



A Secure Infrastructure For System Console and Reset Access

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Area of operation



- Commodity computing
(cheap standard PC + Linux)
- Large number of nodes
- Maximum CPU power / \$\$\$

Current technology



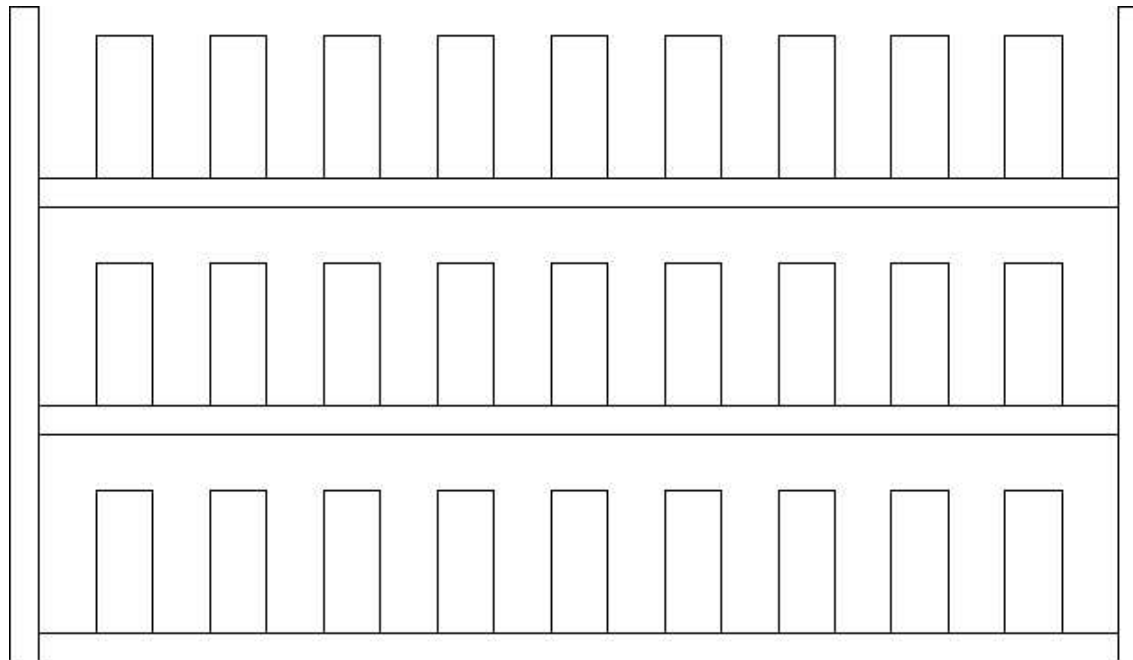
Requirements

- keep **costs** low
- **least possible restriction** on the hardware of nodes managed
- **remote access** (without special client software)
- **secure communication** and data storage
- strong authentication, **role - based authorization**, strict accounting
- **automatization** possible

