 GB	46.20 GB
Internal	21	2 weeks full 2 weeks incremental	1.757 TB	1.605 TB	1.217 TB	1.119 TB
	18	1 month full 1 month incremental	2.552 TB	751.93 GB	1.012 TB	478.56 GB

Business Purpose	No. of clients	Retention	Backup volume: full	Deduplication	Backup volume: incremental	Deduplication
	15	3 months full 3 months incremental	1.195 TB	477.21 GB	1.073 TB	348.61 GB
	9	3 months full 10 days incremental	1.413 TB	1.370 TB	1.229 TB	1.208 TB
	6	3 months full no incremental	2.741 TB	2.314 TB	N/A	N/A
	4	3 months full 2 weeks incremental	1.562 TB	885.03 GB	722.05 GB	279.23 GB
	3	1 year full 1 year incremental	713.98 GB	699.18 GB	941.10 GB	895.43 GB
	2	1 year full 1 month incremental	37.76 GB	37.38 GB	22.88 GB	22.88 GB
	1	1 month full no incremental	245.20 GB	230.49 GB	N/A	N/A
	1	4 weeks full no incremental	236.10 GB	141.42 GB	N/A	N/A
	1	6 months full 6 months incremental	2.254 TB	2.247 TB	41.00 GB	40.55 GB
JCWeb	3	1 year full 10 days incremental	129.95 GB	None	55.34 GB	None
Security	1	1 year full 1 year incremental	1.432 TB	1.388 TB	36.64 GB	30.81 GB
	2	1 year full 10 days incremental	501.70 GB	268.83 GB	23.42 GB	22.65 GB
	1	3 months full 3 months incremental	228.00 GB	None	228.50 GB	22.65 GB
Linda Estep's PC	1	1 year full 1 year incremental	77.55 GB	76.00 GB	23.87 GB	214.79 GB

Business Purpose	No. of clients	Retention	Backup volume: full	Deduplication	Backup volume: incremental	Deduplication
User data	2	6 months full 6 months incremental	6.436 TB	6.28 TB	675.88 GB	666.63 GB
Totals	96		26.790 TB	6.356 TB	7.920 TB	5.443 TB

*This is a backup of the same clients as above; the volumes can be considered the same or similar.

6. Additional issues and solutions

The following issues with JCDC's backup and retention policies have been identified, some of which contribute to the initial problem (scarcity and expense of backup media and the complexity of multiple storage formats), others of which undercut data security.

1. Missing servers

Research for this document revealed that some servers are not included in the NetBackup policies and therefore are not being backed up. JCDC seems to lack safeguards, whether enforced by business rules or by software, that ensure that new servers being brought online be added to a backup and retention schedule.

2. Misdescribed servers

Research for this document revealed that some servers have changed ownership or purpose several times and their backup and retention policies are obsolete, usually resulting in excessive use of resources. One such server has a backup and retention policy of one year for both full and incremental backups; the owner states that 2 weeks would suffice. This means unnecessary usage of tape storage and Iron Mountain services.

3. Nonadherence to JCDC security requirements

Research for this document revealed that owners and system administrators do not consult JCDC written policy for data backup and retention when creating NetBackup policies. Several servers that were not being backed up were added to the NetBackup schedule with no reference at all to administrative policy. JCDC policy is reproduced from *JCDC Policy and Procedures* documentation in [Appendix A](#).

4. Inappropriateness of JCDC security requirements

Research for this document revealed that some owners do not agree with the data categories set forth in JCDC's security requirements. Some owners say that new categories are required, and some disagreed on how to categorize the same type of data.

The following are possible solutions.

1. Have the owners of JCDC security requirements work with data owners to establish meaningful data categories.
2. Educate owners and system administrators on JCDC backup and retention policies.
3. Institute regular reviews of NetBackup policies by the owners to ensure that all servers are being backed up appropriately. See the [Sample backup and retention review form](#) below.
4. Change to a cloud service (under discussion).

6.1. Sample backup and retention review form

The following is an example of a checklist that could be circulated regularly to owners to ensure that information on servers is up to date and that backups and records retention practices are appropriate.

