Pharmacy Information System (PhIS)

and

Clinic Pharmacy System (CPS)

Backup Procedure

Facility

Version	**: 1.0**
Document ID	**: PhIS_CPS/BackupProcedure/Facility**

Revision History

Version No.	Date of Release	Consolidated by	Reviewed / Verified by	List of changes from Previous Version
1.0	15/03/2016	Syariati	Mohd Arif	Initial Document

Verified and Acknowledged By:

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Peer Review

Version No.	Reviewed / Verified by	List of changes from Previous Version
1.0	Michelle Foo	Initial Document

Table of Contents

1 Introduction

This document describes the Standard Operating Procedure of handling backup tapes at facilities. This document covers both types of backup media used at facilities – DDS Gen-6 and RDX.

1.1. Purpose

This procedure provides a guideline on how to handle backup tapes with safe and care.

1.2. Objectives

1. To ensure that backup tapes are handled with care and kept in a safe environment.

1.3. Sections References

This report is organized with the following manner for the ease of reference:

Section 1: Introduction

Section 2: Insert Tape

Section 3: Eject Tape

Section 4: Storing Backup Tape

1.4. Responsibilities

Below is the list of personnel in charge and their responsibility and location.

No.	Person in charge	Responsibility	Location
1.	IT / Pharmacist	• Daily monitor backup jobs • Change backup tape cartridge • Off-site backup tape storage	Facility (Hospital/Clinic)

DDS GEN-6

2 Insert Tape

- With the tape lie flat, insert it into the DDS drive by pushing the tape gently in.

3 Eject Tape

- To eject, press the blue button and remove the tape out.

4 Preparing New DDS Backup Tape

4.1. Introduction

- IBM DDS Generation 6 tape has a native capacity of 80GB and up to 160GB compressed. It has a maximum transfer rate of 6.9MB/s (13.8MB/s compressed).
- The DDS 6 tape has a width of 8mm which allows it to store such large capacity in a small cartridge.
- Native Capacity : 80GB
- Compressed Capacity : 160GB
- Steps to introduce a new DDS tape as a backup tape.
    - # Insert tape (*refer to 'Section 2' of this document*)
    - # Label tape (*refer to 'Section 4.2' of this document*)
    - # Run a test backup
- Steps to change a backup tape in the DDS drive.
    - # Umount tape (*refer to 'Section 4.4' of this document*)
    - # Eject tape (*refer to 'Section 3' of this document*)

4.2. Label New Tape with bconsole

- Labeling volumes is normally done by using the bconsole program

```
# bconsole

*label
```

- The label command will provide a list of defined Storage resources.

  Example:

```
The defined Storage resources are:
   1: File
   2: Tape
Select Storage resource (1-2):
```

- Choose “Tape” storage (2).
- It will then ask for a volume name.

  Example:

```
Enter new Volume name: F1
```

- Once Bacula has verified that the volume does not already exist, it will prompt for the name of the Pool in which the Volume (tape) is to be created. If there is only one Pool (Default), it will be automatically selected.
- If the tape is successfully labeled, it will be automatically mounted as well.

4.3. Relabel a Tape

- In cases where the tape is wrongly labeled, it can be relabeled by rewinding, write an end of file mark to the tape and rewinding the tape again before running the label command again in bconsole.

```
# mt -f /dev/nst0 rewind

# mt -f /dev/nst0 weof

# mt -f /dev/nst0 rewind

# bconsole

* label
```

4.4. Mount and Umount Tape

- If a tape has been previously labeled, it needs to be mounted manually upon inserting it.

```
# bconsole
*mount
```

- To verify that the tape has been mounted, check the storage status by running status storage in bconsole.

```
# bconsole
*status storage
```

