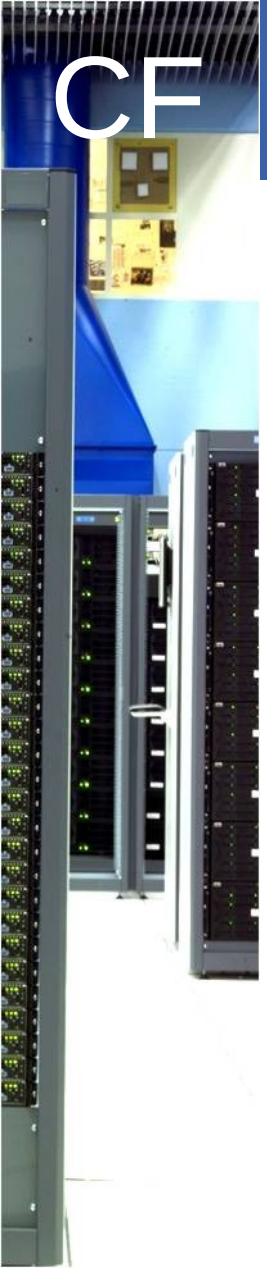


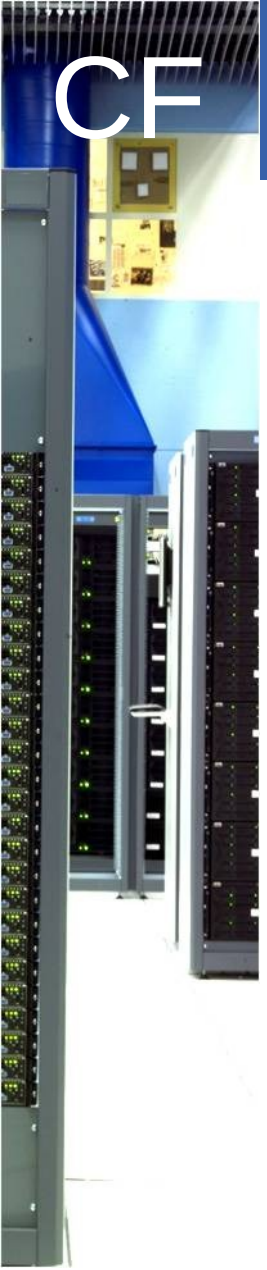
Hardware Acceptance Test Suite HATS

HEPiX Spring 2012

Eric Bonfillou, CERN IT/CF

CERN IT Department
CH-1211 Geneva 23
Switzerland
www.cern.ch/it

Introduction



1. What is the Hardware Acceptance Test Suite?
2. Why was HATS needed?
3. How is it working?
4. What can it achieve?
5. First results on 2011/2012 deliveries
6. From prototype to production release
7. Conclusion

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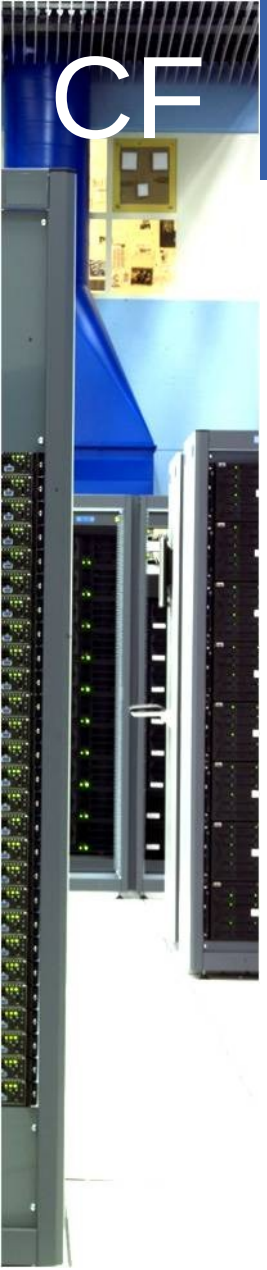
What is HATS?



