

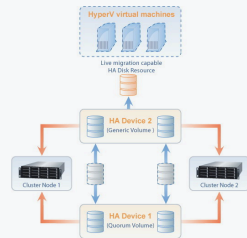
An Agile Service Deployment Framework and its Application

Quattor System Management Tool and HyperV Virtualisation applied to CASTOR Hierarchical Storage Manager at RAL, UK Tier 1

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Hyper-V

- MS 2008 System Centre Manager
- 2008 Server Core hypervisors – no GUI
- Dell Equallogic iSCSI shared storage
- 2x Force 10 10G switches – partitioned to provide separate storage and data networks
- 8 Dell R710 & 11 R620 hypervisor nodes
- Also 19 hypervisors using local storage – used for test & less critical systems
- Quasi self-service – sysadmins can create and manage virtual machines themselves after requesting IP and DNS entries



Quattor

Configuration management & provisioning toolkit www.quattor.org

- Hierarchical template framework compiled to unique xml profiles for each host
- Profile verified during compilation before delivery to host
- Changes can be checked before deployment
- Automated Installer (All) builds kickstart scripts, DHCP etc.
- Client configures host after installation according to profile
- Templates stored in Subversion
- Easy to deploy uniform site wide configurations (DNS, monitoring, SSH keys, accounts etc.)
- Per service/host templates chosen as appropriate
- Package manager allows full reversion

Agile Infrastructure at the RAL Tier 1

As of October 2013, there are approximately:
2000 servers under Quattor control
200 HyperV virtual machines, both test and production

Advantages

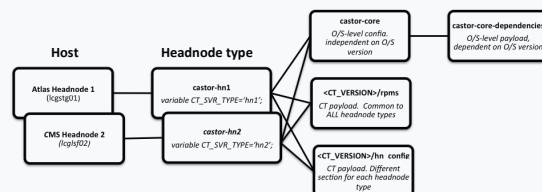
- Improved overall reliability. For example, some hardware intervention no longer requires a service downtime
- Disaster Recovery: Easy recovery from hardware losses (hours instead of days)
- Ease of deploying/decommissioning new servers and services
- Improved response to security alerts
- Consistent management across all Tier-1 services
- Fewer "islands of knowledge" among different service owners

Potential pitfalls

- Learning curve for new staff
- Need to mandate consistent use of Quattor templates (see right)

CASTOR Quattor Templates

In Quattor, multiple PAN source templates may be used and compiled to generate payload profiles that define servers and their setup. When multiple people are maintaining templates, it is useful to provide guidance on how templates should be used to ease future maintainability. In the case of CASTOR we have:



Template content examples:

Content type	Examples
O/S payload	glibc-2.5-81.e15_8.4, vim-enhanced-7.0.109-6.e15 RPMs
O/S-level config	resolv.conf, crontab, admin accounts/keys
CT payload	castor-stager-server-2.1.12-10, castor-vmgr-client-2.1.12-10 RPMs

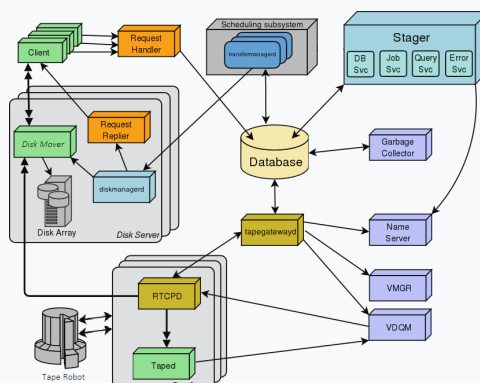
The **CERN Advanced STORAGE** manager: a mature and scalable open source Hierarchical Storage Manager (HSM) solution (integrated online/nearline/offline storage)

- Multiple server types: headnodes, disk server, tape server, monitoring, etc.
- Complex architecture (see diagram) and tricky to install and configure – an ideal candidate for System Management tools

At RAL:

- 5 instances for HEP and other VOs (ATLAS, CMS, LHCb, ALICE, MICE, H1, T2K, ILC, snoplus, minos). Other major users: DIAMOND, BBSRC, CEDA
- 1 tape repack and 2 test instances
- 13.8PB (Tape) + 8PB (Disk) - 64 million files across all production instances.
- Approximately 460 servers in total

Benefits for CASTOR



Before adopting agile infrastructure:

- 4 CASTOR experts running 4 CASTOR instances
- Significant effort deploying new instances and changing hardware

Now using Quattor in production and HyperV in the test infrastructure:

- 2 CASTOR experts running 8 CASTOR instances
- Easy to deploy new instances and set up new servers without sysadmin effort
- Cost and energy savings thanks to server consolidation in our test instances

Future plans to virtualize production headnodes will additionally enable:

- Further downtime reduction during headnode upgrades and interventions
- Dynamic provisioning of load-sharing headnodes to cope with busy periods

Other key people involved in developing these services:
James Adams, Shaun de-Witt, Chris Kruk, Dimitrios Zilaskos