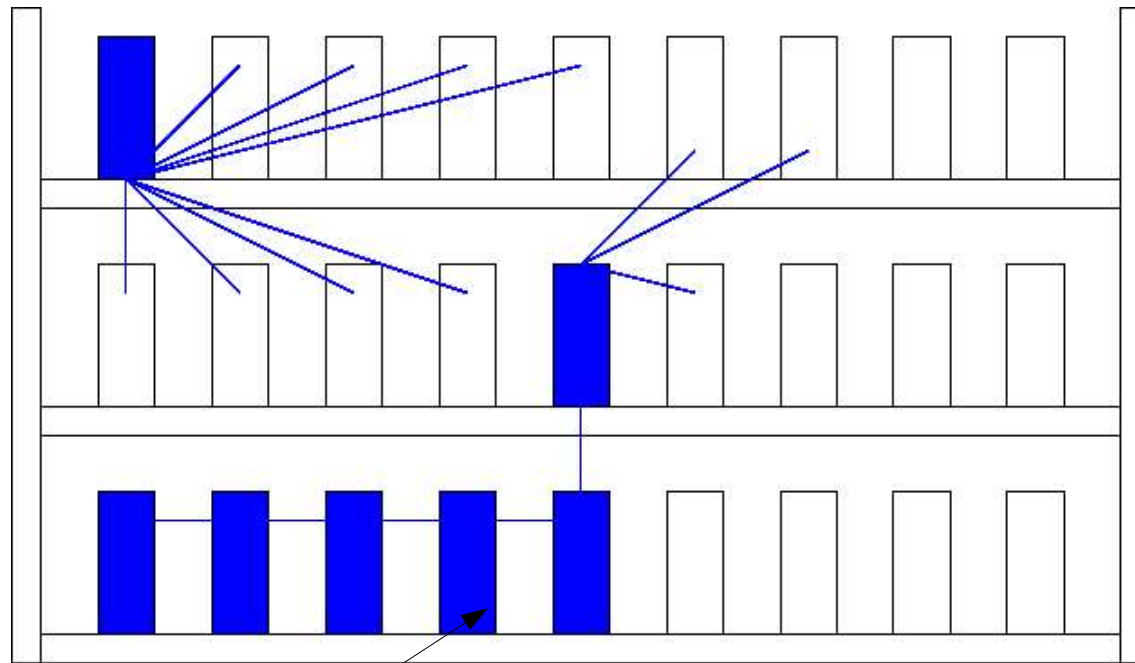
Available technology

- KVM switches
 - analogue:
 - ◆ cheap
 - ◆ not accessible remotely
 - ◆ no resets
 - digital:
 - ◆ expensive
 - ◆ also no resets
- IPMI (Intelligent Platform Management Interface)
 - ◆ all-in-one solution
 - ◆ tests not satisfactory
 - ◆ not widespread enough
- Serial console
 - ◆ widespread, common technology
 - ◆ CC boxes: either cheap or secure but not both
 - ◆ no resets
 - ◆ no BIOS access
- VGA emulator PCI cards ("weasel board" etc.)
 - ◆ all-in-one solution
 - ◆ very expensive

