



Centralized Configuration System for a Large Scale Farm of Network Booted Computers

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Introduction

The ConfDB v2 centralized configuration system contains information on all computer systems of the ATLAS Trigger and DAQ Online computing farm, providing a flexible web interface for performing various operations. The tool aggregates specific system administration information with data from existing sources, such as the CERN central network database and the ATLAS physical locations database. The automatic synchronization with these external sources guarantees consistency across systems and decreases the likelihood of human error.

Main features

- ▶ **general features:** management of the Dynamic Host Configuration Protocol (DHCP) settings and of the Preboot eXecution Environment configuration. DHCP with static allocation (SHCP) is used for all the systems on the network, while PXE booting is used both for fully network booted hosts (usually clients = worker nodes) and for the initial OS installation on locally installed nodes (mostly servers and special purpose systems)
- ▶ **features specific to netbooted clients:**
 - ▶ Complete set of management functionality – each client can be associated with one of the ~90 boot servers, choosing not only a boot image to be loaded but also sets of kernel boot parameters
 - ▶ Special operating system configurations are also available for nodes which need to boot special environments (commissioning of new hardware, diagnostics, etc.)
 - ▶ Automated post-boot configurations, in particular for advanced configurations of network interfaces, such as bonding and VLANs

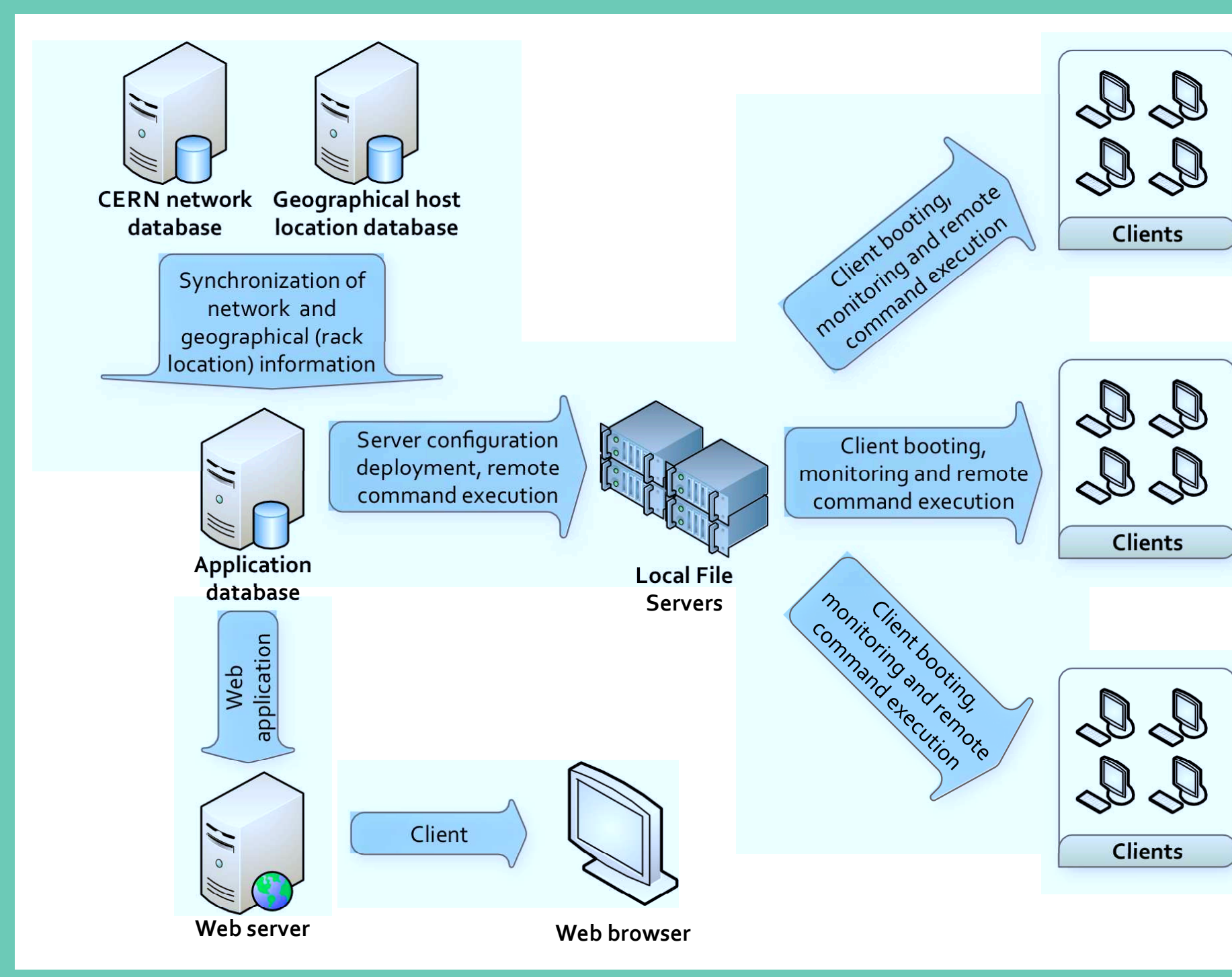
Remote command execution

ConfDB v2 provides a user-friendly interface for remote command execution, with an easy interactive selection of the target systems based on various criteria, taking full advantage of the comprehensive information available for each node. The commands can be chosen from:

