COMPLETE BACKUP SYSTEM
AMANDA & ZRM NETWORK BACKUP SOLUTION PROJECT

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SPECIAL THANKS TO
BCCA COMPUTER CENTRE TEAMS

AMANDA – NETWORK BACKUP SOLUTION

INTRODUCTION

Amanda backup software delivers high performance backup and recovery for Linux, Windows and many OS X environments, popular databases and applications. All backup and recovery operations are managed from the text-based. Amanda is based on the most popular open source backup software.

Distributed data across all platforms, databases and applications is essential. Many businesses cannot afford to purchase and manage expensive and complex backup solutions. Amanda is open source network software provides backup and restore capabilities, coupled with ease of implementation and management.
With Amanda, Systems Administrators can set up a master backup server to back up multiple Linux, Windows, clients to tape, disk, Internet cloud storage, or optical storage devices. Amanda also protects databases such as Oracle and MySQL Server, and MS Exchange etc.

Amanda provides you with the following benefits:

Use a single server to back up multiple networked clients to a variety of media types. Centralized backup simplifies administration.

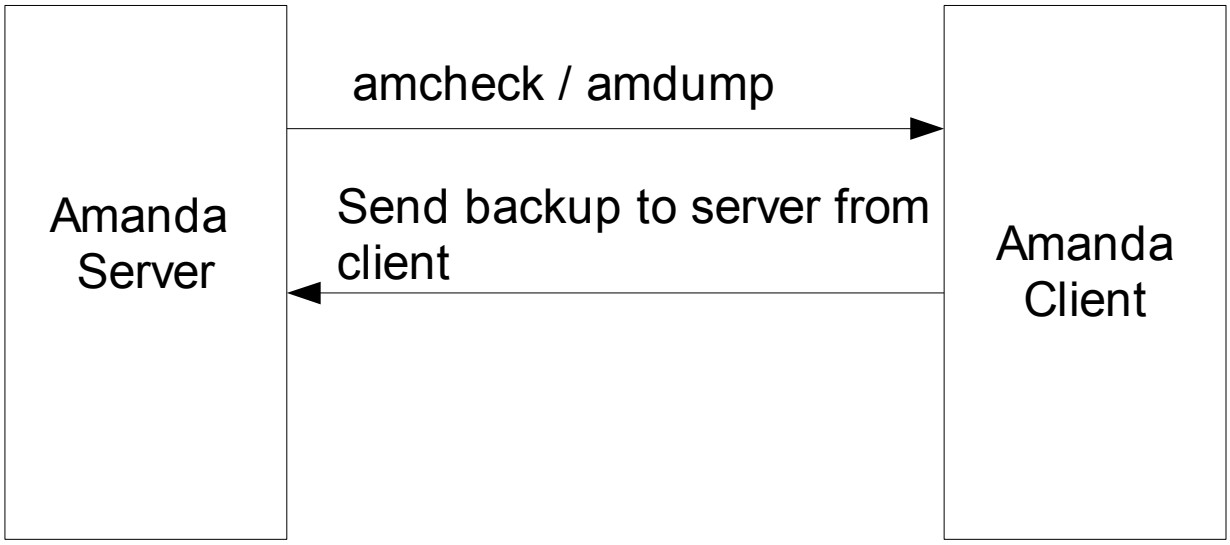
Scheduling backup for different client and equalized total time for backup and also check network and hardware resources.

Can easily select different backup devices. We will see the virtual tape devices and there uses. Also backup simultaneously on disk and tape for regular and disaster recovery.

It can backup with GNUTAR (.gz) and gzip format for files and folders where database backup done with raw and logical (dump).

Encryption and decyption on client as well as server can be possible. Compression can be done at server.

Amanda Enterprise architecture.



For backup Process

For Recovery of data Process

Installation Process:

We can install the amanda with two types with rpm and tarball we choose RPM to install this. You should have compilers available to compile source code.

Now download Amanda from following web site. You can select for 32bit or 64 bit as compatible to your OS
http://www.zmanda.com/download-amanda.php

Package we use for amanda:
amanda-backup_server-3.3.0-1.rhel6.x86_64.rpm

Install Amanda:

rpm -ivh amanda-backup_server-3.3.0-1.rhel6.x86_64.rpm

This will install amanda server in your system and created user "amandabackup" added this user in disk group as we use virtual tape (slots). example directory created where all sample configuration files are created.