Owner: Dave Kelso

Date: March 1, 2016

Client Name	Hardware/OS	Business Purpose	Backup Retention	Recommendation
rich-v-ssd-001	Windows-x64/ Windows 2012	Session State DB for CDSS	Full and Incremental 1 Year	
JCDC-D-IQS-001	Windows-x64/ Windows 2003	Monitoring SQL	Full with 4 week retention. No incrementals	
jcdc-s-iq-001	Windows-x64/ Windows	Data Warehouse	Incremental 2 week retention, Full 3 Month retention	
jcdc-s-sqp-001	Windows-x64/ Windows 2003	SQL Production Center Website and other stuff	Incremental 10 days disk only, Full 1 Year on tape only	
jcdc-s-sqp-002	Windows-x64/ Windows 2003	SQL Production	Incremental 10 days disk only, Full 1 Year on tape only	
JCDC-S-SQPV-00	Windows-x64/ Windows 2008	SQL Production	Incremental 10 days disk only, Full 1 Year on tape only	
jcdc-v-iqs-001	Windows-x64/ Windows	IQ/DB monitoring	Full 1 month	
jcdc-v-iqs-002	Windows-x64/ Windows 2008	IQ/DB monitoring	Full and Incremental 1 month	
jcdc-v-sdb-001	Windows-x64/ Windows 2008	SQL Database	Full 3 months, Incremental 3 months	
JCDC-V-SQL-003	Windows-x64/ Windows 2008	SQL	Full 3 months, Incremental 2 weeks	
<i>Others (list)</i>				

7. References

Job Corps Contingency Planning Policy and Procedures. (2015, February).

National Institute of Standards and Technology. (2004). FIPS PUB 199. *Standards for Security Categorization of Federal Information and Information Systems*. Retrieved January 2016, from <http://csrc.nist.gov/publications/fips/fips199/FIPS-PUB-199-final.pdf>

OCIO Memorandum. (2010, August). Department-wide Uniform E-mail and Electronic Document System Recovery Media Retention Policy.

8. Appendix A: JCDC backup and retention policy

Data Set	Criticality	Tier 2	Tier 3	Offsite Tape	Retention	Notes
Production Databases	High	NetBackup Disk Pool	Tape Library	Yes	3 years	Production databases are defined as those that service production applications and contain data critical to the operation of the Job Corps program. The proposal is to run a full backup and then differentials every day. Data will remain on disk for a period of a month. A full monthly backup will be sent offsite and the differential backups will be deleted after the full monthly backup is taken.
Non-Production Databases (Dev, QA, Prod Test)	Medium	NetBackup Disk Pool	Tape Library	No	None	Non-Production databases (Dev, QA, Prod Test). Data are dumped to disk for a period of two days and then the oldest copy will be deleted
VNX CIFs Servers and File Systems (Production file and Print)	Medium	NetBackup Disk Pool	N/A	No	6 months	This data set includes user data including home directories, user-created data, and shared center data. Currently using NDMP to backup file systems to VNX storage pool. We need to review NDMP setup as it is taking up a considerable amount of disk space.
Exchange	Medium	NetBackup Disk Pool	N/A	No	6 months	This data set includes all user e-mail. We are required by DOL policy to be able to recover e-mail from the previous 6 months. If feasible this data should reside on the Netbackup Disk Pool only.
Development and Quality Assurance Servers	High	NetBackup Disk Pool	Tape Library	Yes	6 months	The development Q/A classification would include all of the data used for developing applications or systems. This data is not production, although it may be eventually promoted to production status. This is a broad data set that includes databases, application code, test data sets and other data related to the development of any Job Corps systems.
Unified Communication Manager/Unity Connection	High	NetBackup Disk Pool	N/A	No	6 months	Unified Communications Manager Database and Unity Connection Database
Internal Systems (Remedy, StarTeam, MAS, etc.)	High	NetBackup Disk Pool	Tape Library	Yes	3 years	Internal systems critical to the operation of the JCDC
VMware Virtual Machine Data Stores (Provisioning Servers and nonprovisioned VMs)	High	NetBackup Disk Pool	N/A	No	6 months	VM backups are for nonprovisioned servers where the OS configuration is such that it can't be easily rebuilt or there is some other compelling reason to back up a specific system.
Development File Servers	Medium	NetBackup Disk Pool	N/A	No	6 months	Development file server data
CDSS Prod File Servers	Medium	NetBackup Disk Pool	Tape Library	Yes	3 years	CDSS Production File Servers
Active Directory Servers (Domain Controllers, DNS Servers)	Medium	NetBackup Disk Pool	N/A	No	6 months	Active Directory DCs/DNS, etc.
Security Servers	Medium	NetBackup Disk Pool	N/A	No	6 months	Security

