



NLC - The Next Linear Collider Project

# NLC Pulsed R&D Project

**Project Summary**

**More Details**

**Project Goals**

**Description**

**Schedule**

**Resources**

**Status**

*Author Name*

*Date*

# Project Summary

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- Examine integration of 120 pulsed functions into EPICS IOC software. The goal of this project is to have EPICS running alongside an 120 Hz NLC IOC application
- The output of this project will be IOCs with operational pulsed functions, a specification on how to add more applications, and a specification on how to operate with either the OPEN or TRIO Control System architecture.

## More Details

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- There should be written procedures on how to interface with the EPICS database in near real-time
- Their needs to be documentation on how the VxWorks TCP/IP communications stack is structured and also its timing requirements.
- There will also be a number of applications written and tested in this R&D project which will directly influence how the real applications are written during the design and implementation phase of the NLC.
- Determine what the latency problems or requirements are in doing longline I/O to see if the task is being held or if their issues of priority inversion

# Project Goals

- Demonstrate that NLC type 120 Hz applications can run alongside and EPICS IOC using a common database and common VxWorks objects
  - Whether the record is local to this CPU or whether the data is down a long line I/O pipe and architecture such as the trio architecture
  - Whether this processing is done in separate CPUs or linked CPUs together locally any single crates or backplane.
- **Byproducts:**
  - Provide test bed for sub-system interoperation testing
  - Narrow down technology choices
  - Determine software interface specifications
  - Provide more detailed input to cost model

# Description

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- **Phase 1:**
  - Identify all NLC activity, which would occur in IOC at 120Hz
  - Identify all EPICS database devices that are used at 120 Hz
  - Identify other labs who have used EPICS in this same function same method
- **Phase2:**
  - Write the VxWorks applications as a test bed
  - Write some code and test it
- **Phase 3:**
  - polish and integrate the code

# Detailed Description

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- **Phase 1**
  - refine project goals and acquire an IOC (or two)
  - Examine other institutions methods of doing the same functions
  - Gather specifics from other groups including feedback, machine protection system, etc.
  - Write the requirements document and detailed test plans
  - Detail the differences required for the OPEN architecture versus the TRIO architecture
  - Document the data flow for both architectures
  - Generate progress report (milestone)



## Detailed Description (cont)

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- Phase 2
  - FY01 - full-time -
  - acquire more IOCs and/or custom networks/protocols
  - Write the code to simulate the required functions
  - Setup a test bench to run the simulations on
  - Perform testing to measure actual results
  - Integrate the test setup with the network R&D project where possible
  - Review findings then prepare the CDR text
  - Write and review the interface specification for EPICS IOC applications -- milestone



## Detailed Description (cont)

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- Phase 3
  - FY02 - 3 F. T. E.'s
  - Write actual code to handle the applications identified
  - Integrate and test on the NLC test network
  - Examine any OPI type interfaces that may be required



# Schedule

- **FY99**
  - develop detailed project goals requirements and network/software/hardware needs
- **FY00**
  - refine project goals and acquire an IOC (or two)
  - Document the data flow for this architecture
  - Generate progress report (milestone)
- **FY01**
  - full-time - acquire more IOCs and/or custom networks/protocols
  - Review findings then prepare the CDR text
  - Write and review the interface specification for EPICS IOC applications
- **FY02**
  - 3 F. T. E.'s
  - Write actual code to handle the applications identified
  - Integrate and test on the NLC test network
  - Examine any OPI type interfaces that may be required

## Team/Resources

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- This will require input from other EPICS collaboration members
- May require hardware and or network configuration help
- Will require software at both the driver level and interrupt a level and possibly application level to verify proper operations and
- some networking equipment may be borrowed
- test system will be installed in Bld ???



# Status

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- Investigated other Labs designs and capabilities (RT99)
- Learned details of Real-Time Linux for possible usage
- Still gathering and classifying bandwidth requirements
- Working on prototype specifications