AWS Virtual Tape Library as storage for Bareos

Luis Alberto Giménez
Systems Engineer
alberto.gimenez@capside.com
@sysvalve

capside
architects of the digital society

The story behind the setup

- Legacy Bacula (5.2) installation
- Physical datacenter
- HP MSL 2024: 24 slots, 1 tape drive, autochanger
- MSL attached to the server, speed was good
- It worked quite well, but…

The story behind the setup

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- 4.0

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- Sometimes backups did not finish on time
- Sometimes the tapes did not fit in the safe case
- The whole tape pool did not fit in MSL + offsite

Even more history (last slide!)

- We wanted to upgrade the backup service
- Zero risks allowed and no service interruption

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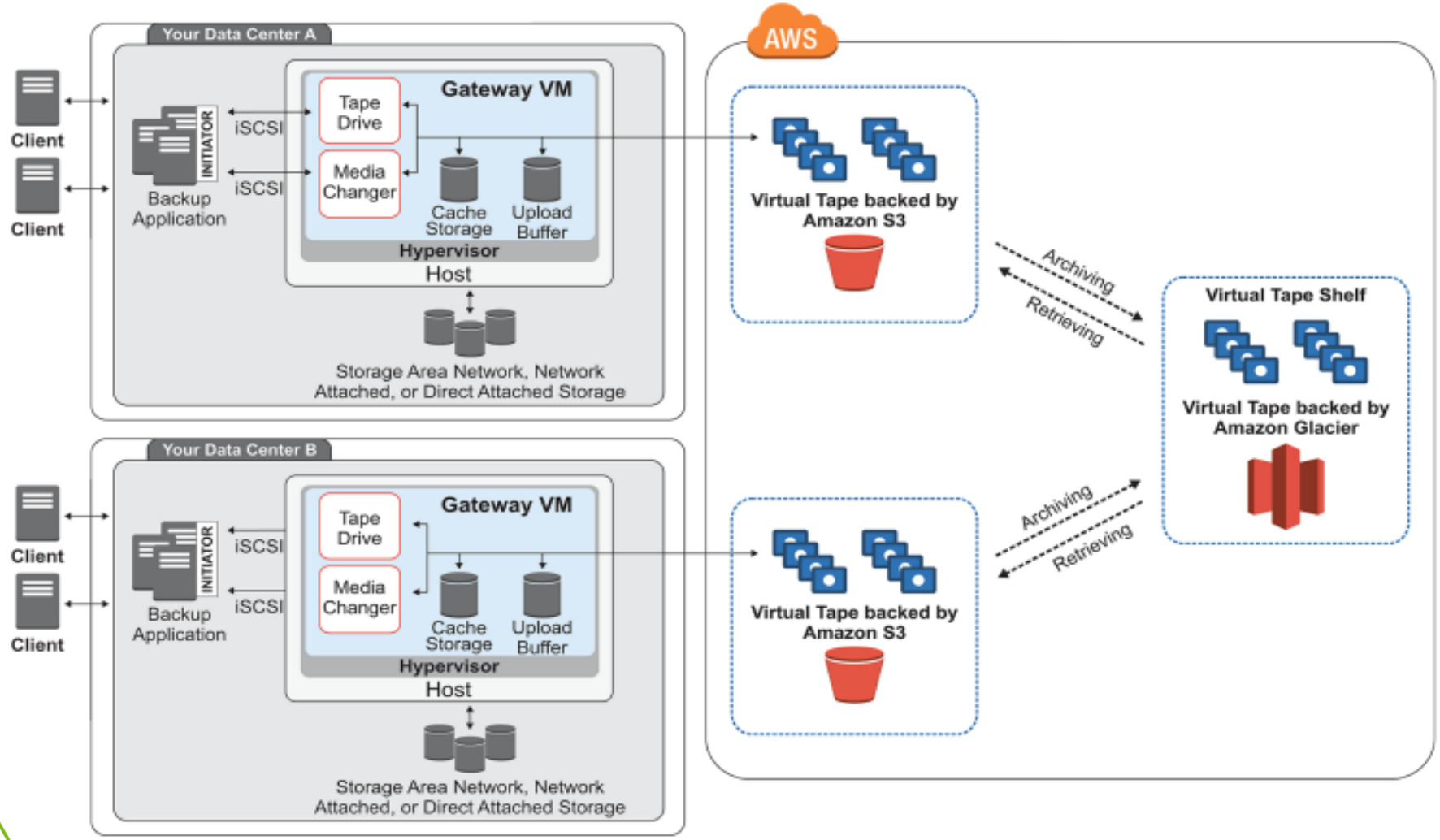
- We wanted to upgrade the backup service
- Zero risks allowed and no service interruption
- Duplicate infrastructure: not cheap
- Start experimenting with AWS VTL