9. Appendix B: List of NetBackup policies

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
1.	DAG1	Windows-x64	Windows2008	Email	Karl Rudolph	Full and Incremental 6 month retention	2.208 TB	75.06%	105 GB	44%
2.	impag-jc-blaise	Windows-x86	Windows2008	Impaq data	Lucas Jones/ Gregg Colvin	Full and Incrementals with 3 month retention.	21.18 GB	92.70%	12.95 GB	99.70%
3.	Impag-jc-interf	Windows-x64	Windows2008	Impaq data	Lucas Jones/ Gregg Colvin	Full and Incrementals with 3 month retention.	24.35 GB	87.70%	12.47 GB	99.70%
4.	impag-jc-sas	Windows-x86	Windows2008	Impaq data	Lucas Jones/ Gregg Colvin	Full and Incrementals with 3 month retention.	232.1 GB	49.90%	25.59 GB	98.00%
5.	JCDC-D-DFS-001	NDMP	NDMP	Dev	Gregg Colvin	Full and Incrementals with 6 month retention.	2.254 TB	99.70%	41 GB	98.90%
6.	JCDC-D-IQS-001	Windows-x64	Windows2003	Monitoring SQL	David Kelso	Full with 4 week retention. No incrementals	236.1 GB	59.90%	N/A	N/A
7.	jcdc-pt-jag-001	Windows-x64	Windows2008	Q/A	Glen Ely	Full and incrementals with 2 week retention	5.843 GB	99.70%	134.9 MB	72.90%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
8.	jcdc-pt-web-001	Windows-x64	Windows2003	Q/A	Glen Ely	Full and incrementals with 2 week retention	5.836 GB	95.00%	8.5MB	95.00%
9.	jcdc-q-jag-001	Windows-x64	Windows2008	Q/A	Glen Ely	Full and incrementals with 2 week retention	7.054 GB	98%	3.07 GB	96%
10	jcdc-q-web-001	Windows-x64	Windows2003	Q/A	Glen Ely	Full and incrementals with 2 week retention	7.054 GB	100%	3.07 GB	100%
11	jcdcrs10	RS6000	AIX6	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full 1 month, Incremental 1 month	17.71 GB	N/A Adv. Disk	1.216 MB	N/A Adv. Disk
12	jcdcrs11	RS6000	AIX6	SPAMIS QA	Richard Barnett/ Simon Medrano	Full 1 month, Incremental 1 month	59.84 GB	N/A Adv. Disk	4.512 MB	N/A Adv. Disk
13	jcdcrs15	RS6000	AIX53	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full 1 month, Incremental 1 month	15.99 GB	95.90%	196.1 MB	99.30%
14	jcdcrs3	RS6000	AIX6	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full 1 month, Incremental 1 month	2.295 GB	N/A Adv. Disk	0.224 MB	N/A Adv. Disk

