

Monitoring Control Applications at CERN

F. Bernard, M. Gonzalez, H. Milcent, L. B. Petrova, F. Varela# (CERN, Switzerland)

INTRODUCTION

The LHC accelerator complex and its associated Experiments rely on many critical auxiliary systems for their safe operation. The Industrial Controls and Engineering (EN-ICE) group of the EN Department at CERN develops solutions and provides support in the domain of medium and large control systems. EN-ICE is currently responsible for the operation and maintenance of around 60 applications that control critical processes for the cryogenics, quench protection systems and power interlocks for the LHC. The **Monitoring Operation of cOntrols Networks (MOON)** package was developed to centrally manage software updates over the lifetime of these applications and to ensure a quick detection of faults during their operation.

MOON Architecture

- Simatic WinCC Open Architecture [1] – commercial SCADA package
- JCOP [2] & UNICOS [3] Frameworks
- The JCOP Component Installation Tool [4] for centralized deployment of software components
- System Overview Tool [5] for farm and application monitoring
- Dedicated functionality, e.g. PLC Monitoring

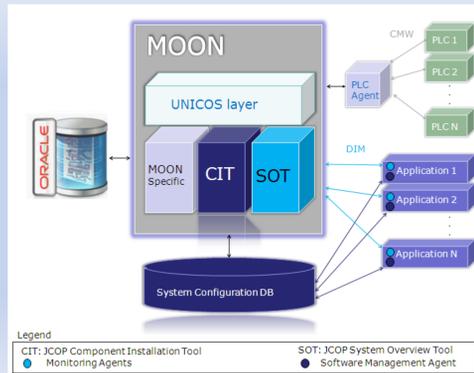
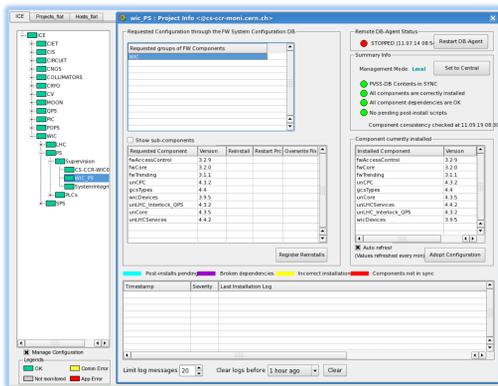


Table 1: Current and expected number of monitored items

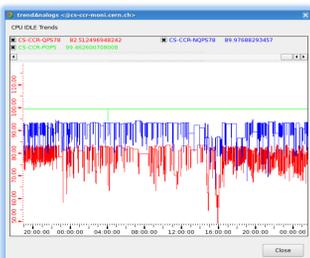
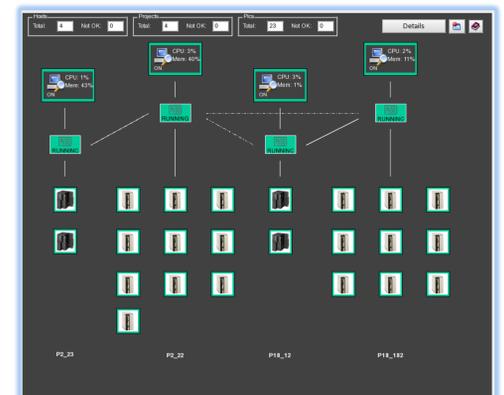
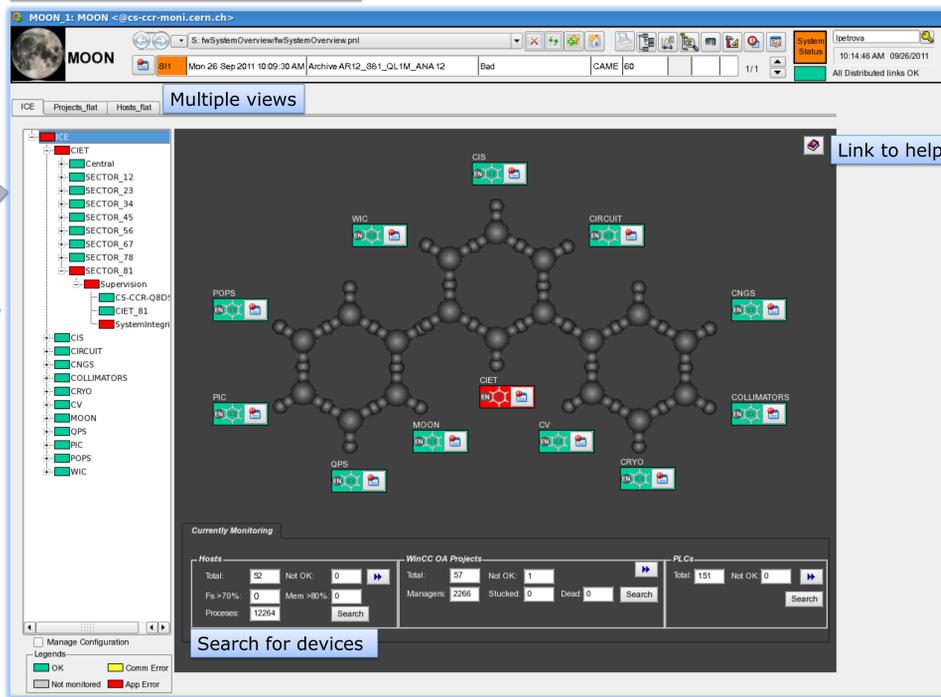
Item	Current number (expected)	Refresh interval (s)
Application Domains	12 (20)	N/A
Hosts	52 (100)	30
WinCC OA applications (PVSS)	57 (300)	30
PLCs	151 (400)	30
Processes	12177 (25000)	30