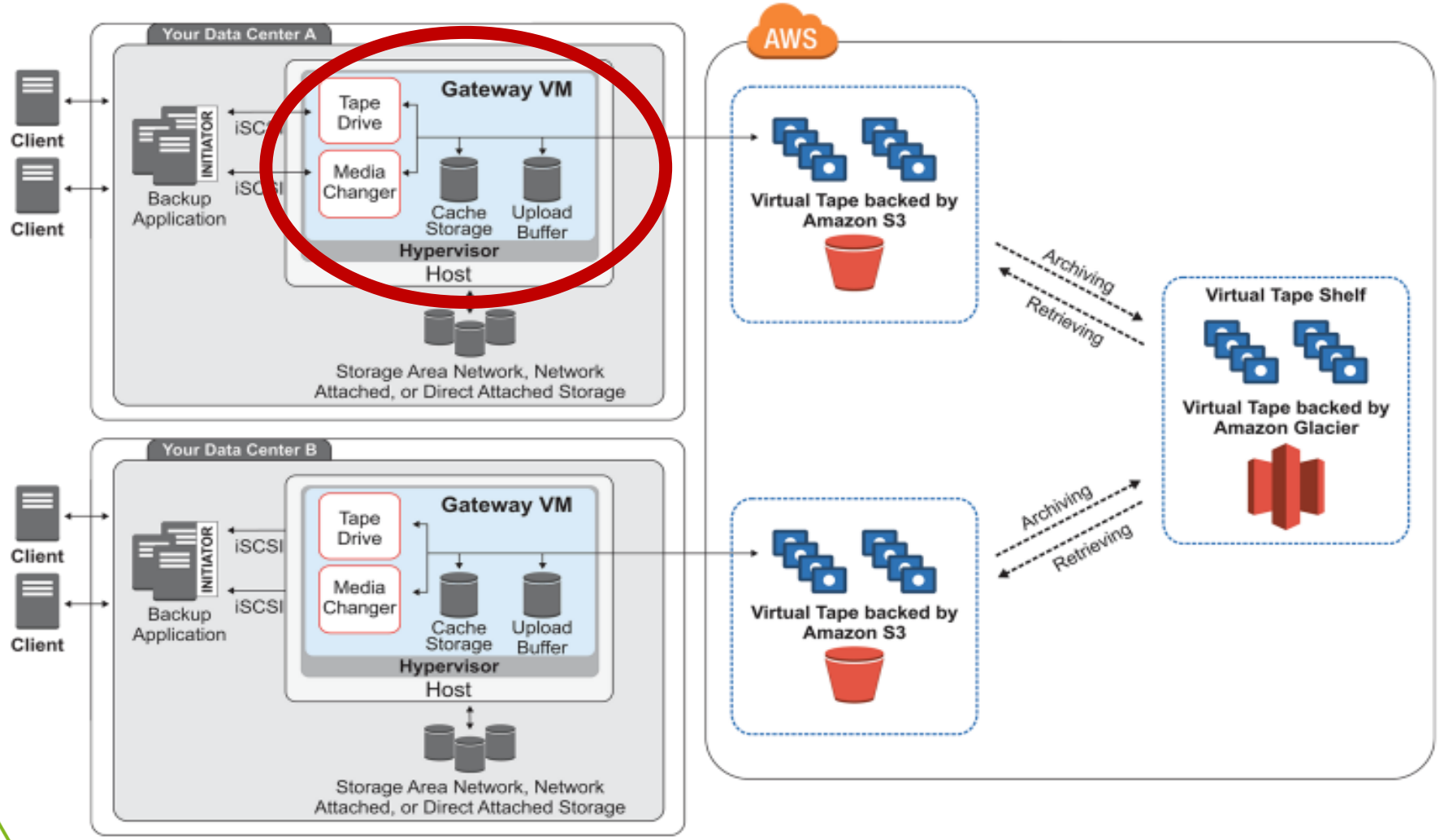
What is AWS Storage Gateway-VTL?

