REMBRANDT – The Remote Beam Instrumentation and Network Diagnosis Tool

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Abstract

Beam instrumentation devices and associated data acquisition components for the coming FAIR accelerators will be distributed over a large area and partially installed in inaccessible radiation exposed areas. Besides operation of the device itself, like acquisition of data, it is mandatory to control also the supporting LAN based components like VME/µTCA crates, front-end controllers (FEC), middle ware servers and more. Fortunately many COTS systems provide means for remote control and monitoring using a variety of standardized protocols like SNMP, IPMI or iAMT.

REMBRANDT, the REMote Beam instRumentation And Network Diagnosis Tool, is a Java framework, which allows the authorized user to monitor and control remote systems while hiding the underlying protocols and connection information such as IP addresses, user-IDs and passwords. In addition to monitoring the device state (like voltage and current load), the main features are the remote power switching of the systems and the observation of the FEC's boot process via protocols like reverse telnet or iAMT Serial-Over-LAN. REMBRANDT is designed to be extensible with new protocols.

REMBRANDT: Mission and Features

Observe and configure distributed DAQ systems.
Reduce trouble-shooting efforts and reaction time.

Monitoring and Control of:

- 24 different DAQ types
- ca. 1000 channels
- ca. 400 DAQ systems
- 17 electronic rooms + many local niches

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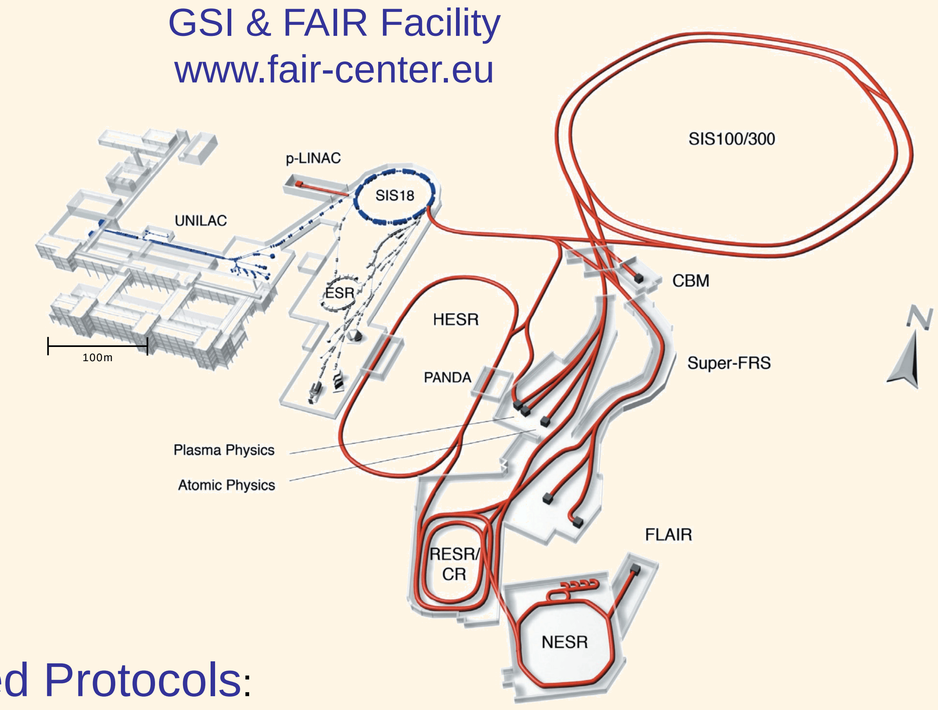


Supported Hardware:

- VME Crate (Wiener, Elma)
- MTCA.4 Crate (NAT MCH)
- Industry PC (eg. Kontron KISS)
- High Voltage Systems (ISEG, CAEN)
- NIM Crate (Wiener)
- Modular CPUs (VME, µTCA)
- LAN Devices

Remote Actions:

- Monitoring
  e.g. Hardware, Fan, Volt/Amp, Temp.
- Power Cycle
- Reset
- Boot Observation
  console output e.g. PXEboot
- Logging
  e.g. user access, settings
- Diagnosis
  e.g. warning, errors

Supported Protocols:

- SNMP (Simple Network Management Protocol): snmp4j libs [1]
- iAMT SOL (Serial-over-LAN): AMTTERM to JAVA [2]
- iAMT (INTEL Active Management Technology): JAVA Web-services
- IPMI (Intelligent Platform Management Interface): VERAX IPMI lib [3]
- Telnet: Apache Commons Net lib [4]
- SSH: Jcraft ssh2 lib [5]
- Ping

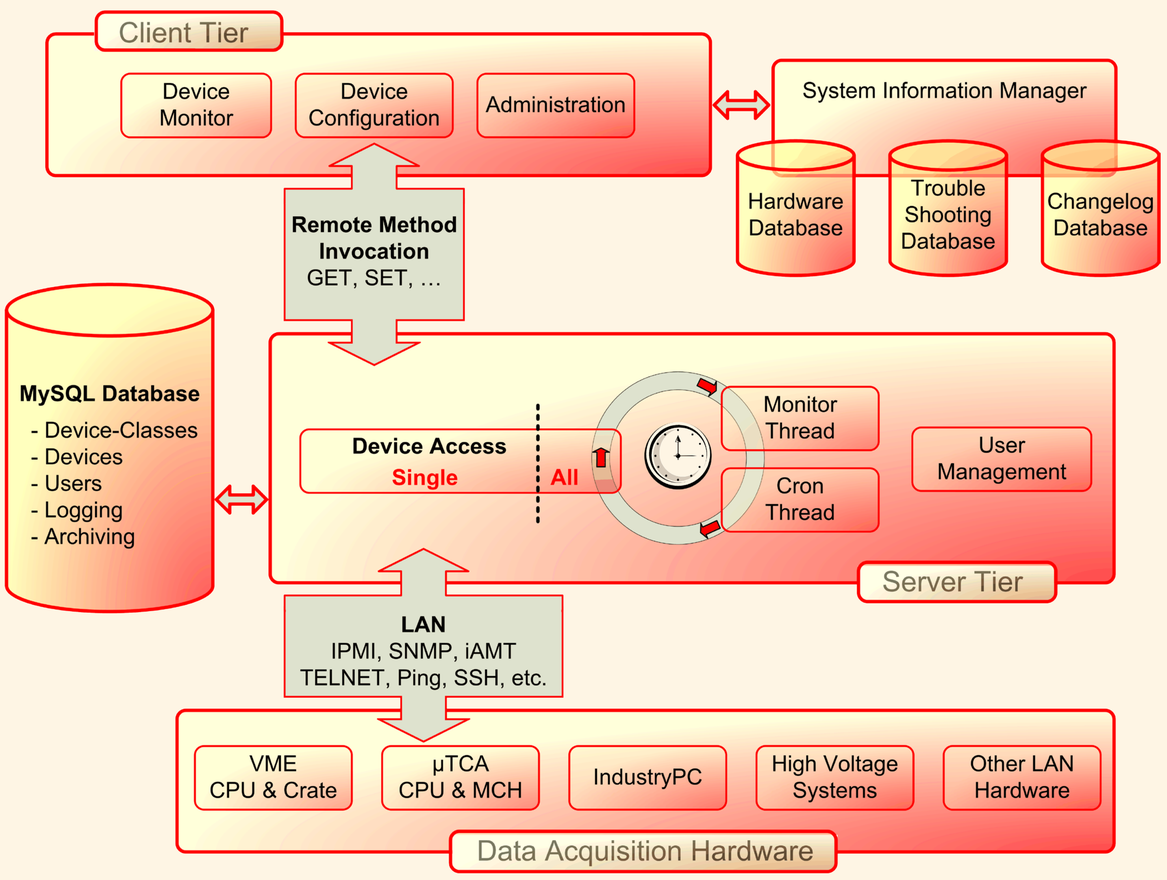
Complemented by:

- IP-KVM Switches
  remote access via USB/VGA/IP
- Terminal Server
  remote access on consoles (RS232)
- Hardware Database & Barcode System

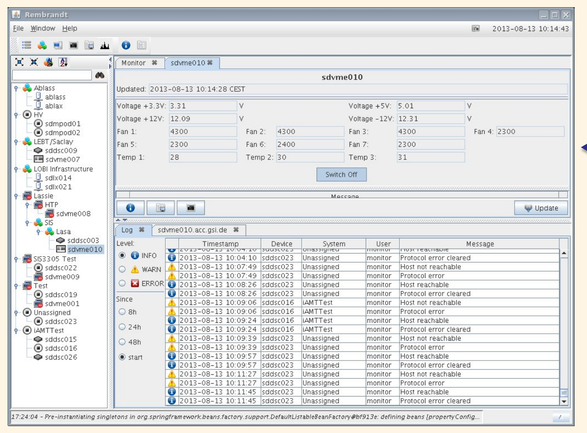
References:

[1] SNMP4J: http://www.snmp4j.org/
[2] amtterm: https://www.kraxel.org/cgit/amtterm/
[3] Verax IPMI Library: Verax Systems http://www.veraxsystems.com
[4] Apache Commons Net: http://commons.apache.org/proper/commons-net/
[5] JSch (Java Secure Channel) SSH2 implementation http://www.jcraft.com/jsch/

Software Architecture

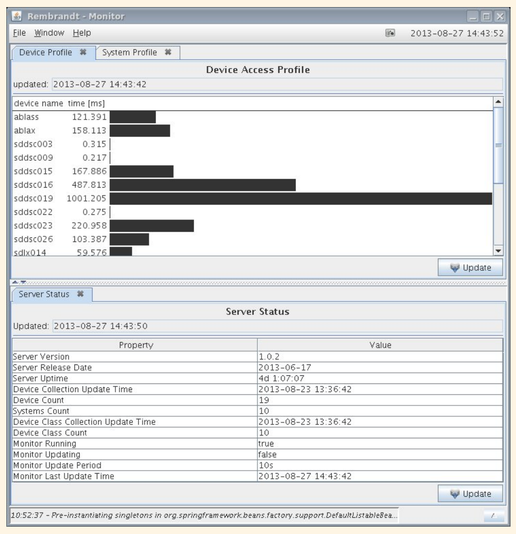


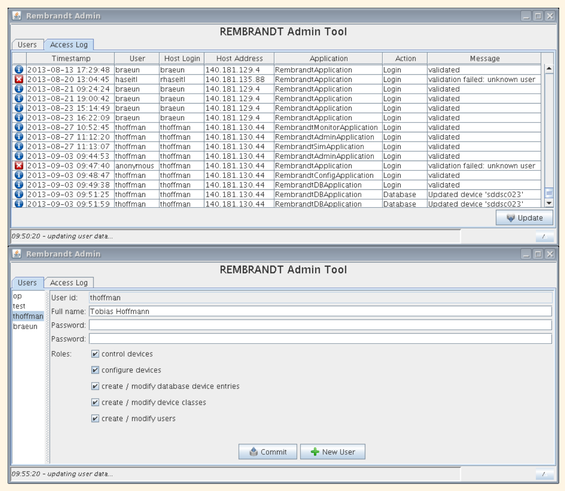
Graphical User Interface



The REMBRANDT Device Monitor. Left: device tree sorted by different categories. Top: SNMP data set for a VME crate. Bottom: general message overview.

The REMBRANDT Server Monitor. Top: Online access time measurements for timeout optimization. Bottom: General server status overview





The REMBRANDT Admin Tool. Top: Access log. Bottom: User Management and access rights.

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