Check example directory as follows
cd /var/lib/amanda/
amanda-release amandates DailySet1 example gnutar-lists template.d

copy the amanda.conf from example to /etc/amanda/DailySet1.
cp /var/lib/amanda/example/amanda.conf /etc/amanda/DailySet1/

copy the disklist from example to /etc/amanda/DailySet1.
#cp /var/lib/amanda/example/disklist /etc/amanda/DailySet1/

Amanda Configuration:

Open your amanda.conf file to edit as follows

org "DailySet1"
mailto "root@localhost" maillId of your system administrators.
dumpuser "amandabackup"
inparallel 4 capacity to check MAX 63.
dumpcycle 1 weeks
runspercycle 7
tapecycle 45 tapes
runtapes 1 How many tapes runs at single run of amdump
tapedev "file:/backup/space/vtapes/DailySet1/slots"
tpchanger "chg-disk"

```
changerfile "/usr/libexec/amanda/chg-disk"
tapetype HARD-DISK
labelstr "^DailySet1-[0-9][0-9]*$"          label the each slot as amanda can understand where
                                             the data get stored while backup from client
```

Holding Disk is used to store the data while amanda is writing data on virtual tapes

```
holdingdisk hd {
   directory "/data/space/amandahold/DailySet1"
}
```

```
infofile "/var/lib/amanda/DailySet1/curinfo"      Database file of backup
logdir "/var/log/amanda/DailySet1"                writes log for amdump process success or fail
indexdir "/var/lib/amanda/DailySet1/index"        Index is used to recover the backup through
                                                  Network
tapelist "/var/lib/amanda/DailySet1/tapelist"     List used and unused tapes in amanda
```

Tapetype:

```
define tapetype HARD-DISK{
        filemark 4KB
        length 20000MB
        }
```

Filemark: It is blank space between two backup.
Length: Partition or disk capacity alloted to store backup

Dumptype:

```
define dumptype src-tar {
      program "GNUTAR"
      compress server fast
      server_encrypt "/usr/sbin/amcrypt"
      server_decrypt_option "-d"
      index Yes
      record Yes # Important! avoids interfering with production runs
}
```
OR

```
define dumptype comp-tar {
      program "GNUTAR"
      compress fast
      index yes
      record no # Important! avoids interfering with production runs
```

}
Interface:

```
define interface local {
        comment “a local disk”
        use 100mbps
}
OR
define interface eth0 {
        comment “a local disk”
        use 100mbps
}
```

As per the above configuration we will create some files and directories and provide proper permissions and ownership.

```
#  mkdir -p /data/space/amandahold/DailySet1
#  chown amandabackup:disk /data/space/amandahold/DailySet1
#  chmod  750 /data/space/amandahold/DailySet1

#  mkdir  -p /var/lib/amanda/DailySet1
#  chown  amandabackup:disk /var/lib/amanda/DailySet1
#  chmod 750 /var/lib/amanda/DailySet1

#  mkdir -p  /var/log/amanda/DailySet1
#  chown  amandabackup:disk /var/log/amanda/DailySet1
#  chmod 750  /var/log/amanda/DailySet1

#  mkdir -p /backup/space/vtapes/DailySet1/slots
#  chown amandabackup:disk /backup/space/vtapes/DailySet1/slots
#  chown 750 /backup/space/vtapes/DailySet1/slots

#  su amandabackup

$  cd /backup/space/vtapes/DailySet1/slots
```

Create tapelist file to verify how many tapes used and unused

```
$  touch /var/lib/amanda/DailySet1/tapelist
$  cd  /backup/space/vtapes/DailySet1/slots
```

Create slots as you define in amanda.conf (tapecycles)

```
$  for ((i=1;$i<=25;i++)); do mkdir slot $i ;done
$  ln -s slot1 data
```

Do amlabel to slots to know amanda which slot is using while backup

$ for ((i=1;$i<=25;i++)); do amlabel DailySet1 DailySet1-0$i slot $i;done

OUTPUT:

Output would be as above for all slots
labeling tape in slot 1 (file:/space/vtapes/test/slots):
rewinding, reading label, not an amanda tape (Read 0 bytes)
rewinding, writing label TEST-1, checking label, done.
And reset the changer to the first slot again:

