Welcome to the

Introduction Workshop

Start

- Make sure you have VirtualBox installed
- Connect to the network
- get DHCP address

Download and unpack Appliance

- download

```
http://192.168.1.1/bareos_64_Bit_osbconf.x86_64-2014.09.17.ovf.tar.gz
```

- unpack appliance

```
tar xzvf bareos_64_Bit_osbconf.x86_64-2014.09.17.ovf.tar.gz
bareos_64_Bit_osbconf-2014.09.17/
bareos_64_Bit_osbconf-2014.09.17/bareos_64_Bit_osbconf.x86_64-2014.09.17.ov
bareos_64_Bit_osbconf-2014.09.17/bareos_64_Bit_osbconf.x86_64-2014.09.17.mf
bareos_64_Bit_osbconf-2014.09.17/bareos_64_Bit_osbconf.x86_64-2014.09.17-di
```

Import appliance

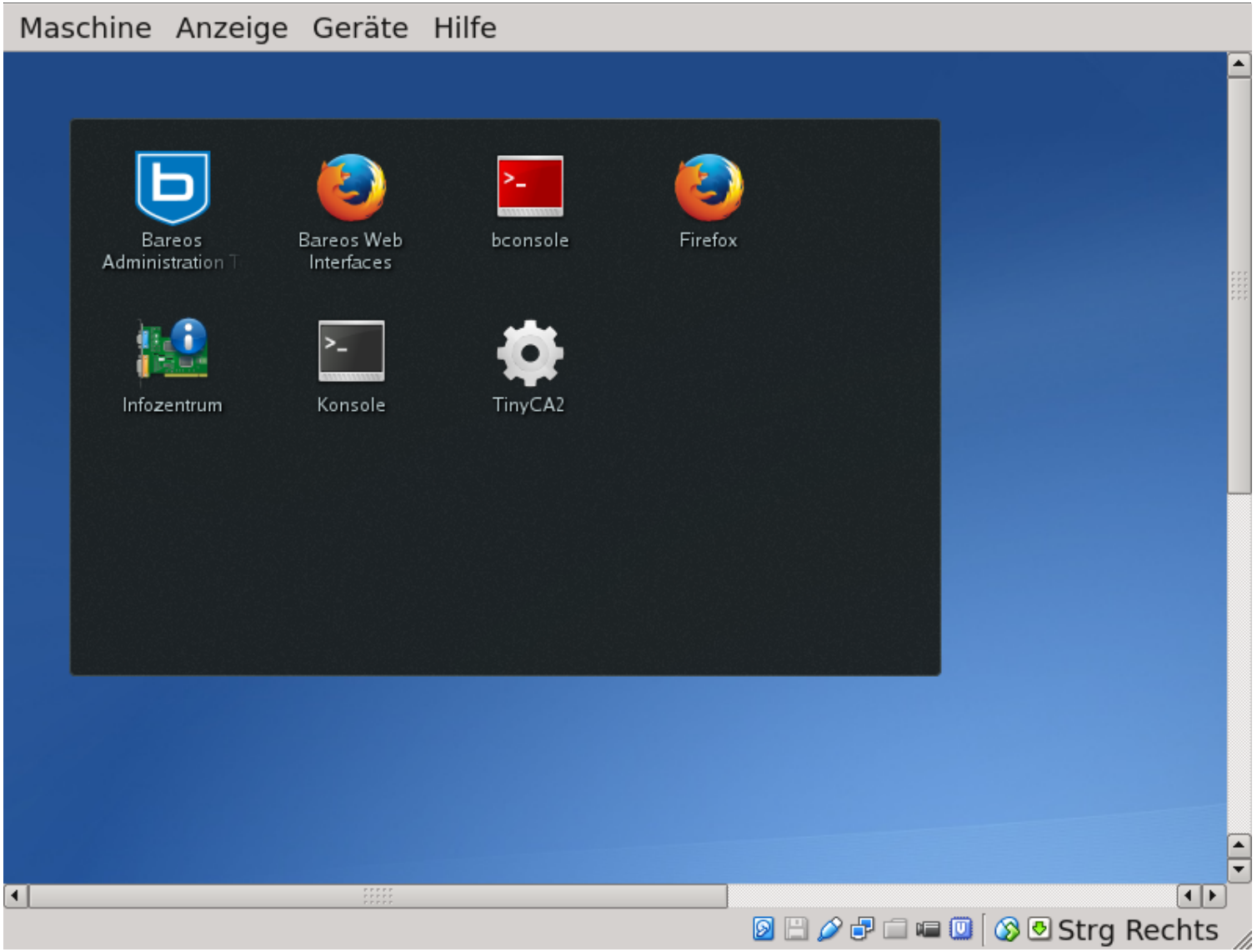
1. Start Virtualbox
2. File .. Import Appliance
3. Choose **bareos_64_Bit_osbconf.x86_64-2014.09.17.ovf**