- It is a simple application aimed at certifying that newly purchased hardware is suitable for production use
- It is also used, as part of a recertification process, on accepted deliveries where a major hardware update/change has been performed
- It is the successor of the former Burn In Test system and as such, puts a heavy (stressing) load on every component inside a system unit

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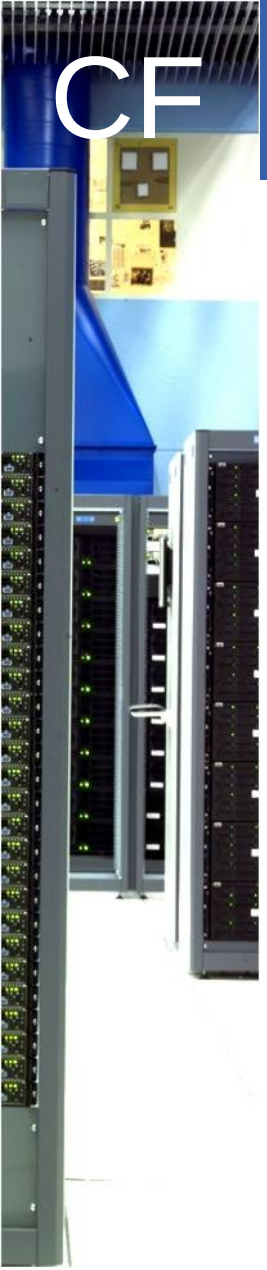
Why was HATS needed?



- After 4 years of running BIT on thousands of servers, two major drawbacks were found
- Operational overhead such as the interaction with system units under evaluation was too heavy
  - No remote console
  - No remote power control
  - No monitoring!
- The confined software environment of a live OS image prevented detection of complex hardware errors
  - Disk controllers problem (filesystem corruption)
  - Disk firmware issues

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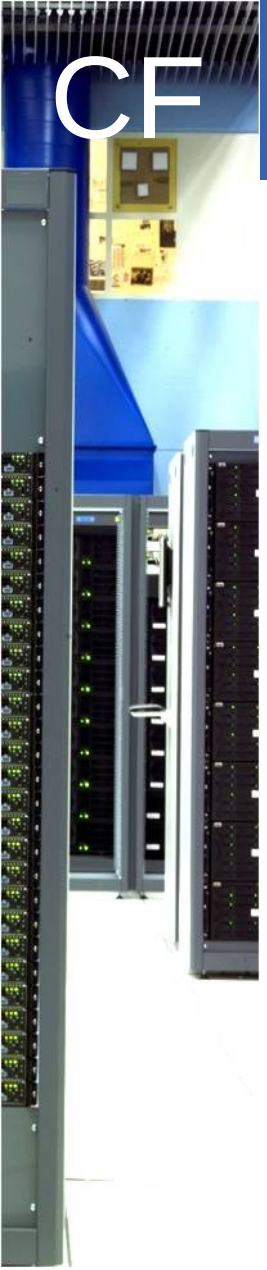
How is it working? (1)



- HATS software runs on a SLC6 server providing the Python Fabric API [1]
  - Communicates with system units via SSH only
  - Transfer files to/from the system units via SSH as well
  - Supports parallel actions on system units
- Each set of test is wrapped into distinct bash scripts executed in sandboxes sequentially (or not)
  - Each set generates its own logs in a structured fashion
  - Each test either terminates naturally or after a time period
  - Controlling failing process(es) is easy in the sandbox

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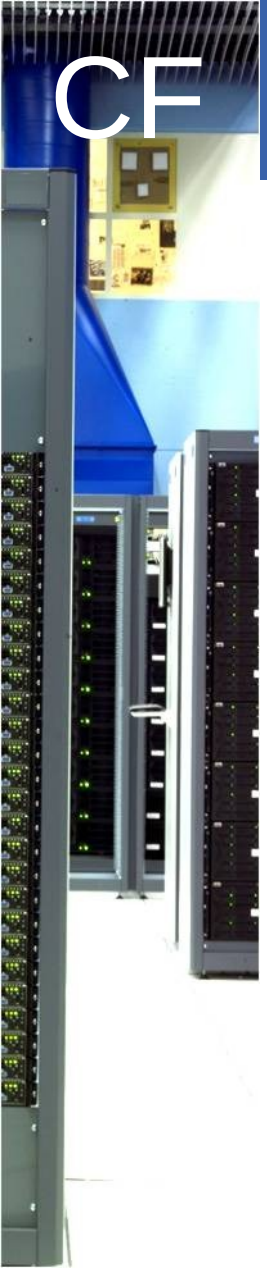
How is it working? (2)



CPU testing

- burnP6
- burnK7
- burnMMX

Memory testing

- memtester
- Fsprobe?