Rack of PCs



Console servers

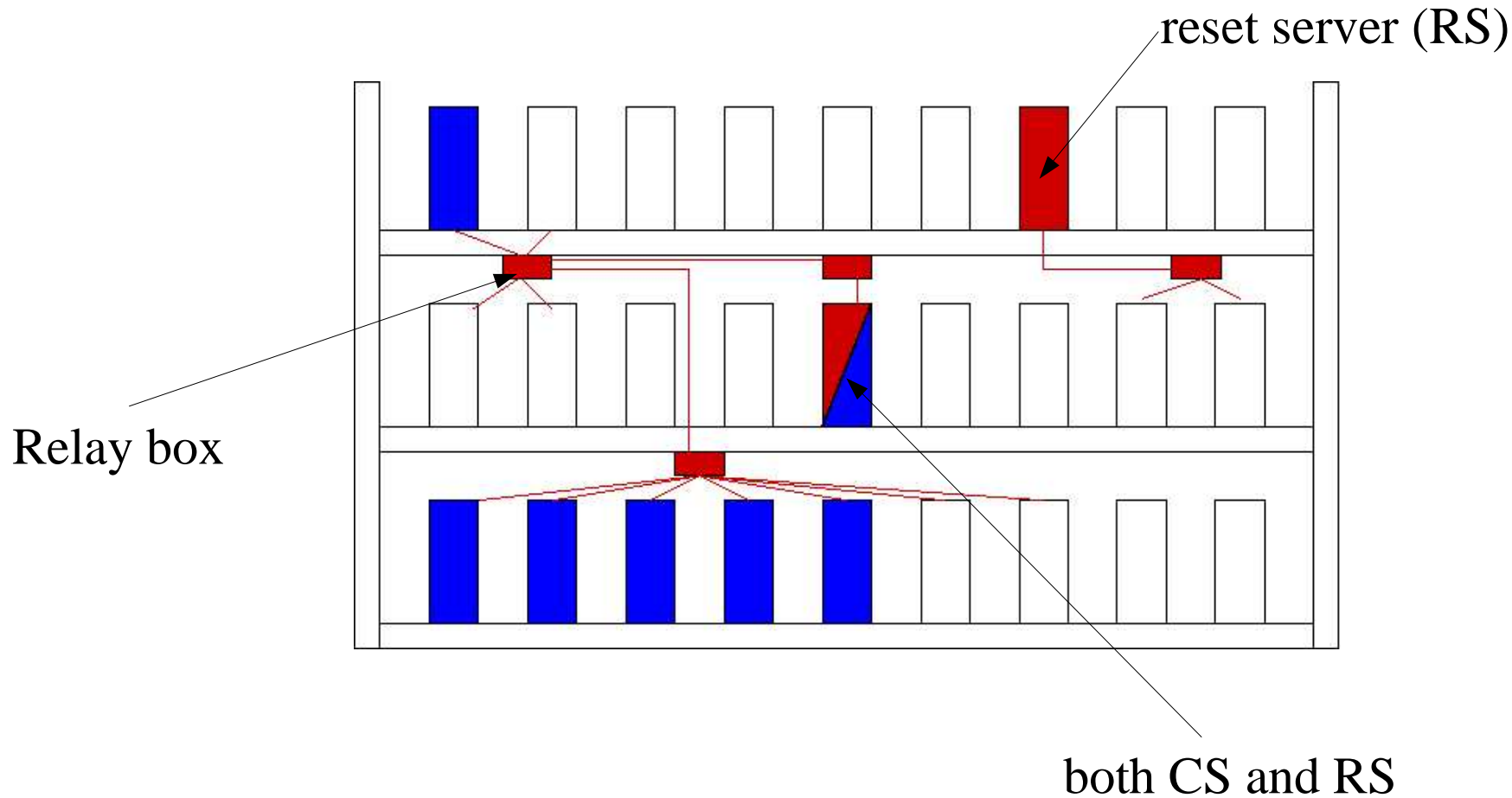


console servers (CS)

Our hardware solution



Console and reset servers



Interfacing the system

- web-based human interface, SSL, X.509 authentication
- role-based access control model
- well-defined database API for machines
- interconnection data and authorization information in the database
- internal communication over SSH



File Edit View Go Bookmarks Tools Window Help

https://lxshare0401/cgi-bin/a.cgi?nodename=%25&gid=%25&order=node&button=Look+u

Home Bookmarks KB Utils News CERN Olvasnivalo a.cgi

Serial database mgmt system

Logged in as: Andras Horvath. Assigned groups: 0 1 2 20 **You have full privileged access.**

☒ Order by Nodename

☐ Order by GID

adc0031 (20)

adc0032 (20)

adc0033 (20)

adc0034 (20)

adc0035 (20)

adc0036 (20)

adc0037 (20)

adc0038 (20)

adc0039 (20)

adc0040 (20)

lxshare0401 (2)

lxshare0402 (2)

lxshare0403 (2)

lxshare0404 (2)

lxshare0405 (2)

lxshare0406 (2)

lxshare0407 (2)

lxshare0408 (2)

lxshare0409 (2)

lxshare0410 (2)

Assign to group:

(with all connected peripherals too)

Reason:

Start date: End date:

☒ Console log ☐ Reset history

[To main menu](#)