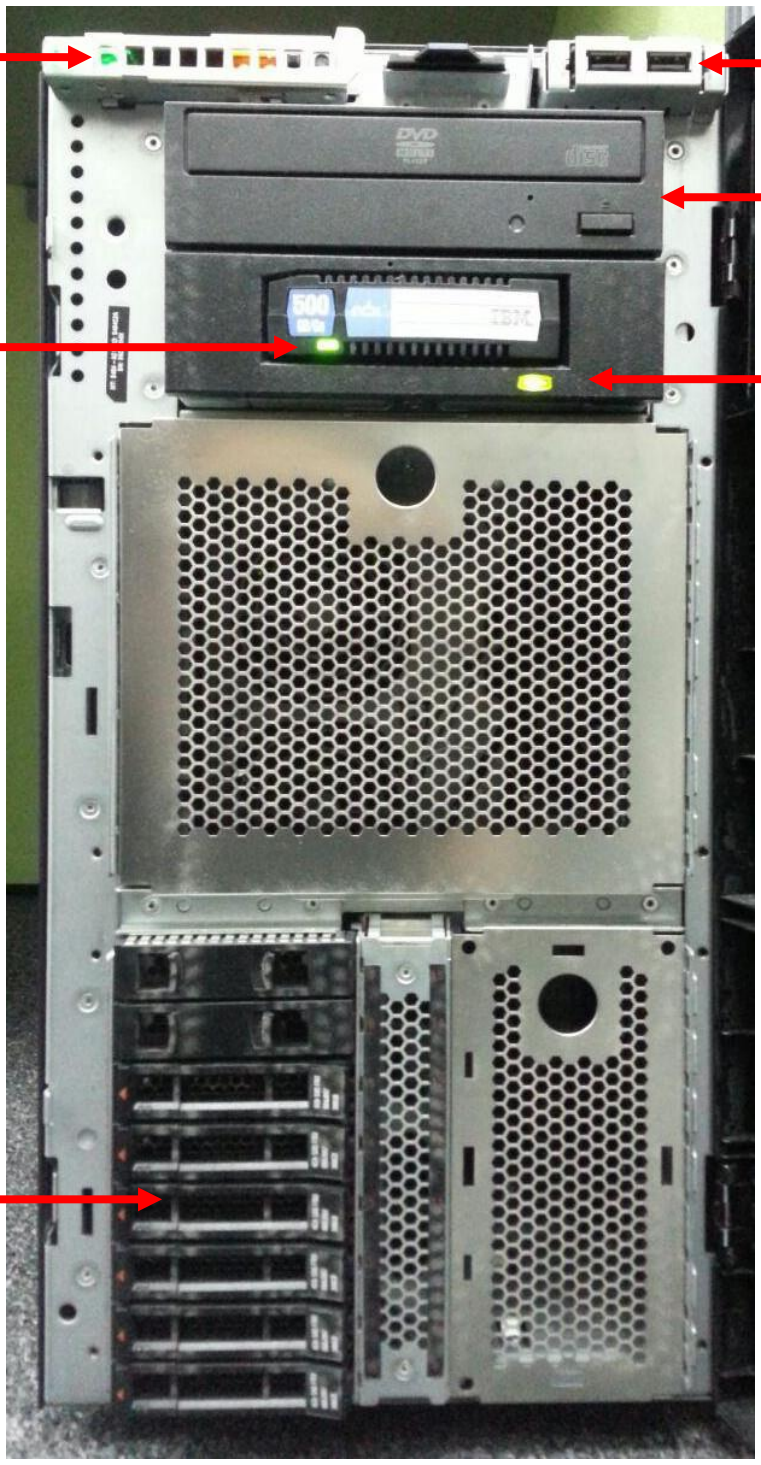
- To eject a tape, it needs to be unmounted first.

```
# bconsole
*umount
```

RDX

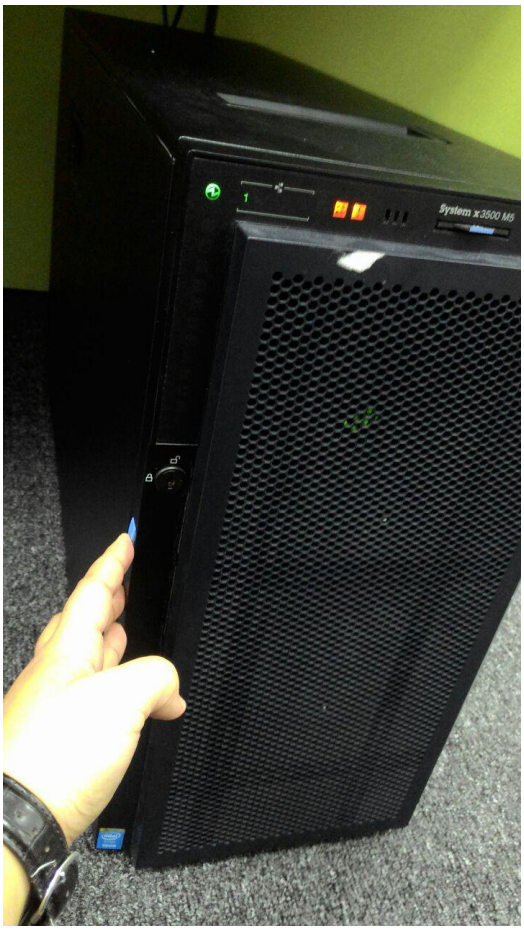
5 System x3500 M5 Tower Server

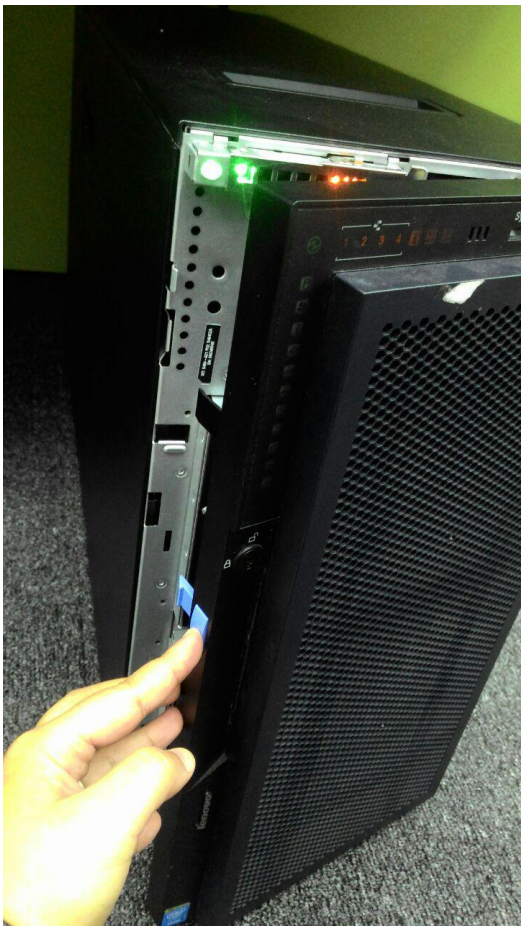
- Server with lid closed and opened.



