Saclay GBAR Command Control

TUPPC040

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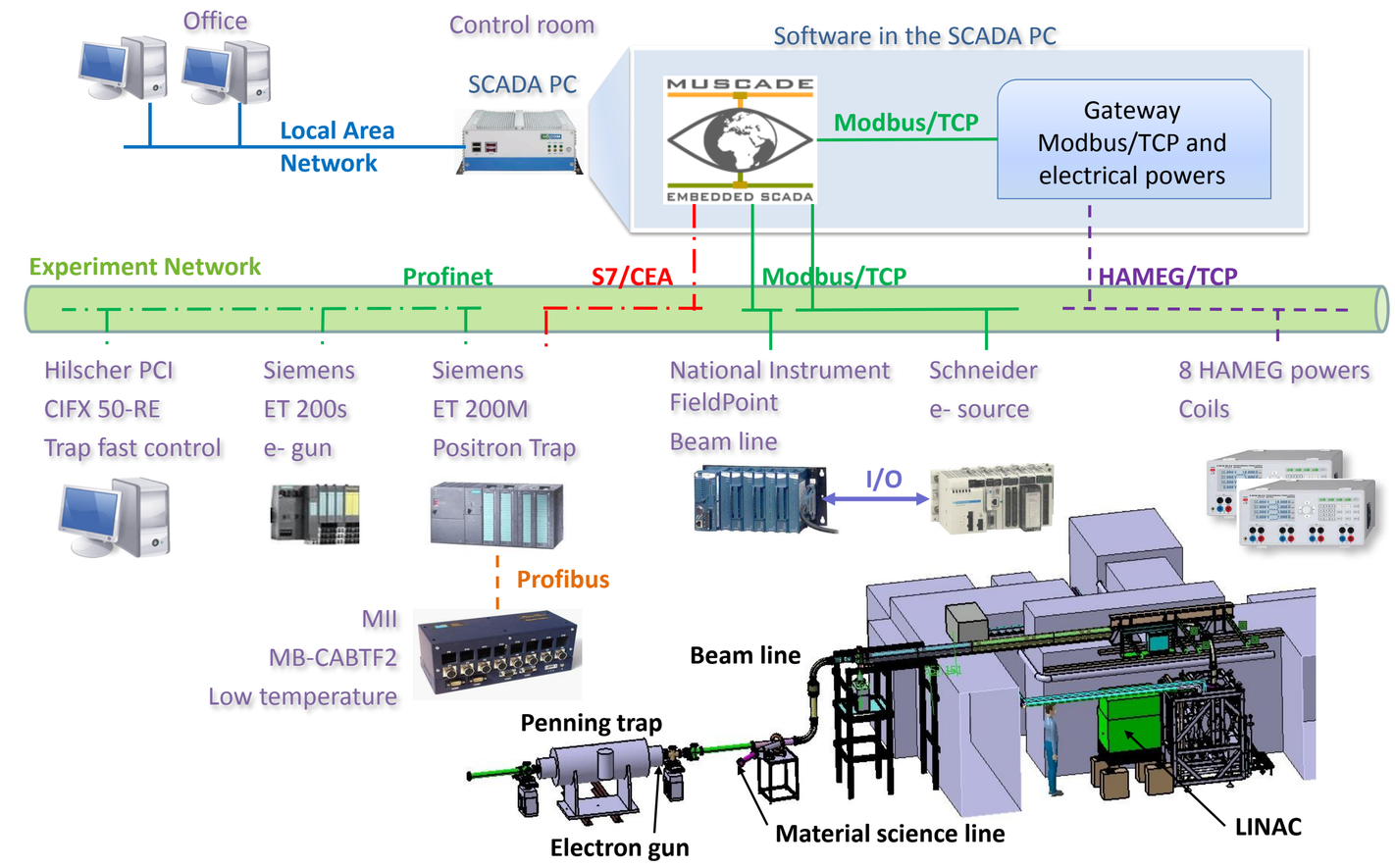
The GBAR experiment will be installed in 2016 at CERN's Antiproton Decelerator, ELENA extension, and will measure the free fall acceleration of neutral antihydrogen atoms. Before construction of GBAR, the CEA/Irfu institute has built a beam line to guide positrons produced by a Linac (linear particle accelerator) through either a materials science line or a Penning trap. The experiment command control is mainly based on Programmable Logical Controllers (PLCs). A CEA/Irfu-developed Muscade SCADA (Supervisory Control and Data Acquisition) is installed on a Windows 7 embedded shoebox PC. It manages local and remote display, and is responsible for archiving and alarms. Muscade was used because it is rapidly and easily configurable. The project required Muscade to communicate with three different types of PLCs: Schneider, National Instruments (NI) and Siemens. Communication is based on Modbus/TCP and on an in-house protocol optimized for the Siemens PLC. To share information between fast and slow controls, a LabVIEW PC dedicated to the trap fast control communicates with a PLC dedicated to security via Profinet fieldbus.

Architecture



Muscade® SCADA centralizes data from the different devices and provides a graphical user interfaces (GUI) locally or from a distance (read only.)

TCP technology is privileged for its flexibility and easy implementation.

Fast electrode software is based on LabVIEW and communicates with the security system (PLC) through a Profinet PCI card. A specific high level driver has been developed.