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
15	jcdcrs4	RS6000	AIX6	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full 1 month, Incremental 1 month	1.502 GB	N/A Adv. Disk	1.44 MB	N/A Adv. Disk
16	jcdcrs5	RS6000	AIX6	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full 1 month, Incremental 1 month	468.6 GB	N/A Adv. Disk	27.12 GB	N/A Adv. Disk
17	jcdcrs6	RS6000	AIX6	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full 1 month, Incremental 1 month	2.679 GB	N/A Adv. Disk	3.072 MB	N/A Adv. Disk
18	jcdcrs7	RS6000	AIX6	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full 1 month, Incremental 1 month	887.8 GB	N/A Adv. Disk	482.4 GB	N/A Adv. Disk
19	jcdc-s-csw-012	Windows-x64	Windows2003	Q/A	Glen Ely	Full and incrementals with 2 week retention	109 MB	95.50%	9.368 MB	95%
20	jcdc-s-ewc-002	Windows-x64	Windows2008	External Webserver	Gregg Colvin	Full and incrementals with 2 week retention	1.262 GB	98%	1.217 GB	98%
21	jcdc-s-ewc-003	Windows-x64	Windows2003	External Webserver	Gregg Colvin	Full and incrementals with 2 week retention	1.265 GB	99.80%	309.5 MB	99.80%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
22	jcdc-s-iq-001	Windows-x64	Windows	Data Warehouse	David Kelso	Incremental 2 week retention, Full 3 Month retention	275.5 GB	To Tape, No Dedup	2.22 GB	98.10%
23	jcdc-ss-bcr-001	Linux-IA64	RedHat2.6	Security	Tommy Chan	Full and Incrementals 1 Year	1.432 TB	96.90%	36.64 GB	84.10%
24	jcdc-ss-bfs-001	Windows-x64	Windows2008	Security	Tommy Chan	Full with 3 month retention. 10 day retention incrementals on disk only	82.43 GB	97.80%	207.9 GB	94.50%
25	jcdc-ss-dbm-001	Windows-x64	Windows2008	Security	Tommy Chan	Full with 3 month retention. No incrementals	2.063 TB	87.40%	284 GB	9.50%
26	jcdc-ss-epo	Windows-x64	Windows2008	Security	Tommy Chan	Full with 3 month retention. 10 day retention incrementals on disk only	89.34 GB	98%	16.8 GB	98.40%
27	jcdc-ss-lnx-001	Linux-IA64	RedHat2.6	Security	Tommy Chan	Retain current policy of full backups for 1 year	169.6 GB	99.40%	1.34 GB	95.20%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
28	jcdc-ss-log-001	Linux-IA64	RedHat2.6	Security	Tommy Chan	Retain current policy of full backups for 1 year	105.3 GB	95.20%	14.84 GB	95.60%
29	jcdc-ss-nes-003	Linux-IA64	RedHat2.6	Security	Tommy Chan	Full with 3 month retention. No incrementals	98.13 GB	94%	N/A	N/A
30	jcdc-ss-nfa-001	Windows-x64	Windows2008	Security	Tommy Chan	Full 3 months, Incremental 3 months	77.58 GB	64.90%	73.35 GB	65.20%
31	jcdc-ss-nsm-003	Windows-x64	Windows2008	Security	Tommy Chan	Full 3 month retention, Incremental 10 days retention	1.074 TB	99.50%	876.3 GB	99.20%
32	jcdc-ss-nsm-003	Windows-x64	Windows2008	Security	Tommy Chan	Full 3 months, Incremental 3 months	9.65 GB	99.50%	89.11 MB	34.80%
33	jcdc-ss-oet-001	Windows-x64	Windows2008	Network Monitoring	Tommy Chan	Full and Incremental 3 months	40.07 GB	78.00%	40.07 GB	77.50%
34	jcdc-ss-ori-001	Windows-x64	WindowsXP	Network Monitoring	Tommy Chan	Full only 3 months	54.44 GB	90.10%	N/A	N/A
35	jcdc-ss-ori-002	Windows-x64	WindowsXP	Network Monitoring	Tommy Chan	Full only 3 months	52.33 GB	82.10%	N/A	N/A
36	jcdc-s-sqh-001	Windows-x86	WindowsXP	Citrix DB	Gregg Colvin	Incremental 10 days, Full 3 months	1.918 GB	To Tape, No Dedup	1.982 GB	99.80%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
37	jcdc-s-sqh-002	Windows-x86	WindowsXP	Citrix DB	Gregg Colvin	Incremental 10 days, Full 3 months	10.4 GB	To Tape, No Dedup	1.324 GB	99.00%