6 Insert Media

- Open the server case by pressing the blue button.

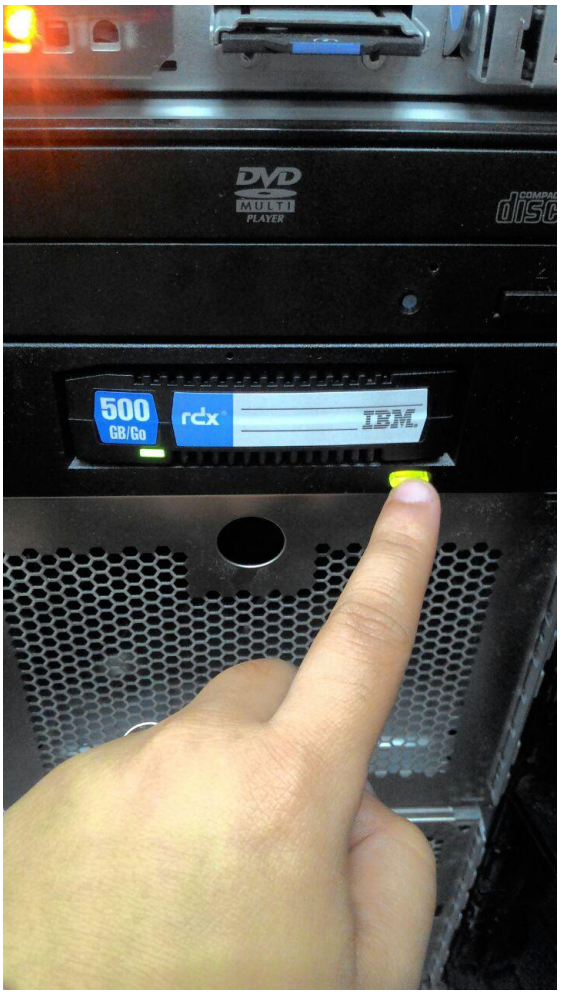




- With the media lie flat, insert it into the RDX drive by pushing the media gently in.

7 Eject Media

- To eject, press the yellow button and remove the media out.



8 Preparing New RDX Backup Media

8.1. Introduction

- RDX is a disk-based removable storage format developed by ProStor Systems Incorporated.
- The hard disk cartridges capacities in used are 320GB and 500GB.
- Steps to introduce a new RDX media as a backup media.
    - # Insert media (*refer to 'Section 3' of this document*)
    - # Format media (*refer to 'Section 5.2' of this document*)
    - # Mount media (*refer to 'Section 5.3' of this document*)
    - # Run a test backup
- Steps to change a backup media in the RDX drive.
    - # Umount media (*refer to 'Section 5.3' of this document*)
    - # Eject media (*refer to 'Section 4' of this document*)

8.2. Format New Media

- New media must be formatted so that it is readable by the operating system.
- To format the media, open up a terminal and as root, run the following command:

  # mkfs.ext3 /dev/<media_device>

  Example: mkfs.ext3 /dev/sdc1

```
# mkfs.ext3 /dev/sdc1
mke2fs 1.41.9 (22-Aug-2009)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
30531584 inodes, 122095360 blocks
6104768 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=4294967296
3727 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
      32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632,
2654208,
      4096000, 7962624, 11239424, 20480000, 23887872, 71663616,
78675968,
      102400000
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done
This filesystem will be automatically checked every 33 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
```

- In the previous example, sdc1 is the device label for the media. To find out the device label, type the following command upon inserting the media into the server:

  # dmesg

  The last few lines of the dmesg log will show the device label of the media:

```
[355674.505737] sdc: detected capacity change from 500103667712 to 0

[355690.553943] sd 7:0:0:0: [sdc] 976764976 512-byte logical blocks:
(500 GB/465 GiB)

[355690.555438] sd 7:0:0:0: [sdc] No Caching mode page present

[355690.555443] sd 7:0:0:0: [sdc] Assuming drive cache: write
through

[355690.557801] sd 7:0:0:0: [sdc] No Caching mode page present

[355690.557806] sd 7:0:0:0: [sdc] Assuming drive cache: write
through

[355690.582285]  sdc: sdc1
```

8.3. Mount and Unmount Media

- Now that the tape has been formatted, it is ready to be mounted. Using the same device label as in the previous example, run the following command to mount the media on a directory /backup.
    - mount /dev/sdc1 /backup
- To verify that the media has been mounted, type 'mount'.

```
# mount
/dev/sda3 on / type ext3 (rw,acl,user_xattr)
proc on /proc type proc (rw)
udev on /dev type tmpfs (rw,mode=0755)
tmpfs on /dev/shm type tmpfs (rw,mode=1777)
devpts on /dev/pts type devpts (rw,mode=0620,gid=5)
/dev/sda1 on /boot/efi type vfat (rw,umask=0002,utf8=true)
fusectl on /sys/fs/fuse/connections type fusectl (rw)
securityfs on /sys/kernel/security type securityfs (rw)
/dev/sdc1 on /backup type ext3 (rw)
```

- To unmount, type the following command:
    - umount /backup

9 Backup Schedule

- Backup runs every night at 10:00 PM.
- Full backups are performed on the 1st day of work (Sunday or Monday).
- Differential backups are performed daily.
- Database backup runs daily.
- Application backup runs on the 1st day of work (Sunday or Monday).

