



CRYOGENIC with UNICOS

LHC_CP Working group 21-22 March 2002
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Glossary

1st PART : Cryogenics Background

2nd PART : UNICOS Specifications

3rd PART : CONCLUSIONS

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Cryogenics Background

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Cryogenics Equipments

LHC RING

- u The eight LHC main ring cryoplants, their infrastructure
- u The cryogenic equipment in the machine cryogenics tunnel
- u Cryogenics for the reference magnets (not yet defined)

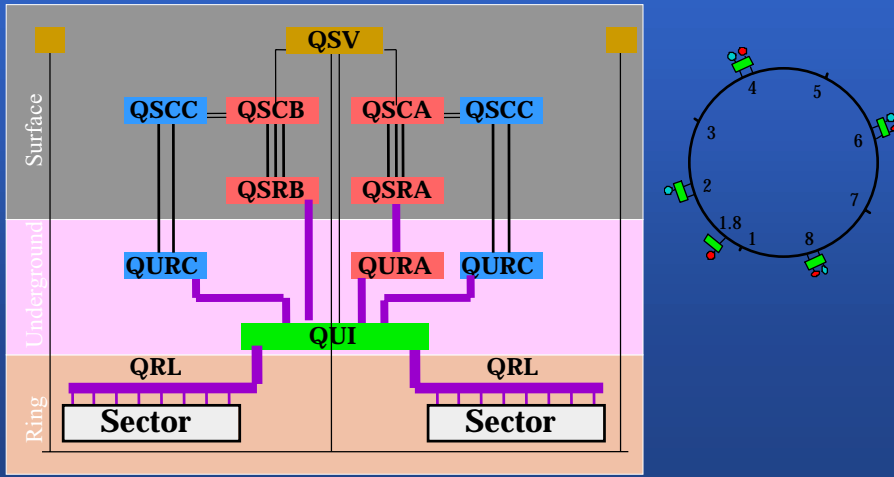
LHC EXPERIMENTS

- u The ATLAS helium externals cryoplants proximity and internal helium cryogenics for BT, ETC and Solenoid magnets.
- u The ATLAS liquid Argon cryogenic system (external and proximity)
- u The CMS helium external cryoplant, proximity and internal helium cryogenics

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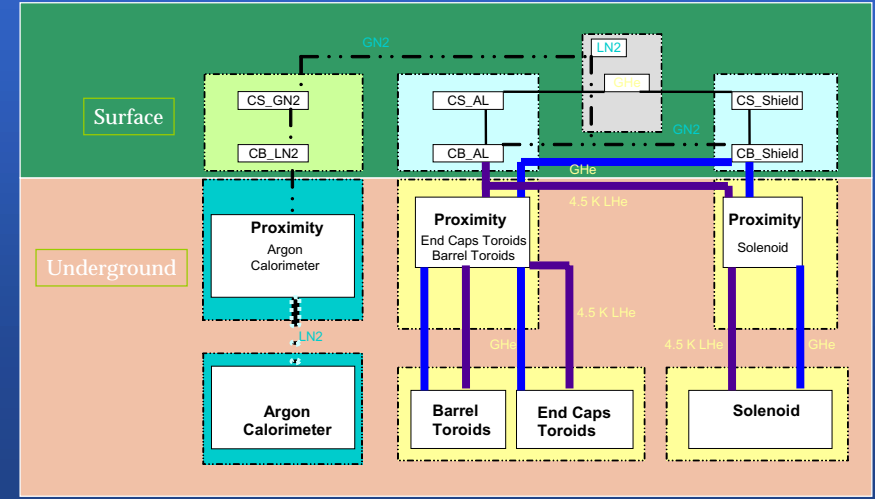
Accelerator Cryogenics



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Experiments Cryogenics



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Who Does What

Specification: CERN, External Institutes, Air Liquide, Linde, ...

User Application: CERN, Consortium

Hardware:

- PLC, Supervision system : Consortium
- Network : Rely ON CERN IT
- Cabling : CERN, Consortium, AL, Linde...

Maintenance:

- User Application : CERN, Consortium
- System : Consortium

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User Application Specification