Take a snapshot

- If things go wrong, you can always go back
- Ctrl-Shift-s
- configure Network:
  - bridged Network to eth0/wlan0
- start virtual machine

Language Configuration

- Choose Language : German/English
- Choose Keyboard : Alt-N
- Choose Timezone : Alt-N


Maschine Anzeige Geräte Hilfe
Bareos Administration T
Bareos Web Interfaces
bconsole
Firefox
Infozentrum
Konsole
TinyCA2
Strg Rechts

Introduction of the hosts

- Marco van Wieringen
  - long-time contributor to bacula code
  - founder of bareos
  - main programmer
- Philipp Storz
  - author of bacula book at open source press
  - founder of bareos
  - programming and coordination

Introduction of attendees

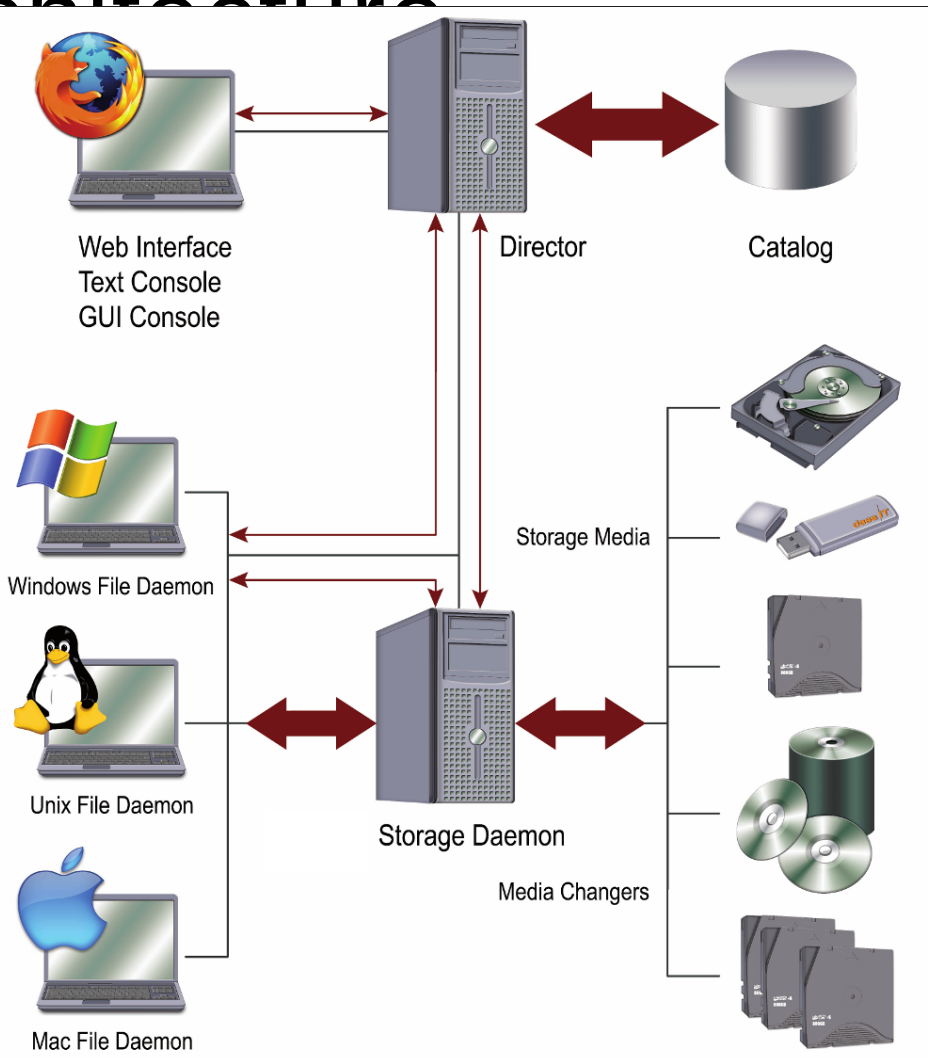
- Please tell us your
  - name
  - organization
  - experience with backup software
  - experience with bareos/bacula
  - do you have a config problem to be solved?