- States with Weekend on Friday and Saturday:

Day	Backup Time	Backup Level
Sunday	10:00 PM	Full
Monday	10:00 PM	Differential
Tuesday	10:00 PM	Differential
Wednesday	10:00 PM	Differential
Thursday	10:00 PM	Differential
Friday	10:00 PM	Differential
Saturday	10:00 PM	Differential

- States with Weekend on Saturday and Sunday:

Day	Backup Time	Backup Level
Monday	10:00 PM	Full
Tuesday	10:00 PM	Differential
Wednesday	10:00 PM	Differential
Thursday	10:00 PM	Differential
Friday	10:00 PM	Differential
Saturday	10:00 PM	Differential
Sunday	10:00 PM	Differential

10 Tape Label

- Backup tapes labeling scheme for both Hospital and Clinics are the same – hostname, followed by a notation of the days.

- Examples:
  # Hospital Raja Permaisuri Bainun
    - hrpb-mon
    - hrpb-tue
    - hrpb-wed
    - hrpb-thu
    - hrpb-fri

  # Klinik Kesihatan Sagil
    - kke010094-mon
    - kke010094-tue
    - kke010094-wed
    - kke010094-thu
    - kke010094-fri

- For certain hospitals who wish to have more sets of backup tapes:
  # Hospital Pakar Sultanah Fatimah

    SET 1
    - hpsf-set1-mon
    - hpsf-set1-tue
    - hpsf-set1-wed
    - hpsf-set1-thu
    - hpsf-set1-fri

    SET 2
    - hpsf-set2-mon
    - hpsf-set2-tue
    - hpsf-set2-wed
    - hpsf-set2-thu
    - hpsf-set2-fri

11 Tape Rotation

- Tape weekly rotation for backup at Hospital / Clinic according to working day.
- Full – Full backup level.
- Diff – Differential backup level.
- Db – Database backup.
- App – Application backup.

Tape Label	Facility Operating Day						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Mon	Full (Db & App)						
Tue		Diff (Db)					
Wed			Diff (Db)				
Thu				Diff (Db)			
Fri					Diff (Db)	Diff (Db)	Diff (Db)

Tape Label	Facility Operating Day						
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Sun	Full (Db & App)						
Mon		Diff (Db)					
Tue			Diff (Db)				
Wed				Diff (Db)			
Thu					Diff (Db)	Diff (Db)	Diff (Db)

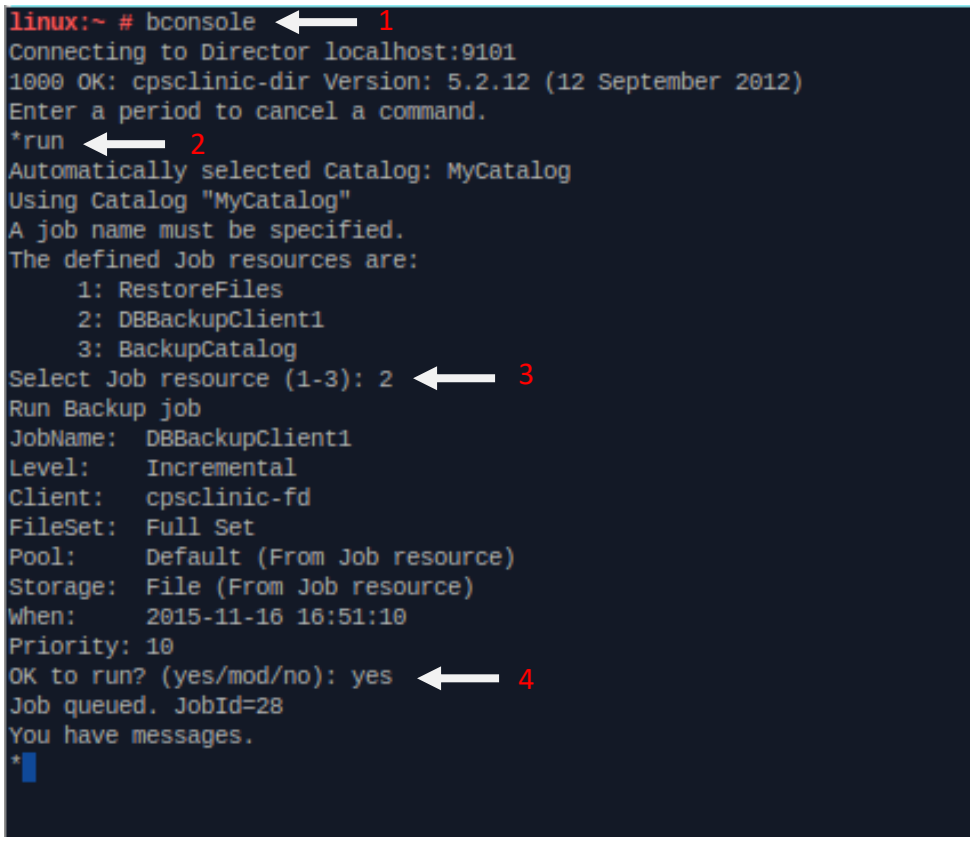
**Note: Tapes are rotated on weekly basis.*

- List of directories being backed up

Server	Directory
Database	• /db02/backup • /db02/pg_log
Application	• /opt/phisesb/GlassFish • /home/phisesb • /etc