38	jcdc-s-sqp-001	Windows-x64	Windows2003	SQL Production Center Website and other stuff	David Kelso	Incremental 10 days disk only, Full 1 Year on tape only	56.55 GB	To Tape, No Dedup	26.63 GB	99.80%
39	jcdc-s-sqp-002	Windows-x64	Windows2003	SQL Production	David Kelso	Incremental 10 days disk only, Full 1 Year on tape only	16.97 GB	To Tape, No Dedup	2.166 GB	98.90%
40	JCDC-S-SQPV-00	Windows-x64	Windows2008	SQL Production	David Kelso	Incremental 10 days disk only, Full 1 Year on tape only	56.43 GB	To Tape, No Dedup	26.54 GB	98.90%
41	jcdc-s-sqv-001	Windows-x64	Windows2003	Citrix DB	Gregg Colvin	Incremental 10 days disk only, Full 3 months tape only	10.61 GB	To Tape, No Dedup	196 MB	93.00%
42	jcdc-s-sqv-002	Windows-x86	WindowsXP	Citrix DB	Gregg Colvin	Incremental 10 days disk only, Full 3 months tape only	10.61 GB	To Tape, No Dedup	196 MB	93.00%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
43	jcdc-ss-rem-002	Windows-x64	Windows2008	Security	Tommy Chan	Full with 3 month retention. 10 day retention incrementals on disk only	94.03 GB	99.50%	94.03 GB	99.50%
44	JCDC-SS-SDB-03A	Windows-x64	Windows2008	Voice	Karl Rudolph	Full and Incremental 2 weeks	728.8 GB	94.50%	714.8 GB	94.50%
45	JCDC-SS-SDB-03B	Windows-x64	Windows2008	Voice	Karl Rudolph	Full and Incremental 2 weeks	291 GB	99.90%	12.18 GB	99.50%
46	jcdc-ss-sec-002	Windows-x64	Windows	Security	Tommy Chan	Full and Incremental 3 months	228 GB	To Tape, No Dedup	228.5 GB	94.00%
47	jcdc-ss-secv-00	Windows-x64	Windows2003	Security	Tommy Chan	Incremental 10 days, Full 1 year tape only.	226.8 GB	To Tape, No Dedup	7.24 GB	99.30%
48	JCDCTACSUB1	VMware	Virtual_Machine	Voice	Karl Rudolph	Full daily, 2 week retention	32.63 GB	97.90%	32.63 GB	97.80%
49	JCDCTACSUB2	VMware	Virtual_Machine	External Webserver	Karl Rudolph	Full daily, 2 week retention	30.72 GB	98.40%	30.77 GB	98.40%
50	jcdc-tr-jag-001	Windows-x64	Windows2003	Q/A	Glen Ely	Full and incrementals with 2 week retention	102.3 MB	99.00%	102.3 MB	99.00%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
51	jcdc-v-adc-014	Windows-x64	Windows2008	Active Directory	Lucas Jones/Karl Rudolph	Full and incrementals with 2 week retention disk only	33.15 MB	90.90%	0.011 MB	92.30%
52	jcdc-v-cdb-01a	Windows-x64	Windows2008	Citrix DB	Gregg Colvin	Full 3 months, Incremental 3 months	128.2 GB	To Tape, No Dedup	131.1 GB	88.30%
53	jcdc-v-cdb-01b	Windows-x64	Windows2008	Citrix DB	Gregg Colvin	Full 3 months, Incremental 3 months	56.01 MB	To Tape, No Dedup	113 GB	83.00%
54	jcdc-v-clm-001	Windows-x64	Windows2003	Csco license manager	Tommy Chan	Full 3 months	47.01 MB	To Tape, No Dedup	N/A	N/A
55	jcdc-v-con-001	Windows-x64	Windows2008	Adobe Connect	Karl Rudolph	Full 3 months, Incremental 3 months	68.64 GB	To Tape, No Dedup	68.67 GB	73.10%
56	jcdc-v-ftp-001	Windows-x64	Windows2008	Voice - Backup	Gregg Colvin	Full 3 months, Incremental 3 months	271 GB	To Tape, No Dedup	272.1 GB	52.00%
57	jcdc-v-iqs-001	Windows-x64	Windows	IQ/DB monitoring	David Kelso	Full 1 month	245.2 GB	94.00%	N/A	N/A
58	jcdc-v-iqs-002	Windows-x64	Windows2008	IQ/DB monitoring	David Kelso	Full and Incremental 1 month	506 GB	97.00%	397 GB	94.30%
59	jcdc-v-mas-001	Windows-x64	Windows2008	General Ledger	Rose Ward	Full 3 months, Incremental 3 months	117.3 GB	72.40%	117.3 GB	62.30%
60	jcdc-v-pvs-01a	Windows-x64	Windows2008	Citrix	Gregg Colvin	Full 3 months	473.5 GB	69.00%	N/A	N/A