Create teams

- two persons
- can solve tasks together

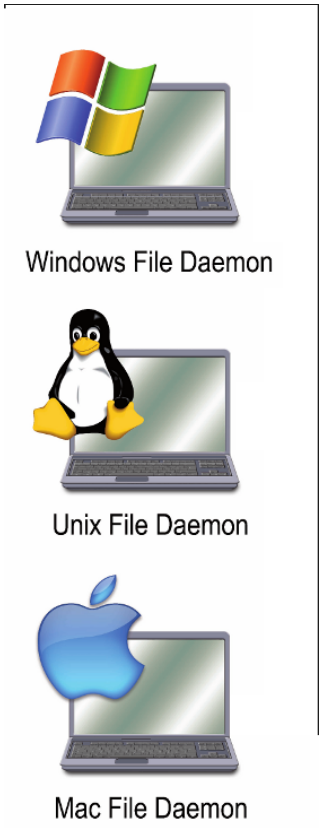
Bareos Architecture

- Communication via TCP/IP
- defined ports are used
- communication can use TLS



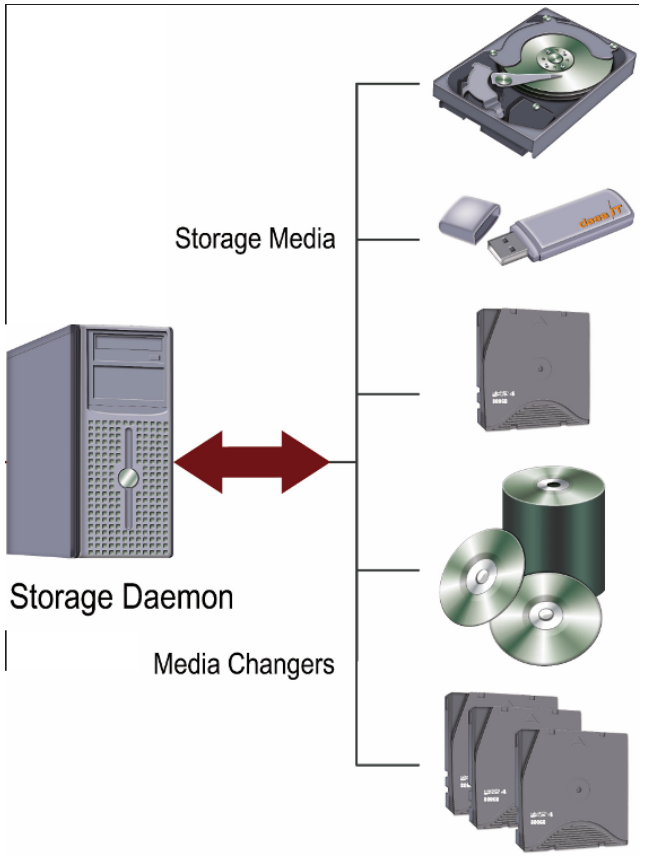
FileDaemon

- Runs on Client Computer
- read, write, verify files
- read, write ACLs, attributes
- make VSS snapshots
- checksum calculation
- compression/encryption
- run scripts



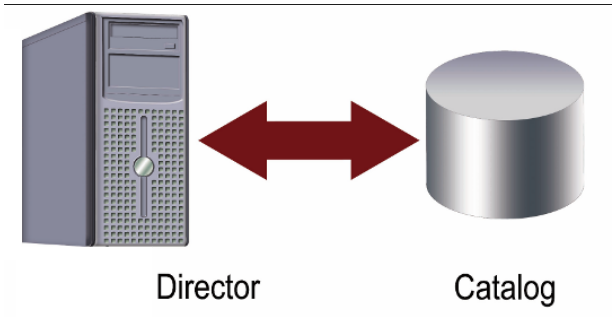
Storage Daemon

- device access (disk, tape)
- media changer control
- read barcodes labels
- write logical labels
- run copy and migration jobs
- handle media errors



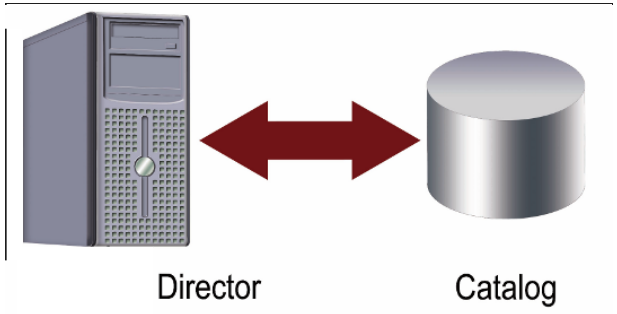
Director

- handle catalog
- media and pool handling
- scheduling
- determine what to backup
- backup level
- does message, statistics and reports
- run scripts