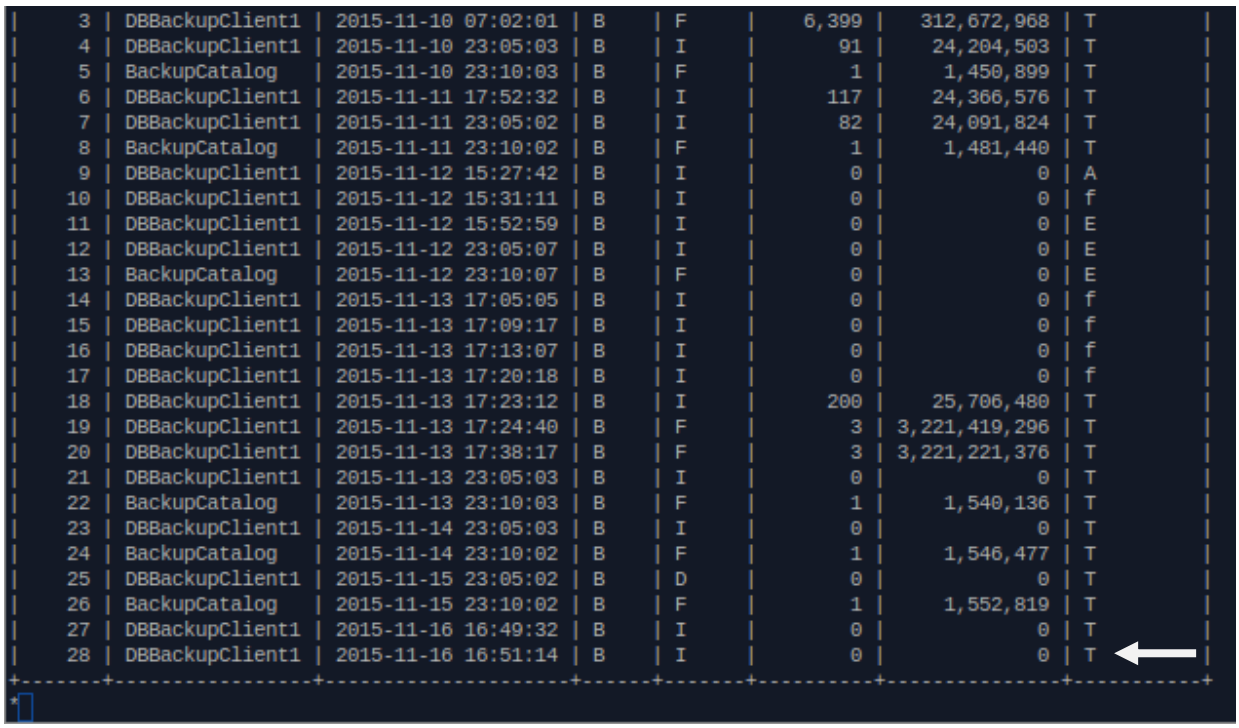
12 Run Manual Backup

- To run a backup manually, open a terminal and follow the steps described below.
    1. Type bconsole and press Enter.
    2. Type run and press Enter.
    3. Key in the selected number of job resource and press Enter.
    4. Type yes and press Enter.



13 Check Job Status with bconsole

- To list the backup jobs, type ‘list jobs’. The output is similar as follows. The letter ‘T’ indicates a successful job.



```
|     3 | DBBackupClient1 | 2015-11-10 07:02:01 | B    | F    |     6,399 |   312,672,968 | T         |
|     4 | DBBackupClient1 | 2015-11-10 23:05:03 | B    | I    |        91 |    24,204,503 | T         |
|     5 | BackupCatalog   | 2015-11-10 23:10:03 | B    | F    |         1 |     1,450,899 | T         |
|     6 | DBBackupClient1 | 2015-11-11 17:52:32 | B    | I    |       117 |    24,366,576 | T         |
|     7 | DBBackupClient1 | 2015-11-11 23:05:02 | B    | I    |        82 |    24,091,824 | T         |
|     8 | BackupCatalog   | 2015-11-11 23:10:02 | B    | F    |         1 |     1,481,440 | T         |
|     9 | DBBackupClient1 | 2015-11-12 15:27:42 | B    | I    |         0 |             0 | A         |
|    10 | DBBackupClient1 | 2015-11-12 15:31:11 | B    | I    |         0 |             0 | f         |
|    11 | DBBackupClient1 | 2015-11-12 15:52:59 | B    | I    |         0 |             0 | E         |
|    12 | DBBackupClient1 | 2015-11-12 23:05:07 | B    | I    |         0 |             0 | E         |
|    13 | BackupCatalog   | 2015-11-12 23:10:07 | B    | F    |         0 |             0 | E         |
|    14 | DBBackupClient1 | 2015-11-13 17:05:05 | B    | I    |         0 |             0 | f         |
|    15 | DBBackupClient1 | 2015-11-13 17:09:17 | B    | I    |         0 |             0 | f         |
|    16 | DBBackupClient1 | 2015-11-13 17:13:07 | B    | I    |         0 |             0 | f         |
|    17 | DBBackupClient1 | 2015-11-13 17:20:18 | B    | I    |         0 |             0 | f         |
|    18 | DBBackupClient1 | 2015-11-13 17:23:12 | B    | I    |       200 |    25,706,480 | T         |
|    19 | DBBackupClient1 | 2015-11-13 17:24:40 | B    | F    |         3 | 3,221,419,296 | T         |
|    20 | DBBackupClient1 | 2015-11-13 17:38:17 | B    | F    |         3 | 3,221,221,376 | T         |
|    21 | DBBackupClient1 | 2015-11-13 23:05:03 | B    | I    |         0 |             0 | T         |
|    22 | BackupCatalog   | 2015-11-13 23:10:03 | B    | F    |         1 |     1,540,136 | T         |
|    23 | DBBackupClient1 | 2015-11-14 23:05:03 | B    | I    |         0 |             0 | T         |
|    24 | BackupCatalog   | 2015-11-14 23:10:02 | B    | F    |         1 |     1,546,477 | T         |
|    25 | DBBackupClient1 | 2015-11-15 23:05:02 | B    | D    |         0 |             0 | T         |
|    26 | BackupCatalog   | 2015-11-15 23:10:02 | B    | F    |         1 |     1,552,819 | T         |
|    27 | DBBackupClient1 | 2015-11-16 16:49:32 | B    | I    |         0 |             0 | T         |
|    28 | DBBackupClient1 | 2015-11-16 16:51:14 | B    | I    |         0 |             0 | T         |
+-------+-----------------+---------------------+------+------+-----------+---------------+-----------+
*
```