HDD testing

- badblocks
- SMART
- fsprobe

Network testing

- netperf

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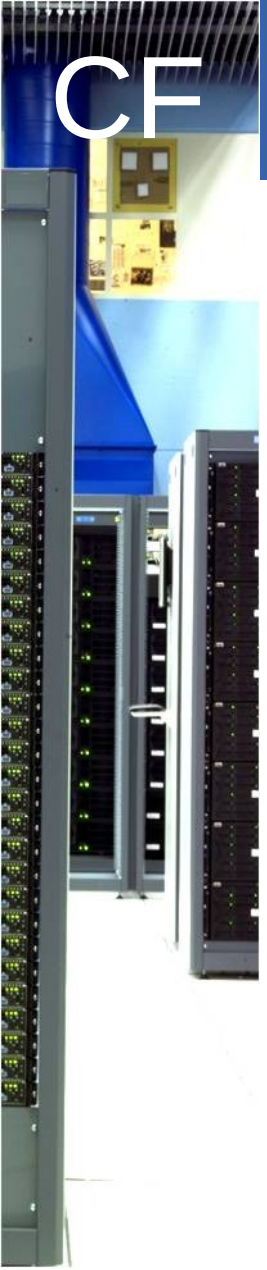

How is it working? (3)

- Software environment
  - Runs on any Linux distribution (live or not)
  - In CERN IT, production setup is desirable though
    - SLC5 or SLC6
    - SMART
    - FSPROBE
    - LEMON
- Operational environment
  - Remote power control (on system units and PDUs)
  - Remote console

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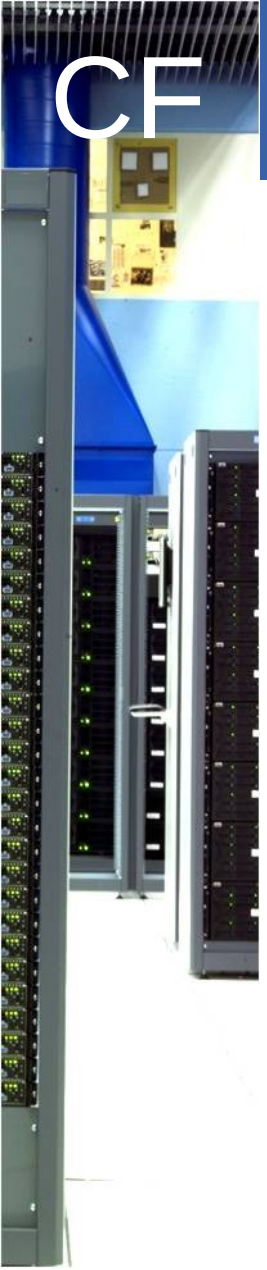
What can it achieve?



- In addition to testing hardware, HATS can (and did):
  - Upgrade BIOS, BMC, RAID controller and drives firmware
  - Run performance measurements (HEPSPEC, FIO, etc…)
  - Execute any system administration task
- It only requires new modules:
  - In the form of bash scripts
  - Additional tools are made available on the nodes via standard software management tools

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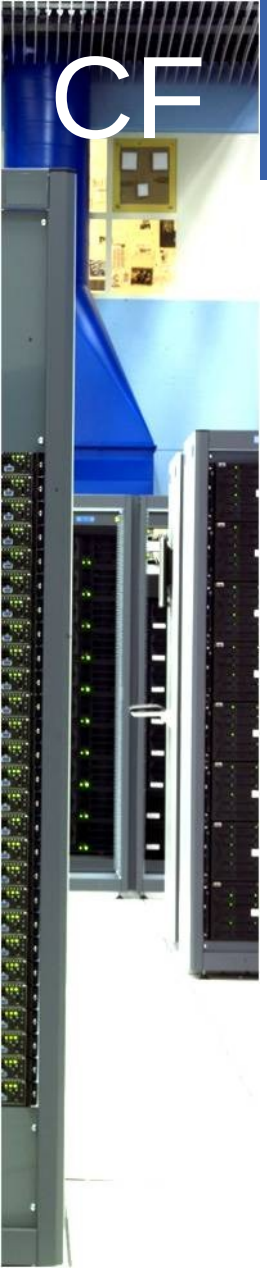
First results