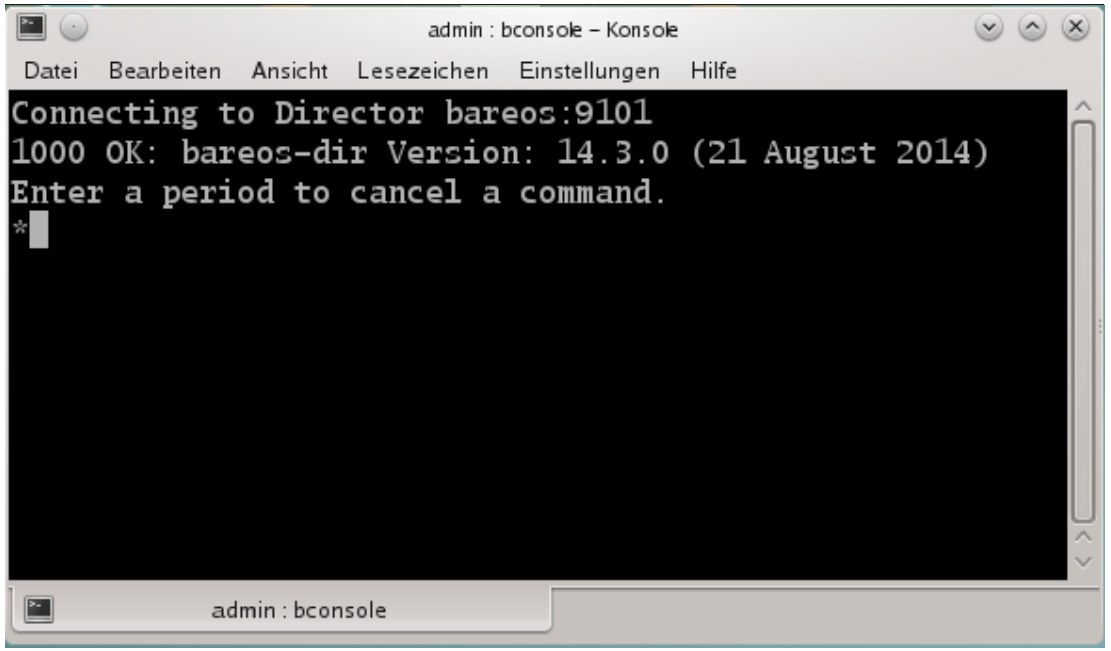


Catalog

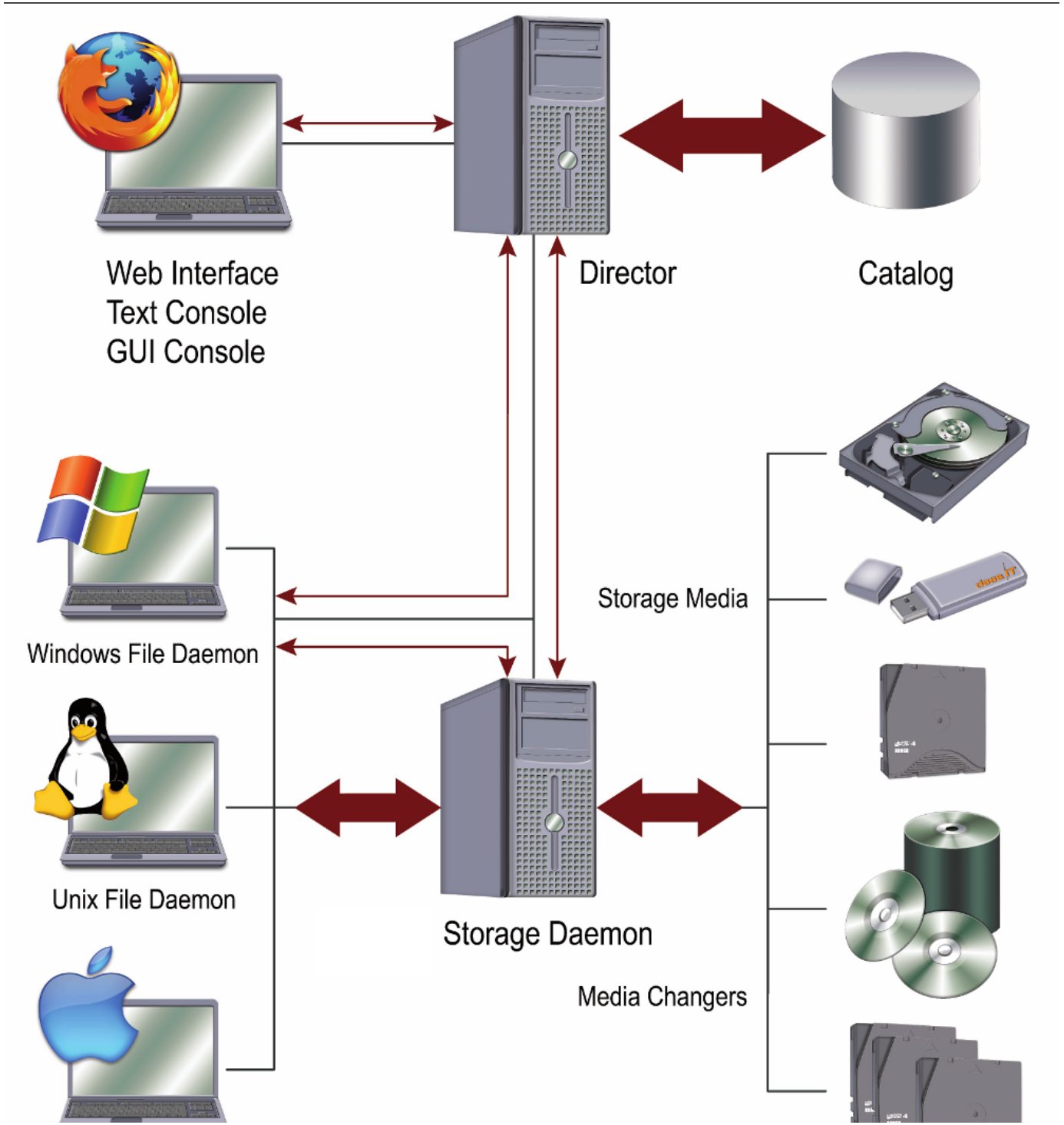
- store info about all files, media, jobs
- PostgreSQL/MySQL/SQLite DB