- Some of the common job status is listed below

T	Terminated normally
C	Created but not yet running
R	Running
E	Terminated in Error
f	Fatal error

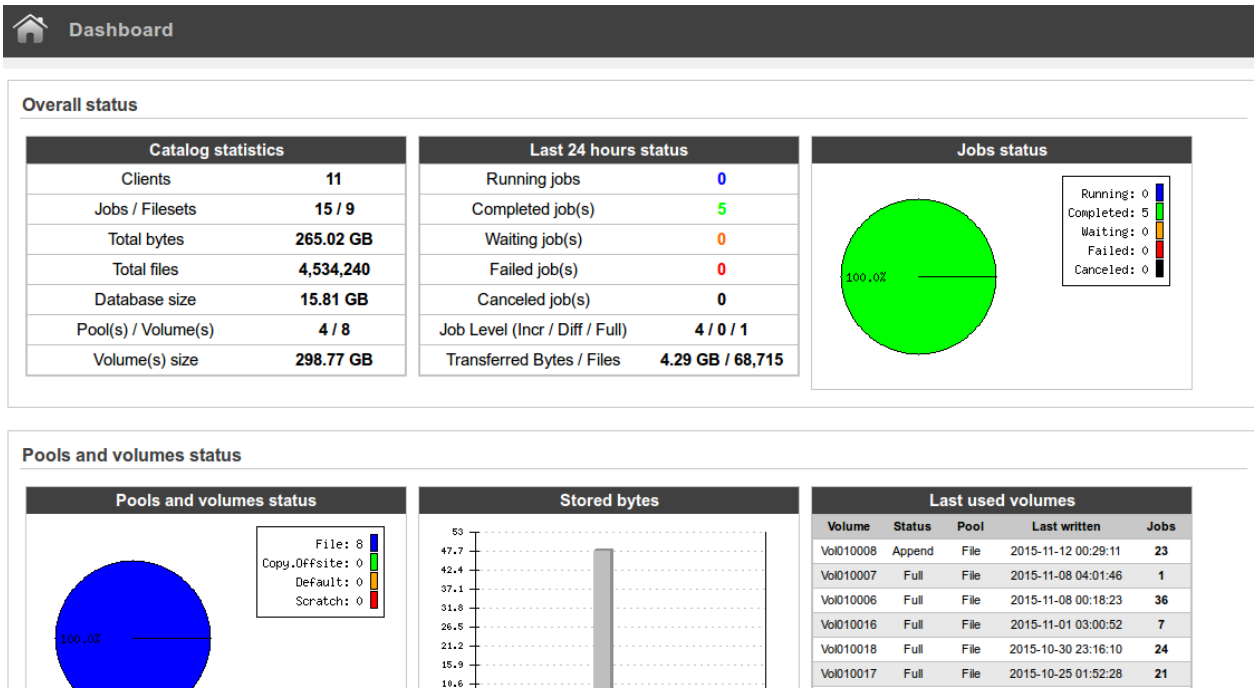
14 Check Job Status with bacula-web

- Status of a backup job can be checked using bacula-web as well
- Bacula-web is a web based interface for bacula backup system that can be accessed with any web browser
- Launch a web browser (Internet Explorer, Mozilla, Opera, etc.), and type in the URL as follows at the address bar:

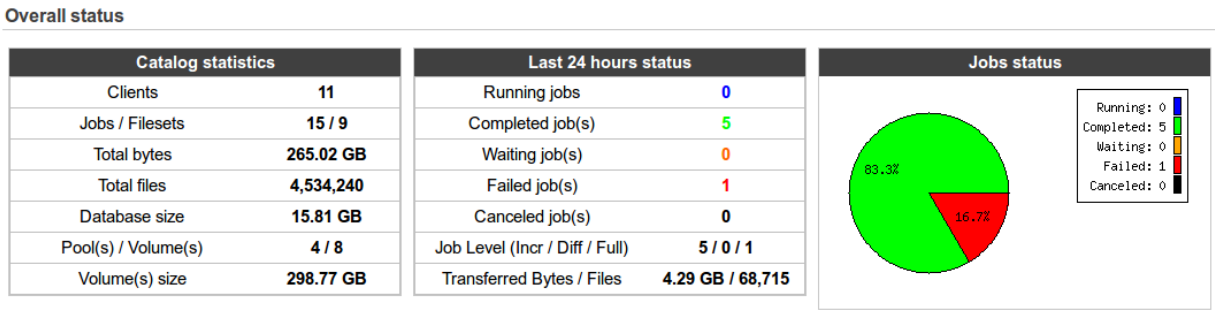
  http://<ip_address_of_backup_server>/bacula-web