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
61	jcdc-v-rem-001	Windows-x86	Windows2003	Ticket tracking	Martin Kovacs	Incremental 10 days, Full 3 months	39.96 GB	99.90%	30.74 GB	95.30%
62	jcdc-v-scr-001	Windows-x86	Windows2008	Citrix scripts	Gregg Colvin	Full 3 months, Incremental 3 months	227 MB	98.60%	4.798 MB	74.70%
63	jcdc-v-sdb-001	Windows-x64	Windows2008	SQL Database	David Kelso	Full 3 months, Incremental 3 months	130.9 GB	58.00%	131 GB	58.60%
64	jcdc-v-sps-01a	Windows-x64	Windows2008	SharePoint	Karl Rudolph	Full 3 months, Incremental 3 months	30.93 GB	93.00%	31.06 GB	93.00%
65	jcdc-v-sps-01b	Windows-x64	Windows2008	SharePoint	Karl Rudolph	Full 3 months, Incremental 3 months	43.96 GB	90.00%	43.97 GB	92.20%
66	JCDC-V-SQL-003	Windows-x64	Windows2008	SQL	David Kelso	Full 3 months, Incremental 2 weeks	641.5 GB	97.00%	74.83 GB	16.30%
67	jcdc-v-stm-001	Windows-x64	Windows2008	Star Team	Mike Ramos	Full 3 months, Incremental 2 weeks	516.6 GB	28.00%	516.6 GB	28.60%
68	jcdc-v-stm-002	Windows-x64	Windows2008	Star Team	Mike Ramos	Full 3 months, Incremental 2 weeks	128.4 GB	92.00%	128.4 GB	92.90%
69	linda-pc	Windows-x64	WindowsXP	Linda	Gregg Colvin	Full and Incremental 1 year	77.55 GB	98.00%	23.87 GB	98.90%
70	richsys1	RS6000	AIX7.1	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full and Incremental 3 years	685.5 GB	0.20%	482.8 GB	0.20%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
71	richsys2	RS6000	AIX7.1	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full and Incremental 3 years	385 GB	11.90%	30.59 GB	12.50%
72	richsys8	RS6000	AIX6.1	CDSS/Spamis	Richard Barnett/ Simon Medrano	Full and Incremental 2 weeks	38.07 GB	12.00%	106.5 MB	95.50%
73	RICHTACPUB	Vmware	RedHat 5	Voice	Martin Kovacs	Full and Incremental 2 weeks	4.237 GB	97.60%	4.237 GB	97.60%
74	RICHTACSUB1	Vmware	RedHat 5	Voice	Martin Kovacs	Full and Incremental 2 weeks	32.77 GB	93.80%	32.77 GB	93.80%
75	rich-v-adc-004	Windows-x64	Windows2008	Active Directory	Karl Rudolph	Full and Incremental 2 weeks	22.92 MB	97.00%	0.011 MB	92.30%
76	rich-v-cava-001	Windows-x64	Windows2008	Citrix data	Gregg Colvin	Full and Incremental 6 months	1.339 TB	96.00%	64.88 GB	96.10%
77	rich-v-cava-002	Windows-x64	Windows2008	Citrix data	Gregg Colvin	Full and Incremental 6 months	5.097 TB	98.00%	611 GB	98.90%
78	rich-v-cdb-02a	Windows-x64	Windows2008	Citrix DB	Gregg Colvin	Full and Incremental 1 month	101 GB	99.50%	55.5 GB	99.50%
79	rich-v-cdb-02b	Windows-x64	Windows2008	Citrix DB	Gregg Colvin	Full and Incremental 1 month	65.34 GB	99.00%	47.59 GB	99.80%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
80	Rich-v-cdc-01b	Windows-x64	Windows2012	Citrix Delivery Controller	Gregg Colvin	Full and Incremental 1 month	7.644 GB	90.00%	339.7 MB	90.50%
81	Rich-v-cdc-01c	Windows-x64	Windows2012	Citrix Delivery Controller	Gregg Colvin	Full and Incremental 1 month	7.008 GB	90.00%	347.6 MB	94.40%
82	rich-v-cdc-01d	Windows-x64	Windows2012	Citrix Delivery Controller	Gregg Colvin	Full and Incremental 1 month	7.511 GB	94.00%	346.5 MB	94.20%
83	rich-v-clc-001	Windows-x64	Windows2012	Citrix License server	Gregg Colvin	Full and Incremental 1 month	4.507 GB	98.00%	214.7 MB	98.20%
84	rich-v-ctx-sf1	Windows-x64	Windows2012	Citrix Scripts server	Gregg Colvin	Full 1 Year, Incremental 1 month	16.41 GB	99.00%	11.61 GB	99.60%
85	rich-v-iqs-001	Windows-x64	Windows 2003	IQ server	David Kelso	Full and Incremental 2 weeks	134.2 GB	61.00%	121.9 GB	61.90%
86	rich-v-iqs-005	Windows-x64	Windows2012	IQ server	David Kelso	Full and Incremental 2 weeks	307.8 GB	93.00%	131 GB	93.80%
87	rich-v-pdb-001	Windows-x64	Windows2008	Citrix Provisioning	Gregg Colvin	Full 1 Year, Incremental 1 month	21.35 GB	99.00%	11.27 GB	99.60%
88	rich-v-pvs-02a	Windows-x64	Windows2008	Citrix Provisioning	Gregg Colvin	Full and Incremental 1 Year	420 GB	99.00%	835.1 GB	94.60%
89	rich-v-pvs-03a	Windows-x64	Windows2008	Citrix Provisioning	Gregg Colvin	Full and Incremental 1 Year	255.5 GB	96.00%	49.08 GB	99.10%