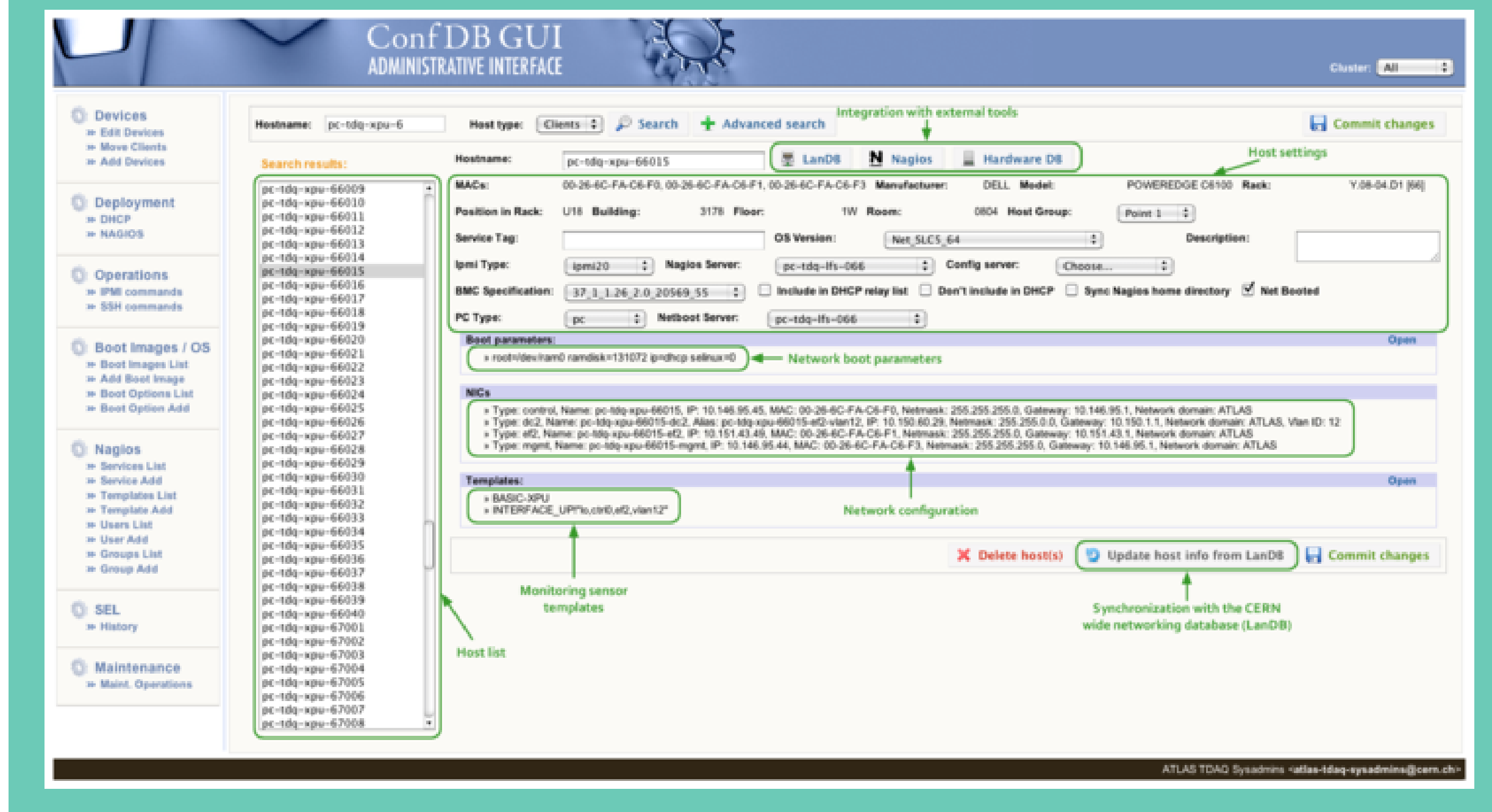
- ▶ a predefined set of IPMI requests
- ▶ a predefined set of shell commands – executed via SSH
- ▶ custom shell commands
- ▶ server specific operations

The command execution is performed in a fully parallel manner. The list of clients is split and distributed according to the parent server of each client, and each server is responsible for executing the commands on the assigned clients. For each server the execution of the command on its clients, via SSH, is also done in parallel, using a number of 32 threads (matching the average number of clients handled by a server). A logging service is in place in order to ensure the traceability of the actions which are being performed.

ConfDBv2 system block diagram



ConfDB web GUI screenshot



Integration with the monitoring system

ConfDB v2 also handles the management of the Nagios-based monitoring and alerting system:

- ▶ Configuration of the monitoring server for each particular node
- ▶ Configuration of specific monitoring configuration – mainly the services and sensors which are being monitored
- ▶ Sets of services and sensors to be monitored are grouped in templates which are then assigned to sets of hosts
- ▶ Additional information: alerts policies, check intervals, notifications targets, etc.

Server management

Certain functions are targeted specifically to servers, namely the configuration deployment for DHCP and monitoring services on any selected subset of available servers or on all of them:

- ▶ DHCP daemon configuration: automated generation and deployment at every relevant configuration change on the affected server (automatic and manual)
- ▶ Deployment of the DHCP relay configuration when changes in the set of allowed servers occur (manual)
- ▶ Deployment of the monitoring configuration (automatic and manual)

Conclusions

The ConfDB v2 centralized configuration system is a very flexible and robust tool which greatly improves the management of the ATLAS Trigger and Data Acquisition Online farm. Not only it offers a quick overview of the current farm configuration and status, but it also allows changes to be applied on selected subsets or on the whole farm in an efficient and consistent manner. It also provides centralized access to all the main components of the computing system, thus acting as a unifying tool for most of the various utilities used to manage the ATLAS TDAQ computing farm.