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Technical Specifications

3 Documents to produce related of the 3 Control Layers:

· Process Logic description

Object Structure

User Application Description in UNICOS Language

· Field description

Fully Parameters Description of Each Field

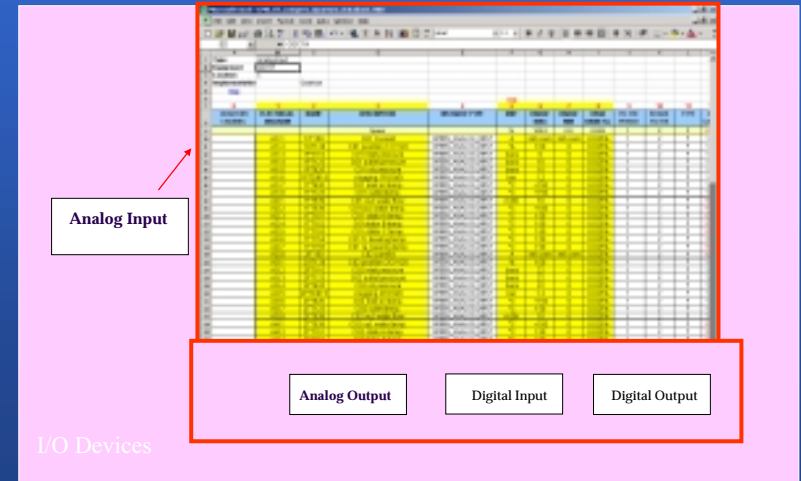
· Data Base Description

List of Input and Output Objects

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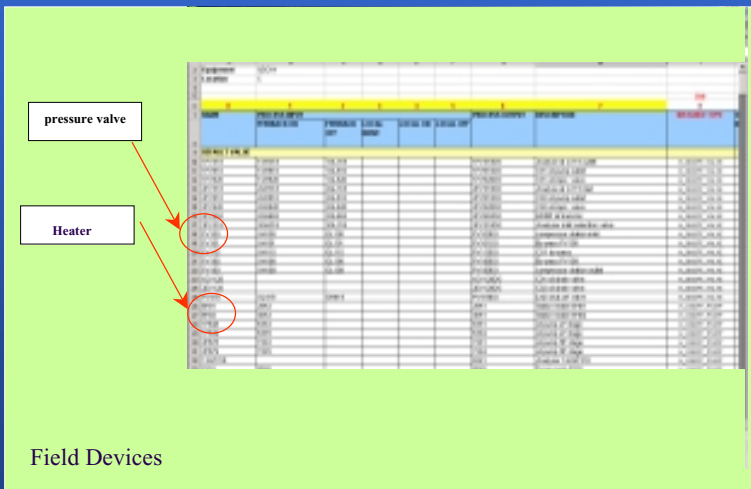
I/O Objects



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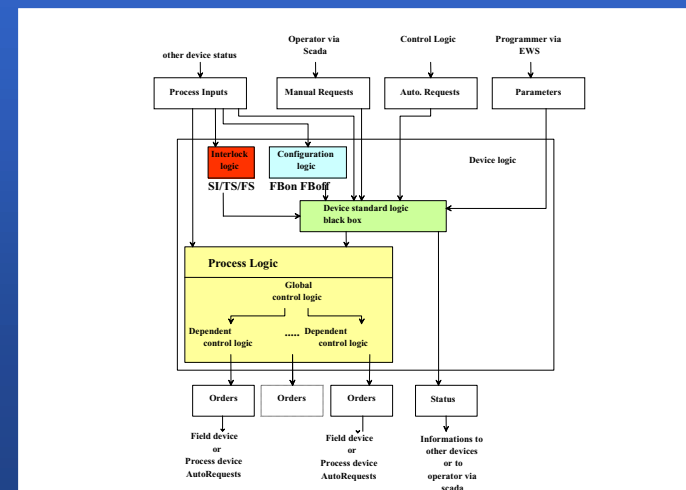
Field Objects



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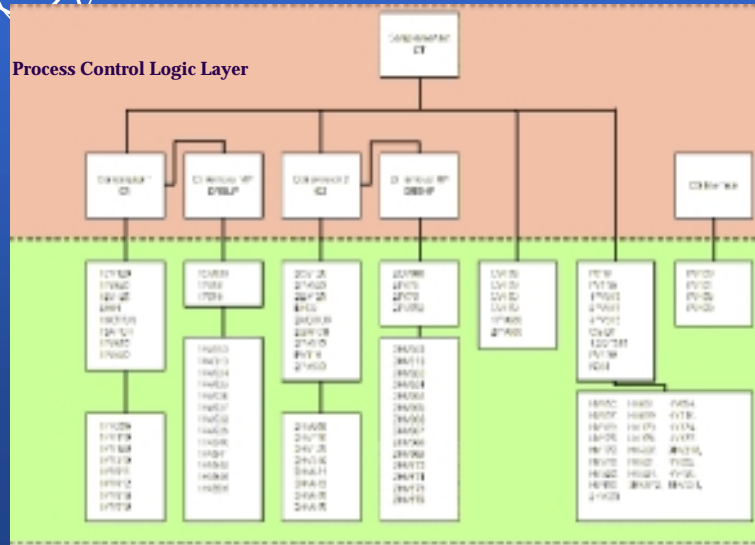
Objects



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Structure



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Field Layer



Process Logic Description TEMPLATE of a PCO

- **Objects controlled:** List of dependent objects
- **Modes & Commands:** Modes of PCO
Commands for Dependant Objects
- **Interlock logic:** Full stop, Temporary stop, Start Interlock
- **Configuration logic:** Feedback On, Off, Controlled stop conditions
- **Process logic:**
 - Global control logic:** Logic of miscellaneous objects(Ex:Stepper).
 - Dependent object control logic:** Specific logic of each dependent object

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First Applications feedback

- u **Good**
 - u PLC framework very reliable
 - u PLC Application easy do maintain & upgrade
 - u Communication stability
 - u After initial learning process Good quality of produced software.
 - u Specification templates ok for all actors
- u **Not that good**
 - u Complex integration of multiple PLC applications into a common supervision
 - u Dr Watson in GUI application
 - u Trend curve not stable
 - u Provisory network
 - u Necessity of a tools for database mapping (lead interface,PCU,Scada)

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CONCLUSION

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Unicos: A new system

User Courses mandatory for :

Specification Author
Programmer
Operator

They can be provided either by CERN or Consortium

System Upgrade :

PLC
Supervision system

⇒ Need time to digest like every new system

BUT....

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UNICOS Advantages for Process Control

Language: Common vocabulary for technical communication

Methodology: Structured Application
Preliminary analysis

Documentation: Logic, Devices and Data Base

Update: Follow-up of modifications
Easy to Upgrade thanks to structure

Programming Tools: Use Embedded Object function

Standard: Operation
Programming

Full Package for Control System

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