	Client	Hardware	OS	Business purpose	Owner/ administrator	Backup and retention schedule	Full	Deduplication	Incremental	Deduplication
90	rich-v-ssd-001	Windows-x64	Windows2012	Session State DB for CDSS	David Kelso	Full and Incremental 1 Year	38.48 GB	99.00%	11.16 GB	99.60%
91	RMaster	Linux-IA64	RedHat 7.1	Netbackup	Richard Barnett/ Simon Medrano	Full and Incremental 1 month	58.87 GB	95.00%	103.9 MB	97.80%
92	UCCXPUB9	Vmware	RedHat 5	Voice	Martin Kovacs	Full and Incremental 2 weeks	64.56 GB	99.20%	64.56 GB	99.20%
93	UCCXSUB9	VMware	Virtual_Machine	Voice	Karl Rudolph	Full daily, 2 week retention	64.48 GB	99.70%	64.48 GB	99.70%
94	vmaster	RS6000	AIX6	Netbackup	Richard Barnett/ Simon Medrano	Full and incremental 1 month	62.03 GB	N/A Adv. Disk	85.82 MB	N/A Adv. Disk
95	vmaster2	Linux-IA64	RedHat2.6	Netbackup	Richard Barnett/ Simon Medrano	Full and incremental 1 month	276.4 GB	N/A Adv. Disk	351.8 MB	N/A Adv. Disk