Done



Serial database mgmt system

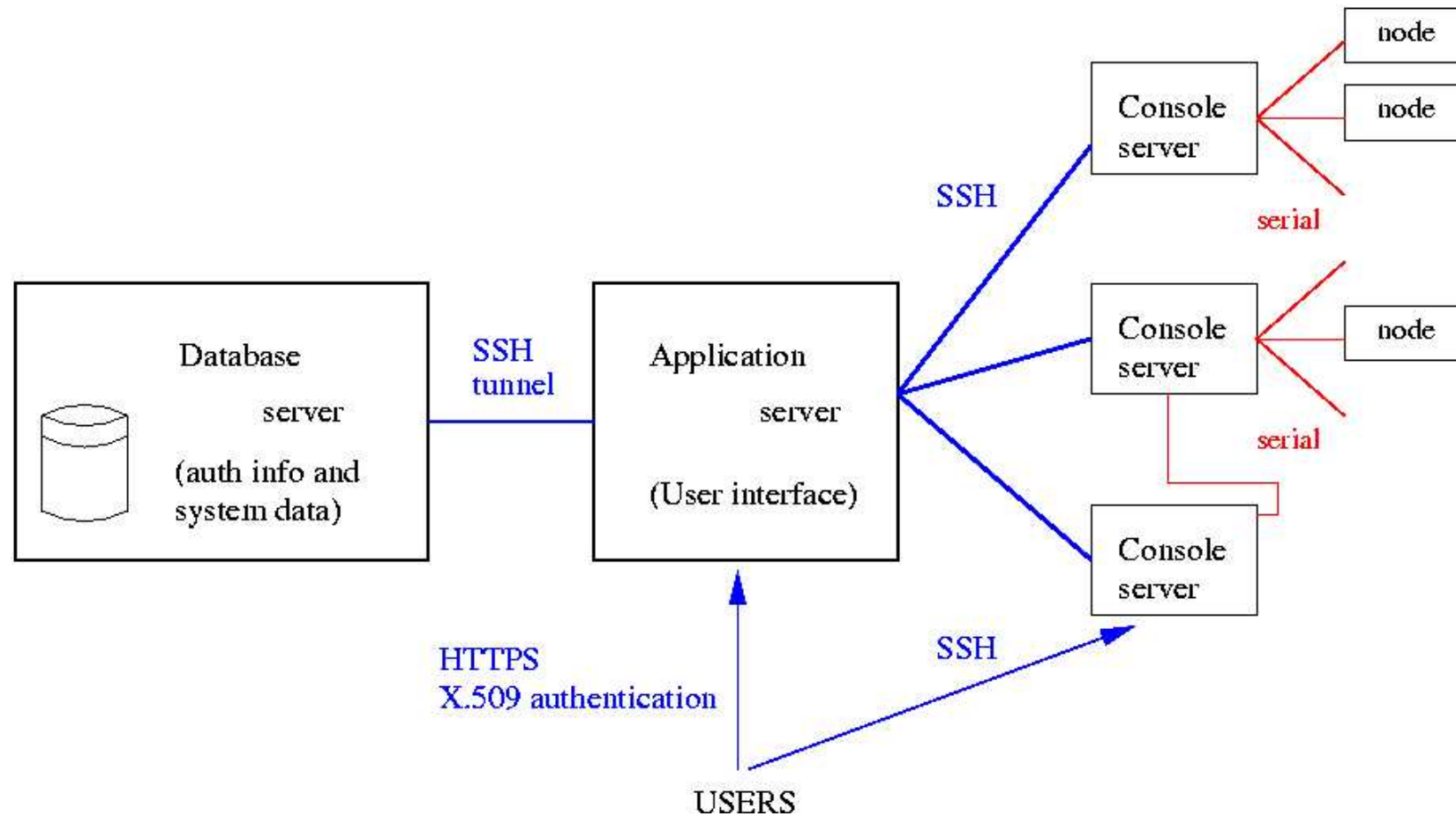
Logged in as: Andras Horvath. Assigned groups: 0 1 2 20 You have full privileged access.

Node name	Connection type	Connected to	Command string	Java connect
lxshare0402	console	ttyS12@lxshare0401	ssh -t ttyS12@lxshare0401	Show console
lxshare0403	console	ttyS9@lxshare0401	ssh -t ttyS9@lxshare0401	Show console
lxshare0404	console	ttyS10@lxshare0401	ssh -t ttyS10@lxshare0401	Show console
lxshare0405	console	ttyS17@lxshare0401	ssh -t ttyS17@lxshare0401	Show console