- Part of Storage Gateway service
- Connect on-premises appliance with cloud storage
- Virtual Tape Library / Volume gateway
- On-premises VTL storage gateway acts as a cache

What is AWS Storage Gateway-VTL?



The appliance (VTL)



VTL appliance

- iSCSI devices exposed:
  - 1 media changer
  - 10 tape drives
- 1600 slots, 1600 import/export slots
- I/E slots for archival/retrieval

Cache Storage/Upload Buffer

- At least two disks (DAS/SAN)
- Cache Storage: Fast access to most recently used data
- Upload buffer: in-transit data to S3 storage
- We can add more disks later

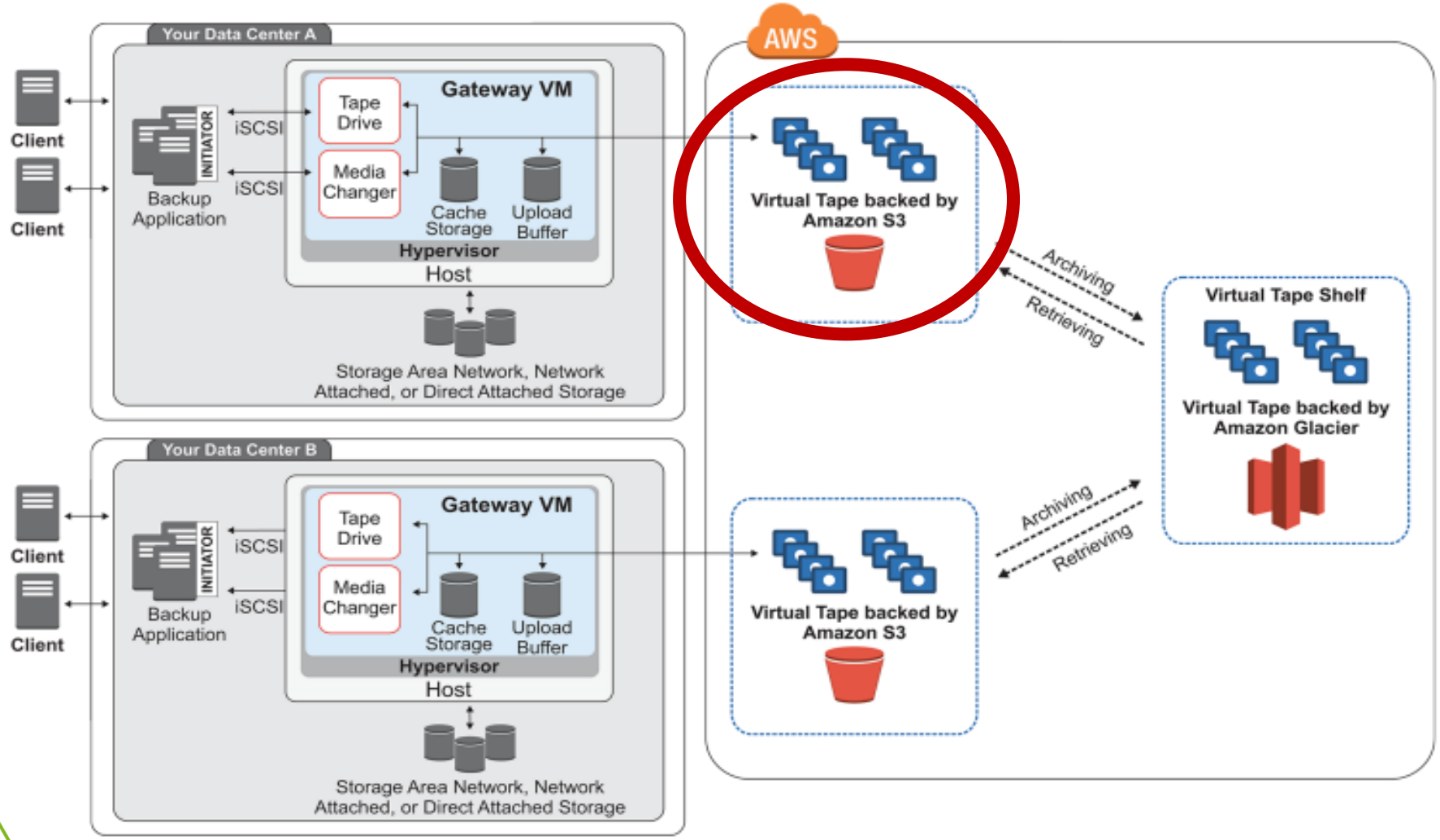
Cache Storage/Upload Buffer

- Adapt LAN to Internet speed: size them properly:
  - Upload buffer at least 150G
  - Cache storage: 1.1 x upload buffer
  - YMMV: formula in the documentation
- We can delete Upload Buffer (needs VTL restart)

Cache disk deletion

- We can delete Cache Storage disks
- Officially not supported, but AWS support confirmed it was possible.
- The cache must be reset, so be sure it is clean
- CloudWatch metrics:
  - UploadBufferUsed
  - CachePercentDirty

