

UNICOS for LHC GCS

- 1 Motivations and objectives
- 1 Problem description
- 1 Issues
- 1 Status
- 1 Pros and Cons

Motivations

- The LEP gas systems
 - A lot of independently built systems
 - No common control system
 - Several operation models
 - Several technologies
- A favourable context
 - Gas systems are standardised by the GWG
 - Recommended industrial control technologies

Objectives

- End-User applications
 - For the four LHC experiments gas systems
 - Complete control applications
 - Supervision and Process Control layers
 - Integrated in LHC experiment DCS.
- Reduce efforts and cost
 - Development
 - Maintenance
 - Operation

Problem description 1/2

- 1 23 gas systems in four experiments
- 1 Commonality
 - 1 Modular architecture:
Mixer, Distribution, Pump, Exhaust, Purifier, Analysis, Recovery, *CO2 Removal*.
 - 1 Standard devices
- 1 Diversity
 - 1 Optional modules
 - 1 Options in a module

Problem description 2/2

- 1 Special operation model
 - 1 A central team
 - 1 Experiment operators
- 1 In house development
 - 1 By a CERN team
 - 1 Contribution of experiments
 - 1 No sub-contracting

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Architecture principles

- Layered applications
 - Supervision
 - Unique look and feel across the 23 applications
 - Abstraction for operators and central team members
 - Process control
 - Automatic behaviors
 - Can run without supervision
- Hierarchical architecture
 - Keep the modular view of GWG experts
 - Low level access for commissioning and debugging.

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Strategy

- Frameworks
 - For process control and supervision
 - Based on the GWG gas modules.
- Instances
 - Ideal case: automatic code production
 - Worst case: copy-paste procedure
 - Reality...

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Why UNICOS?

- Need of a PLC library
 - PLC oriented control
 - PLC software can be complex
 - Need of a common approach for industrial controls
- UNICOS assets
 - An application framework
 - Covers most of the I/O level
 - Open for specific behavior
 - Open operation model (access for operators and experts)

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Issues 1/2

- Concepts
 - Details about UNICOS concepts
 - Mappings with ours...
 - STD, alarms, events, commands, complex commands, recipes...
- Extensibility
 - I/O objects
 - new conversion mechanisms
 - Field objects
 - Our own devices
 - Process Control Objects
- Configuration
- Hardware constraints

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Issues 2/2

- Integration with PVSS
 - Communication Process Control / Supervision
 - Porting of the UNICOS communication layer?
 - Use of OPC?
- Integration with JCOP Framework
 - Operation models
 - UNICOS Objects vs Devices and controllers
 - AWG CM vs Unicos Model
 - Panels and graphical conventions
 - Navigation from one device to the other
 - Operation (modes, commands)
 - Framework openness
 - Hooks for Alarm masking, recipes, etc.

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Status 1/2

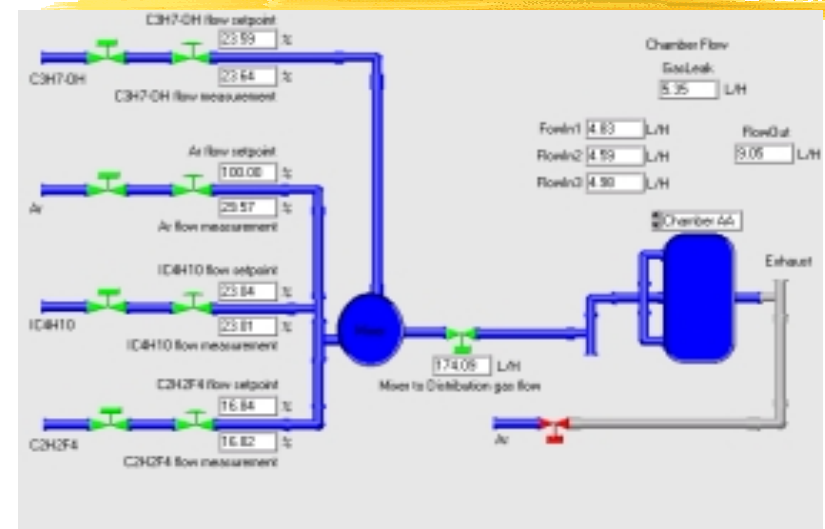
- Study of the concepts
 - Interaction with authors
 - Initial documentation
- Implementation of a real case (NA60 GCS)
 - An early version of UNICOS
 - Porting of PCO and FO on Premium
 - Use of OPC
 - Use of BridgeView/PVSS