Main Features

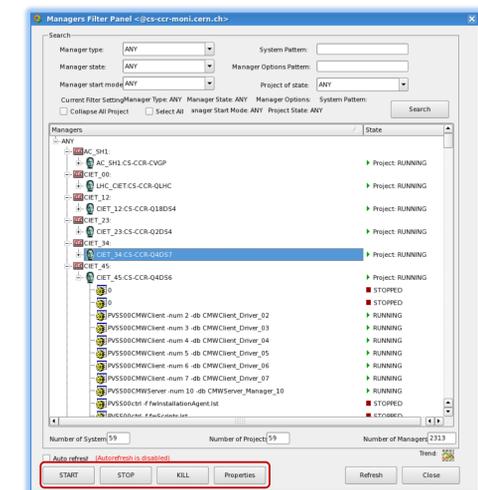
- Integrated software management and application monitoring
- Centralized deployment of software components
- Light-weight access to the run-time databases of remote WinCC OA applications
- Monitoring of all layers of the control systems and their technical infrastructure
- Graphical representation of connections and dependencies amongst components
- Alarm screen showing live and historical alarms
- Intelligent alarm filtering scheme triggers an SMS to the on-call expert
- Long-term storage of alarms and monitored parameters
- Trending
- Multiplatform



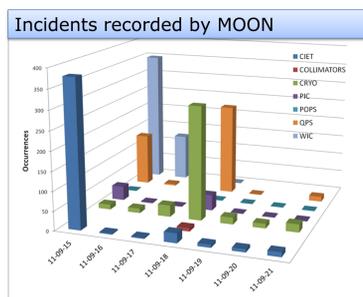
Main graphical interface of MOON



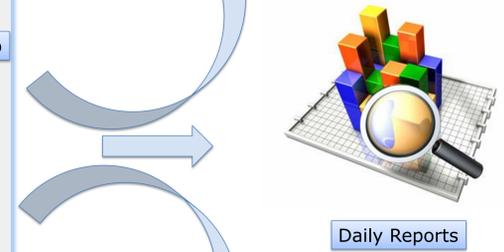
Trending



Remote recovery actions



Incidents recorded by MOON



Alarm screen showing live and historical alarms

Alarm screen showing live and historical alarms



SMS notification to the expert on-call

CONCLUSIONS

The modular design of the EN-ICE Frameworks, the clear definition of the user requirements, as well as the consistent model of abstraction from the control applications enabled the rapid development of MOON with limited resources. Although this tool has only entered the production phase recently, it has already shown its power in assisting experts in their daily work. Currently all software upgrades of the EN-ICE applications are centrally handled using the tool. MOON has significantly reduced the time required for these interventions thus increasing overall efficiency. MOON has moreover become the primary tool for the members of the EN-ICE On-call service to understand the behavior of the control applications and to monitor their performance.

References

- [1] <http://www.pvss.com>
- [2] O. Holme et al., "The JCOP Framework", ICALEPCS 2005, Geneva, Switzerland
- [3] Ph. Gayet, R. Barillere, "UNICOS a framework to build industry like control systems: Principles & Methodology", ICALEPCS 2005, Geneva, Switzerland
- [4] F. Varela, "Software Management of the LHC Detector Control Systems", ICALEPCS 2007, Knoxville, Tennessee, USA
- [5] M. Gonzalez, F. Varela, K. Joshi, "The System Overview Tool of the JCOP Framework", ICALEPCS 2007, Knoxville, Tennessee, USA