bconsole



- UI for restores
- query status
- catalog queries
- run jobs


Web Interface
Text Console
GUI Console
Director
Catalog
Windows File Daemon
Unix File Daemon
Storage Daemon
Storage Media
Media Changers

Architecture Test

- which bareos daemon schedules the backups?
- where is the administrative data stored?
- which bareos daemon reads and writes files on the client?
- which bareos daemon handles media?

Bareos Configuration

- Configuration is done in config files
- Each daemon has its own config file
- usually in **/etc/bareos**
  - bareos-dir.conf
  - bareos-fd.conf
  - bareos-sd.conf
  - bconsole.conf

Bareos configuration syntax

- Configuration files consist of
  - resources
  - directives
- resources can have subresources

```
resourcename {
  directive = value
  directive = value
    SubResource {
      directive = value
      directive = value
  }
}
```

Most important Director Resources:

- Director
- Fileset
- Schedule
- Client
- Job

Director Resource: Definition of Directors' properties

```
Director {                            # define myself
  Name = bareos-dir
  QueryFile = "/usr/lib/bareos/scripts/query.sql"
  Maximum Concurrent Jobs = 1
  Password = "UbCeWuuamTN/FNQhNH7rbdmx8X+ra9j0UkMMrSdUmkO4"         # Co
  Messages = Daemon

  # remove comment in next line to load plugins from specified directory
  # Plugin Directory = /usr/lib64/bareos/plugins
}
```

FileSet: Definition what to backup

```
FileSet {
  Name = "Full Set"
  Include {
    Options {
      signature = MD5
    }
    File = /usr/sbin
  }
```

Schedule: Definition when to run a backup

```
Schedule {
  Name = "WeeklyCycle"
  Run = Full 1st sun at 23:05
  Run = Differential 2nd-5th sun at 23:05
  Run = Incremental mon-sat at 23:05
}
```

Client: Definition of a Client

```
Client {
  Name = bareos-fd
  Address = bareos
  Password = "lecCqzgBjxgM0J3+1adiuLzhy0cPGIHrdYMdtGHMbvKX"          # p
  File Retention = 30 days            # 30 days
  Job Retention = 6 months            # six months
  AutoPrune = no                      # Prune expired Jobs/Files
}
```

Job: Definition of a Job

- combines the other resources to a runnable backup job

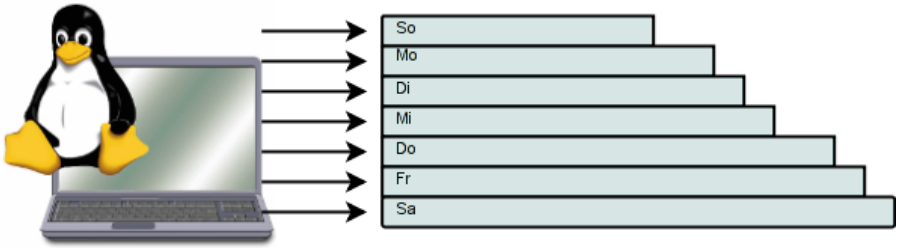
```
Job {
  [...]
  Client = bareos-fd        # what client to backup?
  FileSet = "Full Set"      # which files to backup?
  Schedule = "WeeklyCycle" # when to backup?
  Storage = File            # where to backup?
  Messages = Standard       # where to send messages?
  Pool = File               # what target pool?
}
```

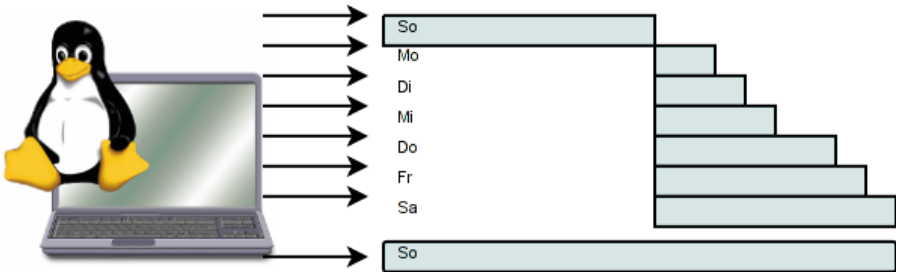
Configuration Test

- which resource configures when a job is scheduled?
- which resource configures what files are backed up?
- which resource configures what client to backup?
- which resource combines the other resources?