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NA60 Gas System

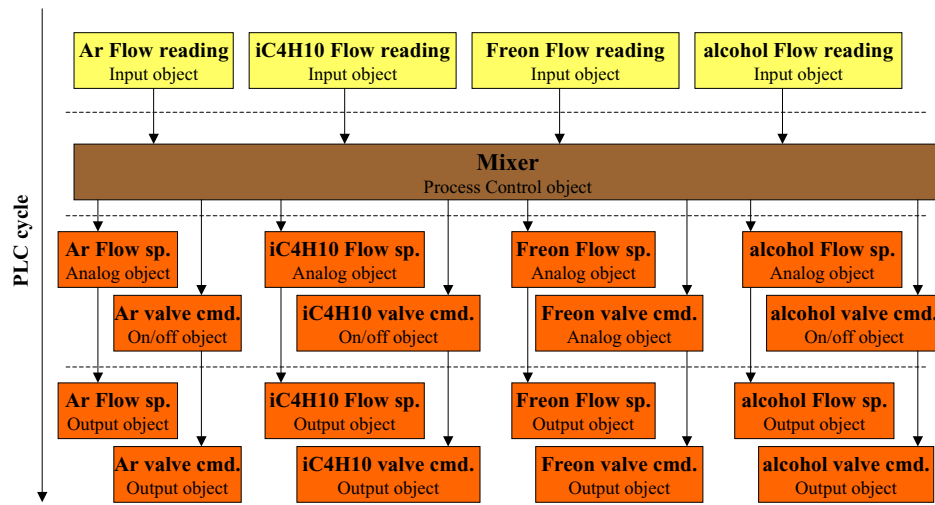


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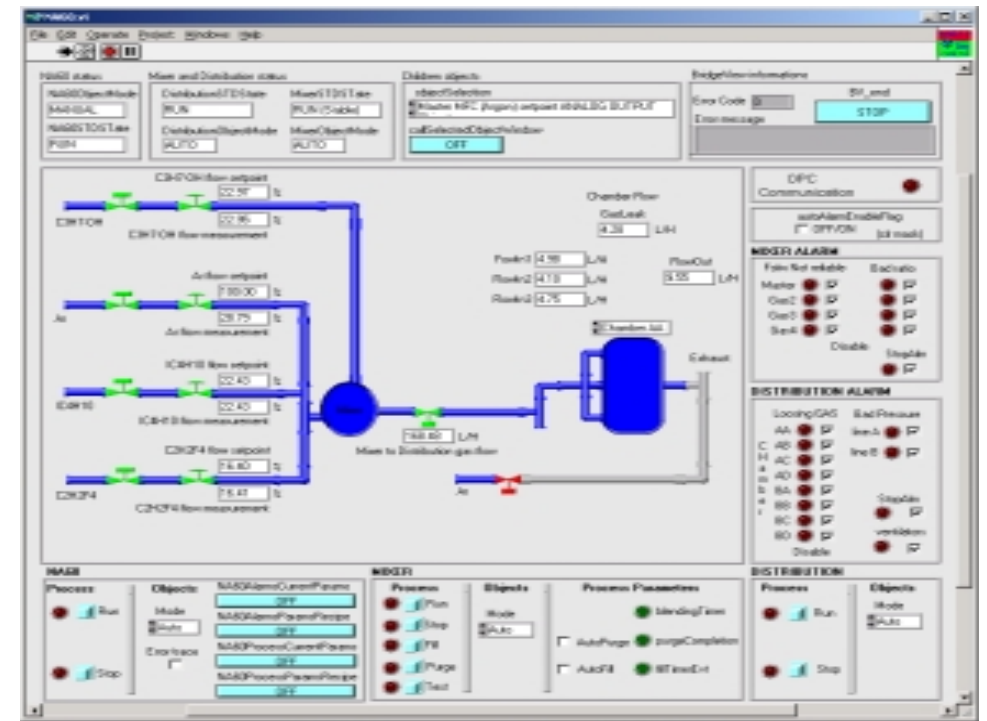
UNICOS implementation in NA60 gas control layer