This will reset tape and load slot1 to backup
$ amtape DailySet1 Reset

To take backup of any client add the host name or IP address of client in disklist file as we created earlier
$ vi /etc/amanda/DailySet1/disklist

agni.hbni.ac.in /var/www/html/sagar/ src-tar

HOST FILE OR DIR TO BE BACKUP BACKUP DUMPTYPE

AMANDA Client configuration

Download Amanda from following web site. You can select for 32bit or 64 bit as compatible to your OS .

http://www.zmanda.com/download-amanda.php

Package we use for amanda:
amanda-backup_client-3.3.0-1.rhel6.x86_64.rpm

Install Amanda client:

rpm -ivh amanda-backup_client-3.3.0-1.rhel6.x86_64.rpm

The amanda-client .conf file will get created at /etc/amanda/amanda-client.conf

CONFIGURATION:
conf "DailySet1" # your config name
index_server "amanda.hbni.ac.in" # amindexd server
tape_server "amanda.hbni.ac.in" # amidxtaped server

tapedev "file:/backup/space/vtapes/DailySet1/slots" # tape device
Also make entry in clientserver /home/amanda/.amandahosts of amanda server name and what commands can be execute with which user.

$ vi .amandahosts
Amanda server name amanda amdump
Amanda server name root amindexd amidxtaped

The file gnutar indicates the list of backup done and also defines whether it's incremental or full

TEST BACKUP:

Now we will test our setup.

The below command amcheck DailySet1 check the server and client parameters such as holding disk, slots availability, label of slot, client configuration etc.

$ amcheck DailySet1

Amanda Tape Server Host Check

Holding disk data/space/amandahold/DailySet1: 22125220 KB disk space available, using 22125220 KB
slot 7: read label `TEST-2', date `20111207091501'
cannot overwrite active tape TEST-2
slot 8: read label `TEST-3', date `X'
NOTE: skipping tape-writable test
Tape TEST-3 label ok
Server check took 0.150 seconds

Amanda Backup Client Hosts Check

Client check: 1 host checked in 0.351 seconds, 0 problems found

Command to take backup
$amdump DailySet1

You will get the log in /var/log/amanda/DailySet1 as we configure in amanda.conf
amdump.1
log.20120111180001.0

This log inform you about amdump process and it success or failure with reason if so fix the errors.

Amanda Recovery Process:

After Successful dump let's have look at recover the data through network.

Goto the client machine and and run amrecover command under root user to restore backup from server. Goto directory where from you have taken backup e.g. if you have backup of /var/www/html/sagar so change the directory to it and run command amrecover test(config file in server)

amrecover DailySet1

AMRECOVER Version 2.5.2p1. Contacting server on amanda.hbni.ac.in …
220 amanda AMANDA index server (2.5.2p1) ready.

Setting restore date to today (2011-12-08)
200 Working date set to 2011-12-08.
200 Config set to test.
200 Dump host set to agni.hbni.ac.in.
Use the setdisk command to choose dump disk to recover

Now you can use help command to check what the various command that you can run through it.

help: lists all the available commands
listhost: shows all the clients that are being dumped on this server
listdisk: show all the directories of a certain client that are being dumped
sethost hostname: sets the hostname
setdisk diskname: sets the disk (or directory) to do the recovery
history: shows the dump history for a disk. History means on which date and time dumps were made.
setdate: sets date of the dump
add: adds a file to be extracted
extract: extracts all the files that has been added to the list by the add command

Now we will see what are basic useful commands that can we use in it for recovery of our backup.

amrecover> listhost
200- List hosts for config test
201- agni.hbni.ac.in
200 List hosts for config test
amrecover> sethost agni.hbni.ac.in
200 Dump host set to agni.hbni.ac.in
amrecover> listdisk

200- List of disk for host
201- /var/www/html/sagar
200 List of disk for host
amrecover> setdisk /var/www/html/sagar
200 Disk set to /var/www/html/sagar
amrecover> ls
2011-12-08-09-15-01 sagar/
2011-12-08-09-15-01 rupesh/
2011-12-08-09-15-01 mahendra/
2011-12-08-09-15-01 .
amrecover> add sagar
Added dir /sagar/ at date 2011-12-08-09-15-01
amrecover> extract

Extracting files using tape drive file:/space/vtapes/test/slots on host amanda.hbni.ac.in.
The following tapes are needed: TEST-8

Restoring files into directory /usr/local/var/amanda
Continue [?/Y/n]?Y

Extracting files using tape drive file:/space/vtapes/test/slots on host amanda.hbni.ac.in.
Load tape TEST-8 now
Continue [?/Y/n/s/t]?y

Load tape TEST-9 now
Continue [?/Y/n/s/t]? y
./sagar/
./sagar/file2

amrecover> exit
200 Good bye.