Full and differential backups

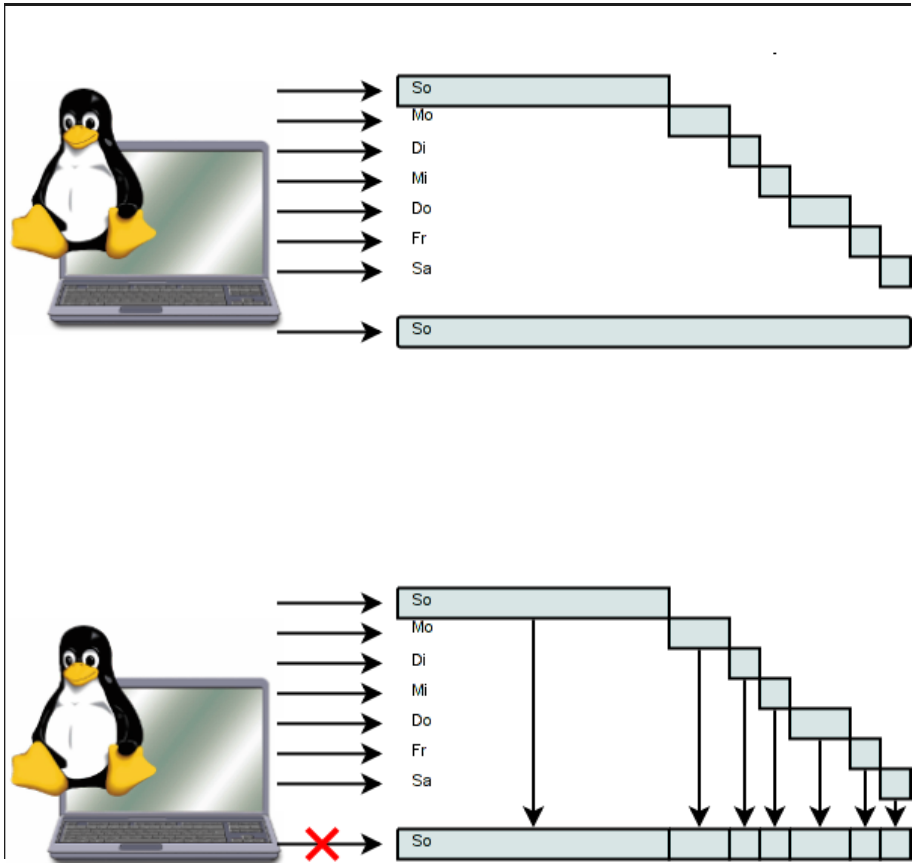
- Full
  - backup everything
- differential
  - backup what has changed since last full
  - timestamps are used
  - restore needs diff and full media





incremental and virtual backups

- incremental
  - backup what has changed since last backup of any level
  - restore needs all media
- virtual
  - create new full backup from existing backup data
  - client not involved



Backup Level Test

- How is determined what has to be backed up during diff and incr. backups?
- Which backup level needs the least amount of data on the backup media?
- Why is differential backup probably more relyable than incremental backup?

Backup Appliance

- OpenSUSE 13.1
- users
  - root
  - admin
- password is **bareos**

Backup Appliance

- Full Bareos installation
  - Director
    - Postgresql Catalog DB
  - Filedaemon
  - Storage Daemon
    - File Storage Device
      - writes to /var/lib/bareos/storage
    - Virtual Autochanger
      - Mhvtl
      - Simulates StorageTek L700
      - One LTO-5 drive
      - 40 Slots
      - 4 I/O Ports / Mail Slots
  - Bareos WebUI
    - Disk-to-Disk-to-Tape configured

mhvtl

```
$ lsscsi -g
[0:0:0:0]    disk    VBOX     HARDDISK         1.0   /dev/sda   /dev/sg0
[3:0:0:0]    mediumx STK      L700             0105  /dev/sch0  /dev/sg2
[3:0:1:0]    tape    IBM      ULT3580-TD5      0105  /dev/st0   /dev/sg1

$ mtx -f /dev/tape/by-id/scsi-SSTK_L700_XYZZY_A status
  Storage Changer /dev/tape/by-id/scsi-SSTK_L700_XYZZY_A:1 Drives, 43 Sl
Data Transfer Element 0:Empty
      Storage Element 1:Full :VolumeTag=E01001L5
      Storage Element 2:Full :VolumeTag=E01002L5
      [...]
      Storage Element 37:Full :VolumeTag=F01037L5
      Storage Element 38:Full :VolumeTag=F01038L5
      Storage Element 39:Full :VolumeTag=F01039L5
      Storage Element 40 IMPORT/EXPORT:Empty
      Storage Element 41 IMPORT/EXPORT:Empty
      Storage Element 42 IMPORT/EXPORT:Empty
      Storage Element 43 IMPORT/EXPORT:Empty
```