Delivery	Evaluation	Problem found	Solution	Recertification
196 CPU servers	DONE	None	N/A	N/A
252 CPU servers	DONE	SOL not working on 33% of the systems	Mainboard replacement	SUCCESS
93 Disk servers	DONE	None	N/A	N/A
63 Disk servers	DONE	None	N/A	N/A
51 FeDa servers	DONE	BMC not configurable	BMC firmwareupgrade	SUCCESS
		Memory modules broken	Memory swap out	ONGOING
61 FeDa servers	DONE	BMC not configurable	BMC firmwareupgrade	SUCCESS
		Memory modules broken	Under investigation	N/A
54 FeDa servers	DONE	BMC not configurable	BMC firmwareupgrade	SUCCESS
192 CPU servers	ONGOING	N/A	N/A	N/A
244 CPU servers	ONGOING	N/A	N/A	N/A
12 AFS servers	DONE	SSDs not recognized after few reboots	SSD replacement	SUCCESS

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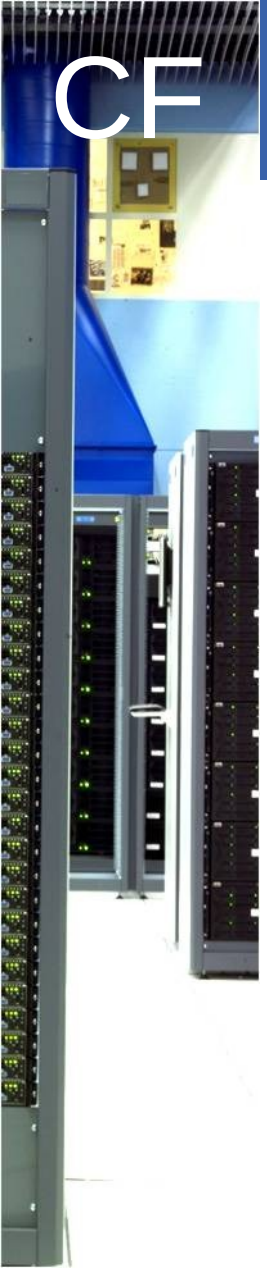
From prototype to production release



- Moving to production by summer 2012
  - Implement graphical user interface
  - Enhance log collection and data mining
  - Enhance status reporting
  - Provide performance statistics collected during testing
  - Document standard workflow procedures for technical staff for running HATS on different hardware types
  - Hand over to Sysadmins to run it on future deliveries

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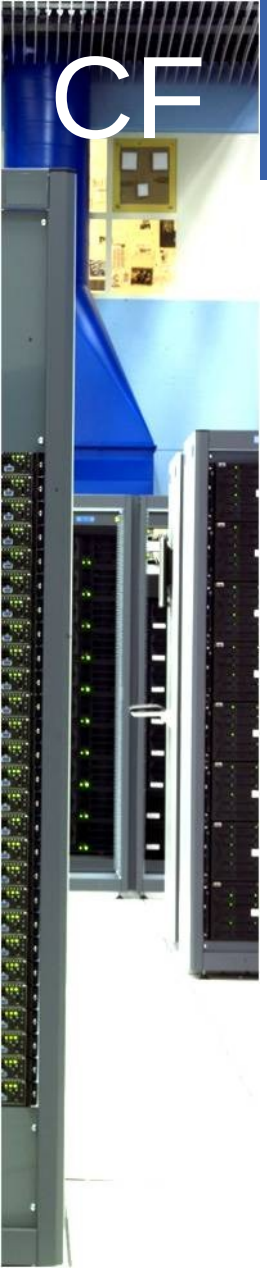

Conclusion

- Current prototype shows that
  - It is much simpler to evaluate fully configured systems (live image or installed on local drive)
  - Operational overhead is significantly reduced with properly configured BMC
  - HATS is really able to detect hardware issues ☺
- Benefits of running evaluation on fully configured systems
  - System configuration handled by the management software tools
  - Hardware error detection handled by monitoring framework

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Questions?