Resetting the environment:

After doing some testing, you may want to reset the environment (clearing all the dumps, and start from the scratch). For this, remove the contents of the status directories and also the virtual tapes from the server machine with following command.

remove the directories or files themselves.
$ rm -rf /backup/space/vtapes/DailySet1/slots/slot*/*
$ rm -rf /data/space/amandahold/DailySet1/*
$ rm -rf /var/lib/amanda/DailySet1/*

$ for ((i=1;$i<=25;i++)); do amlabel DailySet1 DailySet1-0$i slot $i;done

$ amtape DailySet1 reset
Output: changer is reset

Restoring data without Network:

You can restore data with amrestore instead of amrecover in disaster recovery as we can take data in portable HARD-DISK and put into client manually after extracting it.

Command to restore data with amrestore

amrestore file:/backup/space/vtapes/DailySet1/slots agni.hbni.ac.in /var/www/html/sagar

Need to make entry in cron tab to backup data every day

$ crontab -e

30 9 * * * amdump DailySet1

Run amdump command in the morning everyday with configuration file location of amanda.conf (DailySet1)

COMMANDS IN AMANDA:
amadmin: (man amadmin)
Administrative interface to control amanda backup
Example: amadmin test config | grep -i reserved
RESERVED-UDP-PORT 512,1023
RESERVED-TCP-PORT 512,1023
UNRESERVED-TCP-PORT 10080,10085
amadmin x version | grep CONFIG_DIR
CONFIG_DIR="/usr/local/etc/amanda" DEV_PREFIX="/dev/"
amadmin DailySet1config | grep -i unreserved
UNRESERVED-TCP-PORT 10080,10085

amcheck: (man amcheck)
Check server configuration file and there permission as well check client configuration for backup task.
Example: amcheck DailySet1
.
amcleanup: (man amcleanup)
To cleanup running process of amdump or process interrupt in between it clean the process and logged to the /var/lib/amanda/DailySet1/
amlabel: (man amlabel)
To label the tape in tape list to identify the tape in use

ammt: (man ammt)
To check the status of slots
ammt -f file:backup/space/vtapes/DailySet1/slots status
output: online

amflush: (man amflush)
Flush the backup from holding disk to tape so as if backup stop due to lack of space in holding disk
Example: amflush DailySet1

amverify: (man amverify)
Check amanda backup tapes for error it gives details from amanda.conf
Exaple: amverify test

amgetconf: (man amgetconf)
This command will give the details about server configuration file
Example: 1) amgetconf DailySet1unreserved-tcp-port
output: 10080,10085
2) amgetconf DailySet1--list tapetype
output: DVD_SIZED_DISK
QIC-60
DEC-DLT2000

DLT
SURESTORE-1200E
EXB-8500
EXB-8200
HP-DAT
DAT
MIMSY-MEGATAPE

3)amgetconf Dailyset1 --list dumptype
output:NO-COMPRESS
COMPRESS-FAST
COMPRESS-BEST
COMPRESS-CUST
SRVCOMPRESS
BSD-AUTH

amrecover: (man amrecover)
This is mainly used in client side server this is being used by root user to recover data from server.

amtape: (man amtape)
To take care of tape changer control option there many options as above
Example: amtape DailySet1 reset
Output: amtape: changer is reset
Option: to check option amtape –help

amreport: (man amreport)
General Report for amanda summary and email.

amrestore: (man amrestore) or amrestore –help
amrestore is used to put backup file into client manually by decompress it at server side uses as below
amrestore file:/backup/space/vtapes/DailySet1/slots agni.hbni.ac.in /var/www/html

Level 0
A full dump, or back up, of a set of files. This means that every file is saved for later retreival.

Level 1
The first incremental back up of a set of files. This means that only the files that have changed since the last Level 0 have been stored for later retreival.