Hands-on

- start console

```
Connecting to Director bareos:9101
1000 OK: bareos-dir Version: 14.3.0 (21 August
Enter a period to cancel a command.
*
```

- execute **help**

estimate command

```
*estimate
The defined Job resources are:
     1: BackupClient1
     2: CopyToTape
     3: BackupCatalog
     4: RestoreFiles
Select Job resource (1-4): 1
Using Catalog "MyCatalog"
Connecting to Client bareos-fd at bareos:9102
2000 OK estimate files=310 bytes=18,987,521
```

estimate listing

```
*estimate listing
[..]
Using Catalog "MyCatalog"
Connecting to Client bareos-fd at bareos:9102
-rwxr-xr-x   1 root     root           13973 2014-09-17 15:15:46  /usr/s
-rw-r--r--   1 root     root             987 2014-09-17 15:15:46  /usr/s
lrwxrwxrwx   1 root     root              24 2014-09-18 14:22:29  /usr/s
[..]
-rwxr-xr-x   1 root     root           14768 2014-09-17 15:15:46  /usr/s
-rwxr-xr-x   1 root     root            1593 2014-09-17 15:15:46  /usr/s
drwxr-xr-x   2 root     root           12288 2014-09-18 14:22:29  /usr/s
2000 OK estimate files=310 bytes=18,987,521
```

run job **BackupClient1**

```
*run
Automatically selected Catalog: MyCatalog
Using Catalog "MyCatalog"
A job name must be specified.
The defined Job resources are:
     1: BackupClient1
     2: CopyToTape
     3: BackupCatalog
     4: RestoreFiles
Select Job resource (1-4): 1
Run Backup job
JobName:  BackupClient1
Level:    Incremental
Client:   bareos-fd
Format:   Native
FileSet:  Full Set
Pool:     File (From Job resource)
Storage:  File (From Job resource)
```

check status by looking for messages

```
*messages
18-Sep 17:16 bareos-dir JobId 1: No prior Full backup Job record found.
18-Sep 17:16 bareos-dir JobId 1: No prior or suitable Full backup found
18-Sep 17:16 bareos-dir JobId 1: Start Backup JobId 1, Job=BackupClient1
18-Sep 17:16 bareos-dir JobId 1: Created new Volume "File-0001" in catal
18-Sep 17:16 bareos-dir JobId 1: Using Device "FileStorage" to write.
18-Sep 17:16 bareos-sd JobId 1: Labeled new Volume "File-0001" on device
18-Sep 17:16 bareos-sd JobId 1: Wrote label to prelabeled Volume "File-0
18-Sep 17:17 bareos-sd JobId 1: Elapsed time=00:00:15, Transfer rate=1.2
18-Sep 17:17 bareos-dir JobId 1: Bareos bareos-dir 14.3.0 (21Aug14):
  Build OS:               x86_64-suse-linux-gnu suse openSUSE 13.1 (Bott
  JobId:                  1
  Job:                    BackupClient1.2014-09-18_17.16.49_08
  Backup Level:           Full (upgraded from Incremental)
  Client:                 "bareos-fd" 14.3.0 (21Aug14) x86_64-suse-linux
  FileSet:                "Full Set" 2014-09-18 17:16:52
  Pool:                   "File" (From Job resource)
  Catalog:                "MyCatalog" (From Client resource)
```

restore files

```
*restore
To select the JobIds, you have the following choices:
     1: List last 20 Jobs run
     2: List Jobs where a given File is saved
     3: Enter list of comma separated JobIds to select
     4: Enter SQL list command
     5: Select the most recent backup for a client
[..]
5
[...]
You have selected the following JobId: 1

Building directory tree for JobId(s) 1 ...  ++++++++++++++++++++++++++++++++
309 files inserted into the tree.
cwd is: /

$ find *
[...]
```

check restore

```
*mess
18-Sep 17:29 bareos-dir JobId 2: Start Restore Job RestoreFiles.2014-09-
18-Sep 17:29 bareos-dir JobId 2: Using Device "FileStorage" to read.
18-Sep 17:29 bareos-sd JobId 2: Ready to read from volume "File-0001" on
18-Sep 17:29 bareos-sd JobId 2: Forward spacing Volume "File-0001" to fi
18-Sep 17:29 bareos-dir JobId 2: Bareos bareos-dir 14.3.0 (21Aug14):
  Build OS:               x86_64-suse-linux-gnu suse openSUSE 13.1 (Bott
  JobId:                  2
  Job:                    RestoreFiles.2014-09-18_17.29.41_09
  Restore Client:         bareos-fd
  Start time:             18-Sep-2014 17:29:43
  End time:               18-Sep-2014 17:29:45
  Elapsed time:           2 secs
  Files Expected:         1
  Files Restored:         1
  Bytes Restored:         49,296
  Rate:                   24.6 KB/s
  FD Errors:              0
```