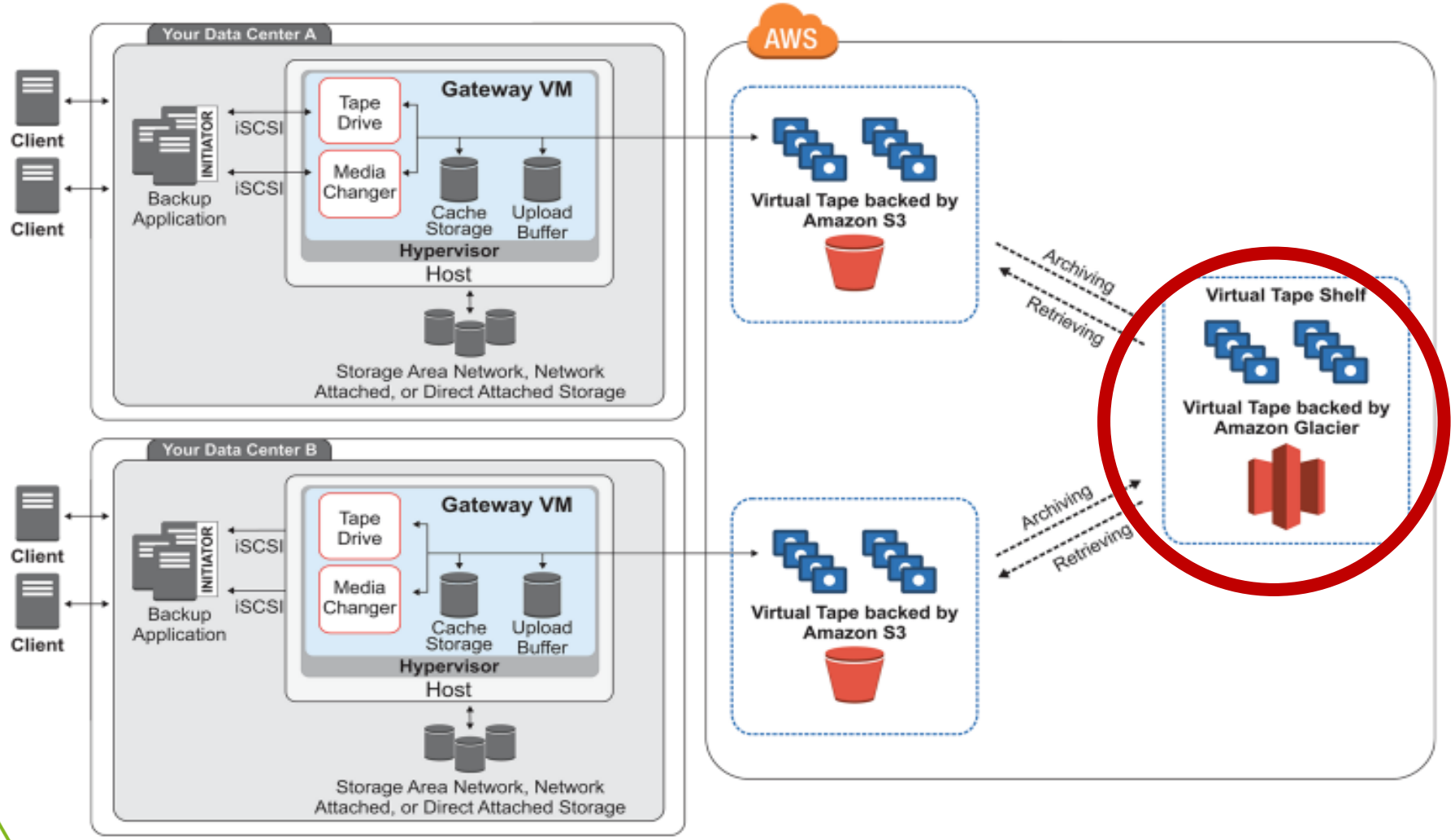
The Virtual Tapes



Virtual Tapes

- Analogous to the good old physical tape cartridges
- From 100G to 2.5TB per tape
- Backed in S3 storage
- Up to 1500 tapes or 150TB of data per gateway
- Managed via AWS web console or API

The Virtual Tape Shelf

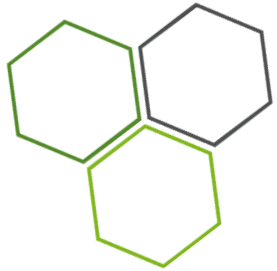


Virtual Tape Shelf

- Analogous to off-site tape holding facility
- Stored in Amazon Glacier
  - Lower cost (4x times cheaper than S3)
  - 24h retrieval time
- One VTS per account per AWS region

Virtual Tape Shelf

- Archival via Import/Export slots in the VTL
- Retrieval management via Web Console or API
- Retrieved tapes visible in Import/Export slots
- Read-only tapes after retrieval



Read-only tapes?

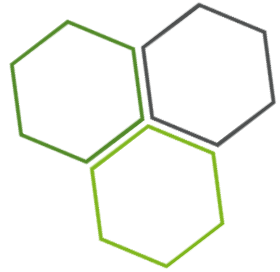
WTF?

What about recycling?


EXCUSE ME
DO YOU HAVE A MOMENT TO TALK ABOUT
GODZILLA, OUR LORD AND SAVIOR?

Let me talk you about...

- One of the cloud best-practices



Embrace the constraints

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- Embrace the constraints
- Why do we **love** tapes?

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- One of the cloud best-practices
- Embrace the constraints
- Why do we **love** tapes?
- We should love **data**, not the place where it is stored

Rethink Tape lifecycle

- No Bareos-managed tape lifecycle (if we want archival)
- BUT we can manage the storage gateway via API
- Maybe a plugin could be written?

Storage Gateway setup

- Using the AWS Web console, service Storage Gateway
- “Deploy new Storage Gateway”, “Gateway-Virtual Tape Library”
- Download the VM template (ESX or HyperV)]
- Download and deploy the on-premises appliance
- Activate the gateway (register the appliance)

Bareos server setup

- Instal iscsi initiator tools (open-iscsi in Debian)
- Discover the targets

```
iscsiadm --mode discovery --type sendtargets \
      --portal GATEWAY_IP:3260
```

Bareos server setup

- Login to each one of the targets

```
iscsiadm --mode node \
     --targetname iqn.1997-05.com.amazon:sgw-852ecaec-tapedrive-01 \
     --portal GATEWAY_IP:3260,1 --login
```

- Increase iSCSI timeouts (VTL is uploading via Internet!)