Level n
The incremental backup of files since the last Level n-1 backup. Note: Levels can sometimes be difficult to understand, so there is an Example available.

Disklist Entry (DLE)

Amanda stores the items to be backed up in the disklist file, so each item becomes a Disklist Entry.

dumpcycle
The maximum length of time that a DLE receives a Level 0 backup. (Usually 1 week)

runspercycle
The number of times during a dumpcycle that Amanda will be run. (Usually 7 for every night of the week or 5 for every weeknight, assuming a dumpcycle of 1 week)

tapecycle
The number of tapes Amanda must use before "recycling" tapes. (Ideally this should be at minimum 2*runspercycle+1. That way you have two complete sets of backups, plus an extra tape if something goes wrong)

BACKUP OF MySQL DATABASE with ZRM

As we all know how database is important to each organization to smooth functionality of services. Setting up MySQL backup and restore processes typically takes up a lot of a DBA's time and attention. Henceforth lets create full logical or raw backups of your databases , generate reports about the backups, verify the integrity of the backups, and recover your databases. It can also send email notifcations about the backup status, and you can implement multiple backup policies.

This can be achieved with the amanda too with MySQL-zrm (for server and client).
ZRM is Zamanda Recovery Manager for database. Let have look at how it works in real environment.

INSTALLATION PROCESS.

Amanda Server:
Download MySQL-zrm-2.2.0-1.noarch rpm from given link below
http://www.zmanda.com/download-zrm.php

Install the RPM with root user
#rpm -ivh MySQL-zrm-2.2.0-1.noarch

You will get configuration file in below folder
/etc/mysql-zrm/mysql-zrm.conf copy the file into new directory Dailyrun1 created at same location and set proper permission to the same

We will change the configuration file
vi /etc/mysql-zrm/mysql-zrm.conf

Backup level, use 0 for full, 1 is incremental,default is full backup
backup-level=0

Backup method,either “raw” or “logical”.use logical
backup-mode=logical (logical means mysqldump)
Backup type,use regular
backup-type=regular

Destination, directory where backups will be stored, default is /var/lib/mysql-zrm. You can specify the location here
destination=/var/lib/mysql-backup

Retention policy, specify in days (D), week(W),months (M) or years(Y)
retention-policy=1W

compress=1

compress-plugin=/usr/bin/gzip

all-databases=1
user="root"
password="bcca123"
host="agni.hbni.ac.in"
tmpdir=/data/mysql-zrm
verbose=1
mailto="root@localhost"
mail=only-on-error

MySQL Client configuration

Install below rpm on client to take MySQl backup.
MySQL-zrm-client-2.2.0-1.noarch

While taking backup of MySQL database it is necessary to allow server to access and backup the database from mysql thus we need to create above configuration.

mysql> grant all on *.* to root@31.101.1.29 identified by 'password123';

mysql> flush privileges;

above command allow you to access client's mysql remotly

MySql ZRM commands for backup and for restore process

#####Command used to take backup manually.
mysql-zrm-schedular –now --backup-set=DailyRun

####command to schedule backup of client
-----Run full backup command on 9.30am on every sunday------
mysql-zrm-schedular --add –start 9.30 –day-of-week 0 –backup-set=DailyRun –backup-level 0

------Run incremental backup on 9.30am daily
mysql-zrm-schedular –add –interval daily –start 9:30 –backup-set=DailyRun –backup-level 1

------To verify the scheduling
mysql-zrm-schedular –query

-------To delete existing scheduling
mysql-zrm-schedular –delete

#####To Check backup status

mysql-zrm-reporter --where backup-set =DailyRun --show backup-status-info

mysql-zrm-reporter --where backup-set=DailyRun --show backup-performance-info

####To verify the backup
mysql-zrm --action verify-backup --backup-set=DailyRun

Output: verify-backup:INFO: ZRM for MySQL - version built from source
DailyRun:verify-backup:INFO: Verification successful

Now come to really action of restoring data from server to client

###Recovery command
mysql-zrm-reporter --show restore-info --where backup-set=DailyRun

select which backup you want this will sho you by the above command

mysql-zrm -restore --backup-set dailyrun --source-directory \
/var/lib/mysql-zrm/dailyrun/20061025161624/

With above command backup get stored in client.