S7/CEA is an in-house protocol to optimize the data exchange.

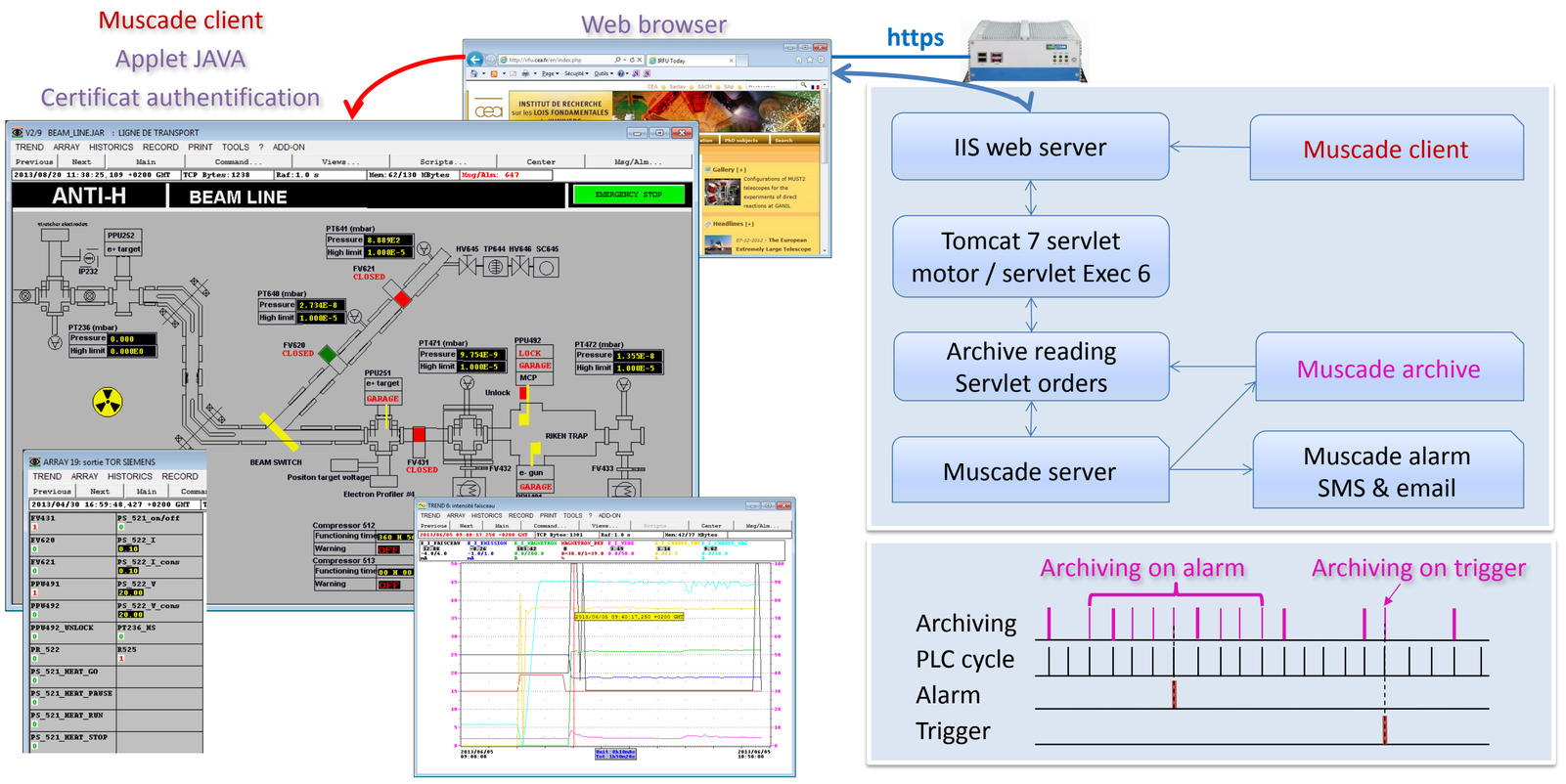
The MicroBox MB-CABTF2 is a multiplexer for resistive sensor measurements.

The FieldPoint and Schneider communication is achieved through I/O.

Schneider PLC has been provided with the LINAC by Getinge Linac Technologies.

A Windows service based on JAVA is a gateway between the SCADA and electrical power HAMEG.

Muscade®



Muscade® SCADA's main features:

- Full JAVA
- Archiving (all database) at the PLC frequency on alarm
- Snapshot on trigger
- VCR mode to visualize one or several views in the past and navigate step by step
- Communication compatible slow baud rate
- Light: able to put it on a chip
- Client download from a web browser or locally
- Client able to read archive without the server

SCADA PC

The SCADA PC features:

- Minimized maintenance (no mechanical movement, dust): fanless, SSD disk
- Robust OS: Windows 7 embedded (clone, update)
- Secure: R/W access to hard disk, network configuration.

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References

[1] The GBAR collaboration. *Proposal to measure the Gravitational Behavior of Antihydrogen at Rest*. CERN-SPSC-2011-029, 2011.

[2] http://muscade.cea.fr/

[3] http://irfu.cea.fr/Phocea/Vie_des_labos/Ast/ast_visu.php?id_ast=823

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