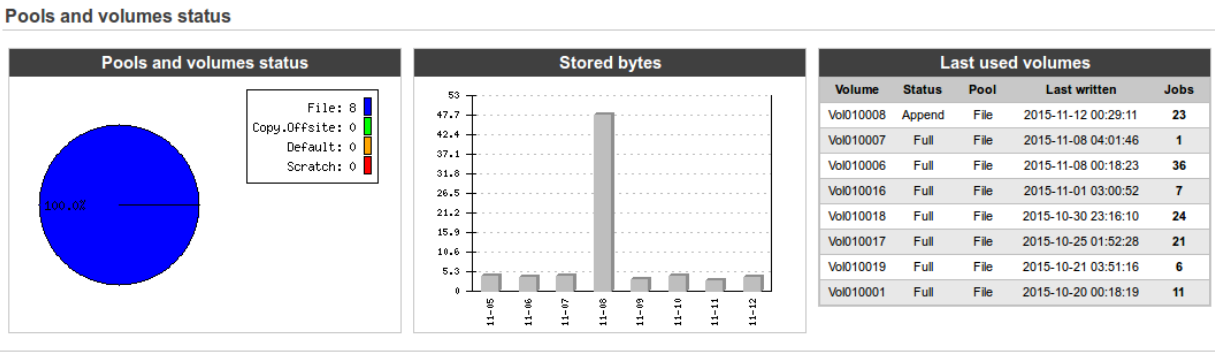
  Example: http://10.48.21.105/bacula-web

- Bacula-web front page shows the overall status of backup jobs performed

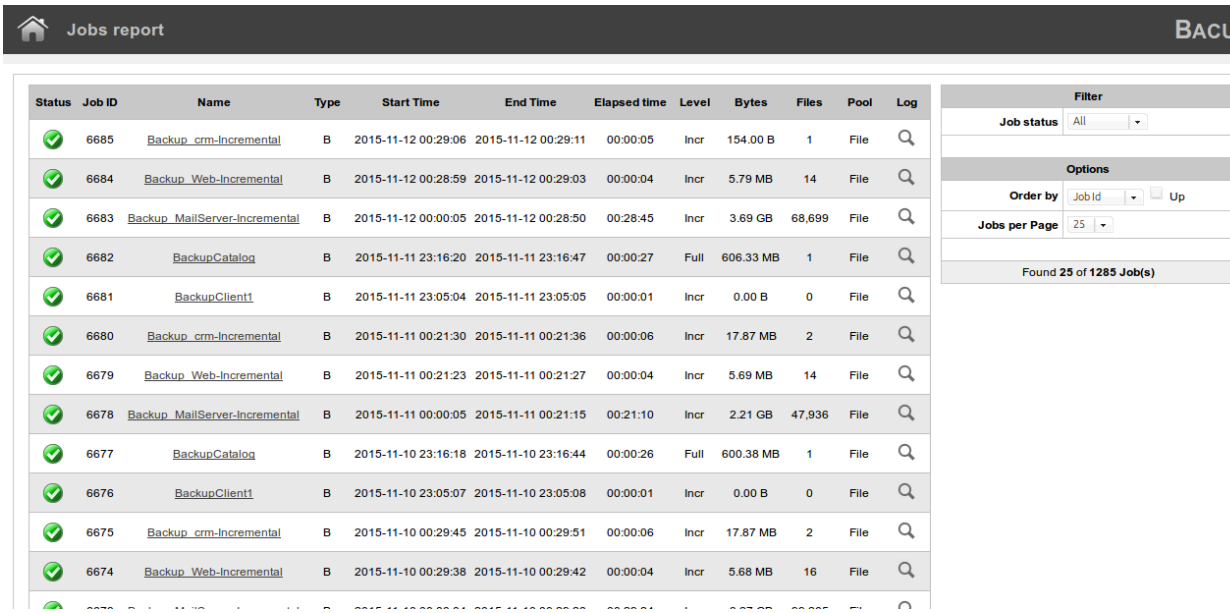


- A red portion on a pie chart of the jobs status indicates error in backup jobs. Click on the pie chart to view more details on the jobs status