Your new devices

```
# lsscsi --generic
[9:0:0:0]    tape         IBM      ULT3580-TD5      0103  /dev/st0     /dev/sg2
[10:0:0:0]   tape         IBM      ULT3580-TD5      0103  /dev/st1     /dev/sg3
[11:0:0:0]   mediumx      STK      L700             0103  /dev/sch0    /dev/sg4
[12:0:0:0]   tape         IBM      ULT3580-TD5      0103  /dev/st2     /dev/sg5
```

Media changer: mtx shot first

- Nice /dev/sch0 iSCSI changer device file
- mtx won't support it

```
/dev/sch0 is not an sg device, or old sg driver
```

- From the man: *"Control SCSI media changer devices"*

It’s okay to be generic

- As mtx seems to be drunk, we need to use the generic device
- /dev/sg4 to the rescue!
- We can use that device file for Bareos configuration

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- As mtx seems to be drunk, we need to use the generic device
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- Or can we?

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- Modern kernels detect dynamically connected devices
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- VTL: 11 generic devices all connected at the same time
- What can go wrong?
- *"The autochanger device file changes"* can go wrong

Udev rules to the rescue!

- Magic spell to assign always a known name to the changer

```
SUBSYSTEM=="scsi_generic", SUBSYSTEMS=="scsi", ATTRS{type}=="8", \
  IMPORT{program}="scsi_id --sg-version=3 --export --whitelisted –d $devnode", \
  SYMLINK+="autochanger"
```

- Save the spell in /etc/udev/rules.d/80-vtl-autochanger.rules
- Use /dev/autochanger in Bareos config

What about tape drives?

- Default *udev* rules are OK

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- Default *udev* rules are OK
- If you are OK with device names like

```
/dev/tape/by-path/ip-10.4.7.100:3260-iscsi-iqn.1997-
05.com.amazon:sgw-852ecaec-tapedrive-01-lun-0-nst
```

Bareos configuration: Storage

- Just use them like regular SCSI devices

```
Device {
    Name = "tapedrive-0"
    DeviceType = tape
    DriveIndex = 0
    ArchiveDevice = "/dev/tape/by-path/uninteresting.iscsi.stuff-tapedrive-01-lun-0-nst"
    MediaType = ULT3580-TD5
    AutoChanger = yes                    # default: no
}
```

Bareos configuration: Storage

```
Autochanger {
  Name = "VTL-autochanger"
  Changer Device = /dev/autochanger

  Device = tapedrive-0
  Device = tapedrive-1

  Changer Command = "/usr/lib/bareos/scripts/mtx-changer %c %o %S %a %d"
}
```

Bareos configuration: Director

```
Storage {
  Name = VTL
  # Do not use "localhost" here
  Address = ip-10-4-8-76                # YES, I CHEATED!
  Password = "DummyPassword"
  Device = "VTL-autochanger"
  Media Type = ULT3580-TD5
}
```

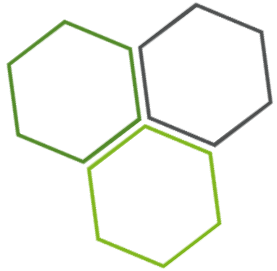
Bareos configuration: Director

```
Pool {
  Name = VTLFull
  Pool Type = Backup
  Storage = VTL
  [...]
}
```

- Set up Jobs or JobDefs to use those pools
- Or set up the storage in the Job resource

Changer operation from bconsole

- Very cool Bareos features!
- Import and export (archive) tapes from bconsole itself
- Even move tapes around the slots
- Remember to *update slots*
- *status slots storage=VTL*



Questions?

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www.capside.com

hello@capside.com

linkedin.com/company/capside

@capside

Barcelona
Plaça de Catalunya, 1
08002 - Barcelona

Madrid
Cerro de los Gamos, 1
28224 – Pozuelo de Alarcón