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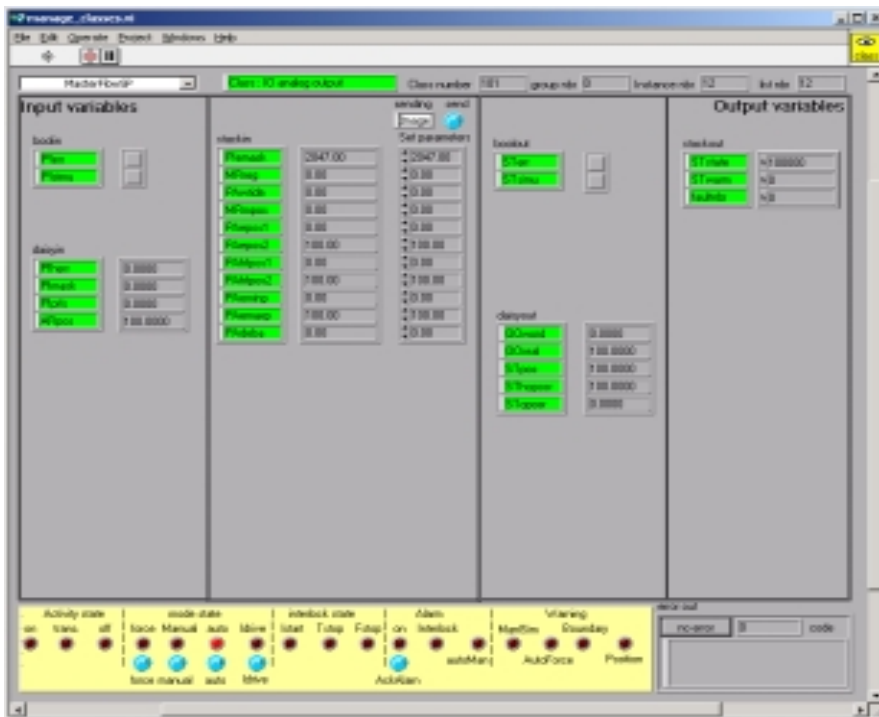
Status 2/2

- Engineering
 - Working on code generation
- Design of the process control
 - In progress.
 - 2.5 out of 6 modules
- Supervision
 - Waiting for LHC-IAS decision about PVSS
 - HMI mock-up

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What will come next?

- 1 Completion of process control design
 - 1 For the main modules
- 1 A prototype on actual Gas Racks
 - 1 Use the actual release of UNICOS
 - 1 Use an alternative communication layer
- 1 Validation
 - 1 Our gas specific Field Objects
 - 1 Main gas PCOs

Further Steps

- 1 Implementation of all our modules
- 1 Development of the supervision layer
 - 1 With Unicos-PVSS...
- 1 Engineering
 - 1 Code generation
 - 1 Configuration
 - 1 Version management
- 1 Migration toward Unity.

Pros

- 1 A complete solution
 - 1 But one can use a subset of UNICOS.
- 1 The PLC library
 - 1 Very good for automation
 - 1 Simulation and force facilities
 - 1 Automatic vs manual requests.
 - 1 Places for application specific extensions
- 1 Collaboration
 - 1 Available for CERN.
 - 1 Possibility of collaboration
- 1 Evolution
 - 1 PVSS and JCOP framework.

Cons

- 1 Information
 - 1 Difficult for a beginner
 - 1 Lack of tutorial
- 1 Platform dependant
 - 1 Schneider Quantum and Premium
 - 1 "Modbus"
- 1 Communication
 - 1 Tailored for Cryo.

Conclusions



- 1 We tried UNICOS
- 1 We will use UNICOS
 - 1 It is available
 - 1 It covers a large part of our needs
 - 1 It can be adapted
- 1 We wait next UNICOS deliverables
 - 1 Supervision layer, communication
- 1 We hope to improve the collaboration.