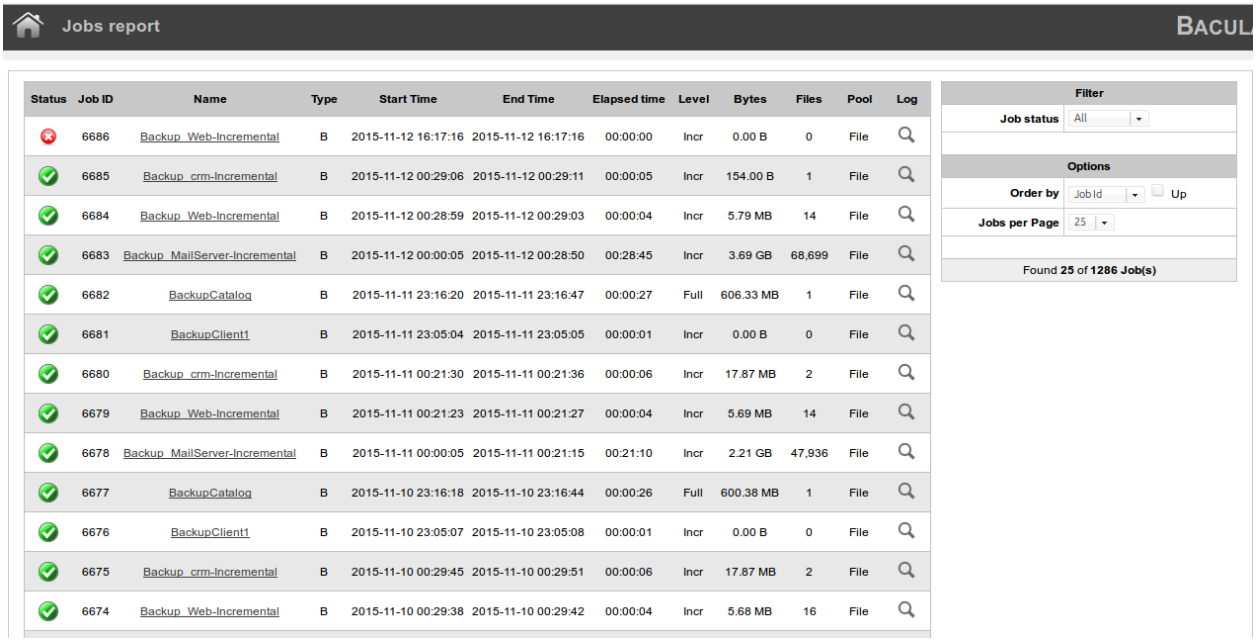




- Latest job on top. Type B; stands for Backup



- Status marked with an ‘X’ in red for job that is not successful



Jobs report — BACULA

Status	Job ID	Name	Type	Start Time	End Time	Elapsed time	Level	Bytes	Files	Pool	Log
✗	6686	Backup_Web-Incremental	B	2015-11-12 16:17:16	2015-11-12 16:17:16	00:00:00	Incr	0.00 B	0	File	
✓	6685	Backup_crm-Incremental	B	2015-11-12 00:29:06	2015-11-12 00:29:11	00:00:05	Incr	154.00 B	1	File	
✓	6684	Backup_Web-Incremental	B	2015-11-12 00:28:59	2015-11-12 00:29:03	00:00:04	Incr	5.79 MB	14	File	
✓	6683	Backup_MailServer-Incremental	B	2015-11-12 00:00:05	2015-11-12 00:28:50	00:28:45	Incr	3.69 GB	68,699	File	
✓	6682	BackupCatalog	B	2015-11-11 23:16:20	2015-11-11 23:16:47	00:00:27	Full	606.33 MB	1	File	
✓	6681	BackupClient1	B	2015-11-11 23:05:04	2015-11-11 23:05:05	00:00:01	Incr	0.00 B	0	File	
✓	6680	Backup_crm-Incremental	B	2015-11-11 00:21:30	2015-11-11 00:21:36	00:00:06	Incr	17.87 MB	2	File	
✓	6679	Backup_Web-Incremental	B	2015-11-11 00:21:23	2015-11-11 00:21:27	00:00:04	Incr	5.69 MB	14	File	
✓	6678	Backup_MailServer-Incremental	B	2015-11-11 00:00:05	2015-11-11 00:21:15	00:21:10	Incr	2.21 GB	47,936	File	
✓	6677	BackupCatalog	B	2015-11-10 23:16:18	2015-11-10 23:16:44	00:00:26	Full	600.38 MB	1	File	
✓	6676	BackupClient1	B	2015-11-10 23:05:07	2015-11-10 23:05:08	00:00:01	Incr	0.00 B	0	File	
✓	6675	Backup_crm-Incremental	B	2015-11-10 00:29:45	2015-11-10 00:29:51	00:00:06	Incr	17.87 MB	2	File	
✓	6674	Backup_Web-Incremental	B	2015-11-10 00:29:38	2015-11-10 00:29:42	00:00:04	Incr	5.68 MB	16	File	

Filter
Job status: All

Options
Order by: JobId Up
Jobs per Page: 25

Found **25** of **1286 Job(s)**

15 Storing Backup Tape

15.1. Offsite Data Protection

- Backup tape must be kept at a remote location as part of a disaster recovery plan. The location should be within a reasonable distance for timely recovery.

Facility	Offsite Location
Hospital	Different building within the hospital
Clinic	The nearest Klinik Kesihatan, Pejabat Kesihatan Daerah, Hospital or other government agencies within the area. Backup tapes can be switched between two clinics as well.

- Tapes should be placed in a room that is secure and not easily accessible by the public.
- Keep all tapes, disks and other materials in a controlled environment safe from heat, humidity, dust, etc.
- Keep an inventory of all offsite materials.

16 Acronyms

Abbreviation	Definition
backup tape	storage medium used to keep backup data
RDX	Removable Disk Technology
URL	Uniform Resource Locator; an address to a resource on the Internet
bconsole	Bacula console
bacula-web	Monitoring and reporting web GUI for bacula