check in system:

```
$ find /tmp/bareos-restores/
/tmp/bareos-restores/
/tmp/bareos-restores/usr
/tmp/bareos-restores/usr/sbin
/tmp/bareos-restores/usr/sbin/mtx
```

bconsole test

- What command shows possible available commands?
- What command is used to show how much data a backup will contain, and how can the exact files be shown?
- What command is used to run a backup?
- What command is used to do a recover files?

Exercise 1

- BackupClient1 should additionally backup ***/etc***
  - Hint: *reload* command can be used to update dir configuration without new start

Solution for Exercise 1

1. Add line "File = /etc" to FileSet "Full Set" in /etc/bareos-dir.conf
2. open bconsole and type "reload"
3. run "estimate listing" to see if /etc would be backed up
4. alternatively, run job "BackupClient1"

status command

- shows status of system components

status director

- shows next scheduled jobs

```
Scheduled Jobs:
Level          Type     Pri  Scheduled          Name               Volume
===================================================================================
Incremental    Backup    10  19-Sep-14 23:05    BackupClient1      File-000
Incremental    Copy      10  19-Sep-14 23:05    CopyToTape
Full           Backup    11  19-Sep-14 23:10    BackupCatalog      File-000
```

- shows running jobs

```
Running Jobs:
Console connected at 19-Sep-14 13:51
No Jobs running.
```

- show terminated jobs

```
Terminated Jobs:
 JobId  Level    Files      Bytes   Status   Finished        Name
====================================================================
     1  Full         310    18.98 M  OK       18-Sep-14 17:17 BackupClient1
     2                 1    49.29 K  OK       18-Sep-14 17:29 RestoreFiles
```

status client

- shows runnig jobs on client

```
Running Jobs:
Director connected at: 19-Sep-14 13:54
No Jobs running.
====
```

- shows terminated jobs on client

```
Terminated Jobs:
 JobId  Level    Files      Bytes   Status   Finished        Name
====================================================================
     1  Full       310    18.98 M  OK       18-Sep-14 17:17 BackupClie
     2                1    49.29 K  OK       18-Sep-14 17:29 RestoreFil
     3  Incr          0          0  OK       18-Sep-14 23:05 BackupClie
====
```

- info comes from local status file
- can differ from director view as other director can also connect this client

status storage

- shows running jobs
- shows waiting jobs
- shows terminated jobs
- shows device status

```
Autochanger "LTO-Changer" with devices:
   "Drive-1" (/dev/nst0)
Device "FileStorage" (/var/lib/bareos/storage) is not
Device "Drive-1" (/dev/nst0) is not open.
    Drive 0 is not loaded.
```

- shows volume status

```
Used Volume status:
====

====
```

status scheduler

- shows what jobs are triggered by which schedule

```
Schedule                Jobs Triggered
=======================================================
WeeklyCycle
                        BackupClient1
                        CopyToTape

WeeklyCycleAfterBackup
                        BackupCatalog
```

- shows a preview for 7 days

```
Scheduler Preview for 7 days:

Date                    Schedule                Overrides
=======================================================
Fri 19-Sep-2014 23:05   WeeklyCycle             Level=Incre
Fri 19-Sep-2014 23:10   WeeklyCycleAfterBackup  Level=Full
Sat 20-Sep-2014 23:05   WeeklyCycle             Level=Incre
Sat 20-Sep-2014 23:10   WeeklyCycleAfterBackup  Level=Full
[...]
```

Exercise 2

- Full Backup of Job BackupClient1 should be scheduled in 5 minutes

Solution for Exercise 2

1. Add line "Run = Full at 15:05" to Schedule "WeeklyCycle" in /etc/bareos-dir.conf
2. open bconsole and type "reload"
3. run "status schedule schedule=WeeklyCycle" and check if schedule is updated
4. wait 5 minutes and check if backup starts

Exercise 3: backup partner's client

- Part 1: Configure link between director and client

Solution for Exercise 3 p.1

1. Add a client ressource to your director configuration pointing to your partner's client
2. Add a director ressource to your client's config pointing to your partner's director
3. Restart director and filedaemon
4. run status client to see if your partner's client is accessible

Exercise 3: backup partner's client

- Part 2: configure a backup job for partner's client

Solution for Exercise 3 p.2

1. Create a fileset to backup your partner's client
2. Create a job ressource to backup partner's client
3. Run backup of your partner's client
4. Run restore to your partner's client

Open talk

- your questions?
- other ideas:
  - Disaster recovery
  - usage of bls/bextract
  - check copy to tape setup in vm