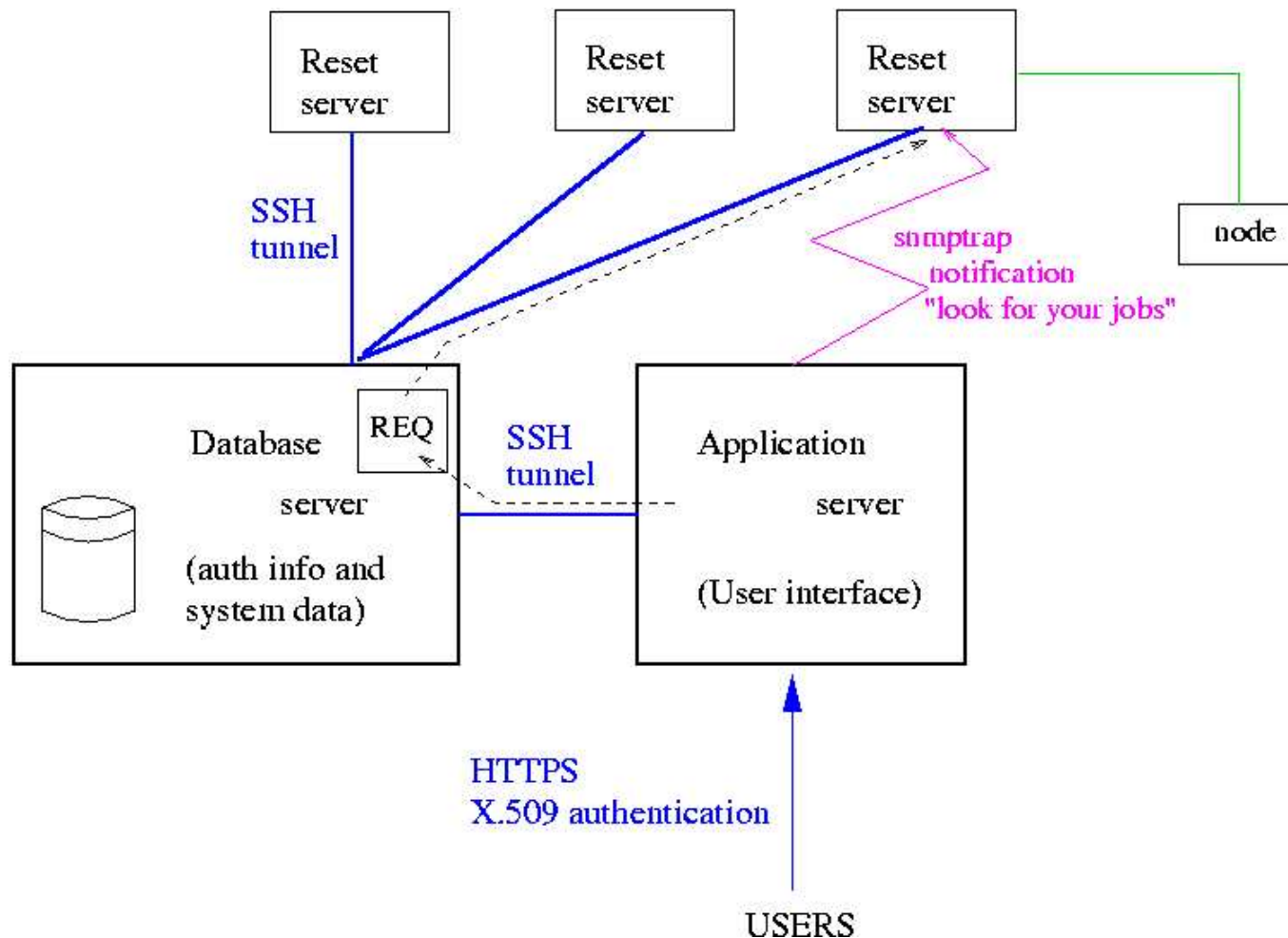
[To main menu](#)



Architecture - consoles



Architecture - reset subsystem



Costs

- serial console solution: \$24 / node
- remote reset system: \$17 / node
- **worktime:**
 - node cabling: 10 nodes / person / hour
 - (cable making: for 5 nodes / person / hour)

Commercial ssh-enabled serial console servers:

starting from about \$110 / node

Digital KVM switches:

from about \$500 / node

Current status, next steps

- **Current status**
 - hand-made cabling - deployed to 50 nodes
 - received user feedback
 - got request for more nodes
- **Immediate future**
 - move to large-scale deployment
- ***Goal: LHC grid - 6000 nodes!***



Thank you for your attention

Reset board control software developed by:

- Preslav Konstantinov
- Guner Passage

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