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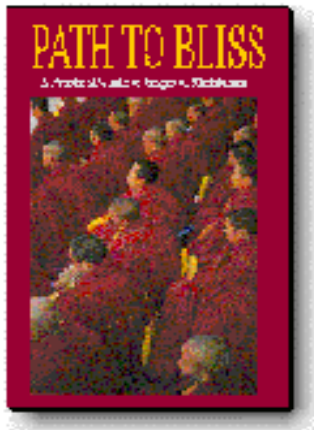
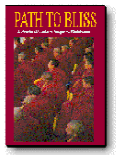


Linux/PCI: The new ESRF beamline control system

Alejandro HOMS-PURON

BLISS Group

ESRF



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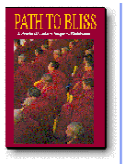
Talk outline

- Introduction
- Bus couplers
- Prototype setup for ID31
- New features
- Conclusions



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Introduction

ESRF today

VMEbus

Motorola 68000 33 MHz / OS9

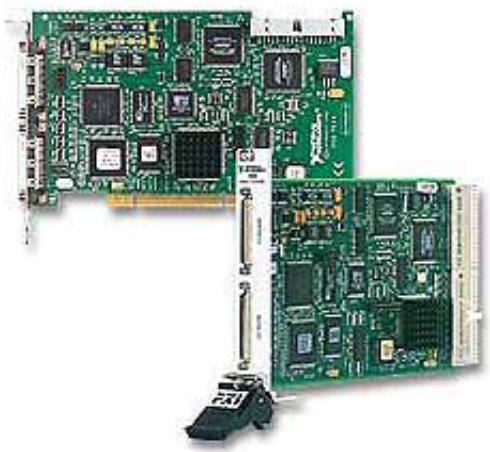
10 MBps Ethernet

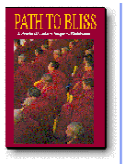
Modernization project

PCI & cPCI

Pentium III 1 GHz / Linux

100 MBps Ethernet





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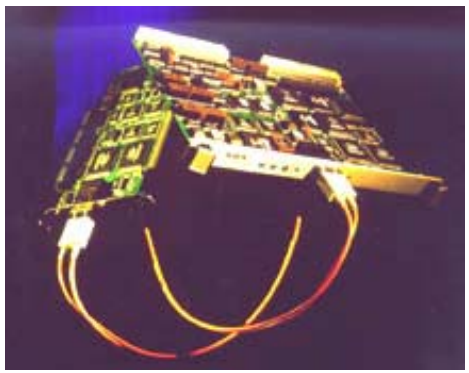
Bus couplers

PCI – VME Bus coupler (Bit-3)

SBS Model 620, Fiber optic link

Transfer rate: 35 Mbyte/s (DMA)

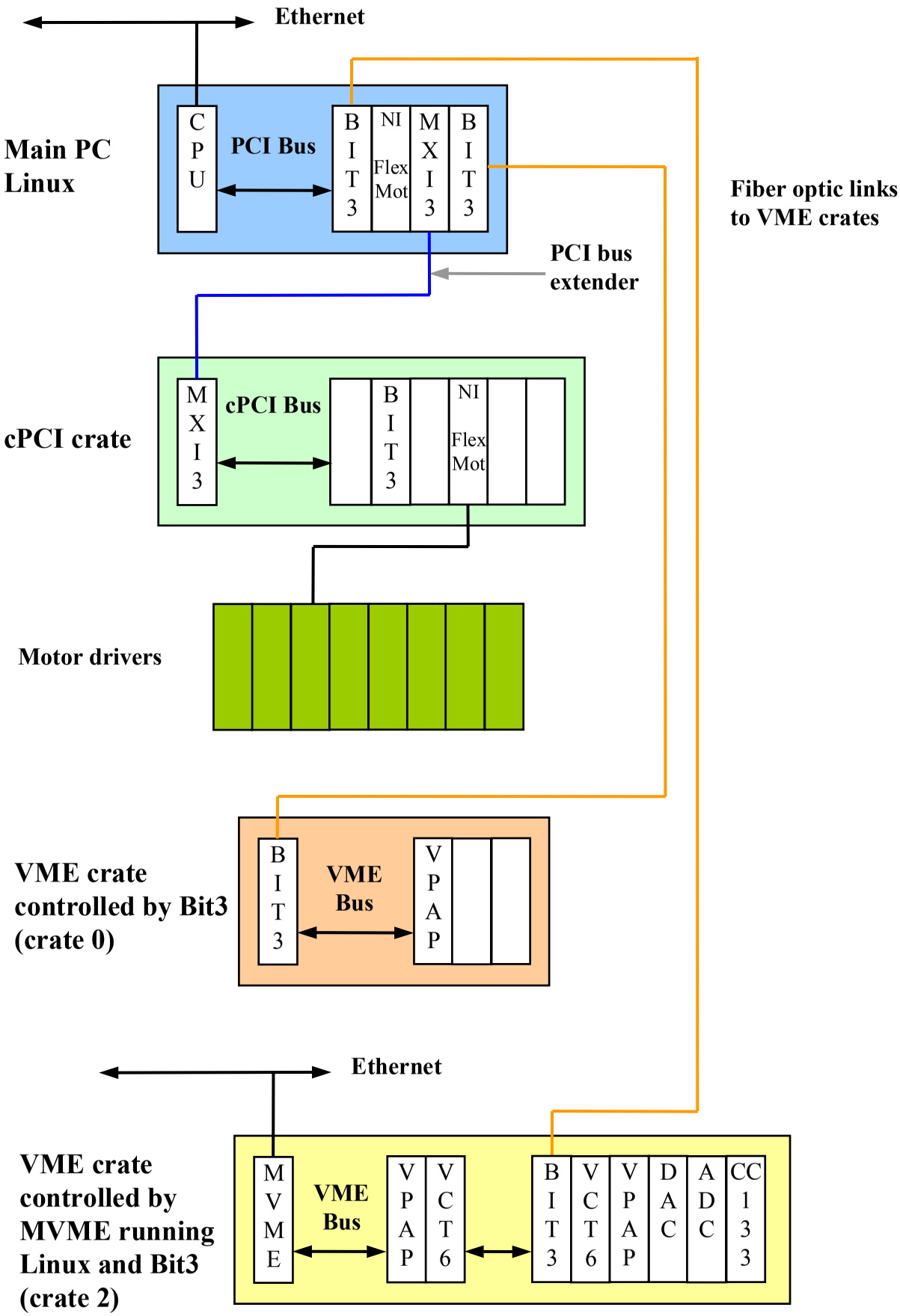


PCI – cPCI Bus Extender (MXI-3)

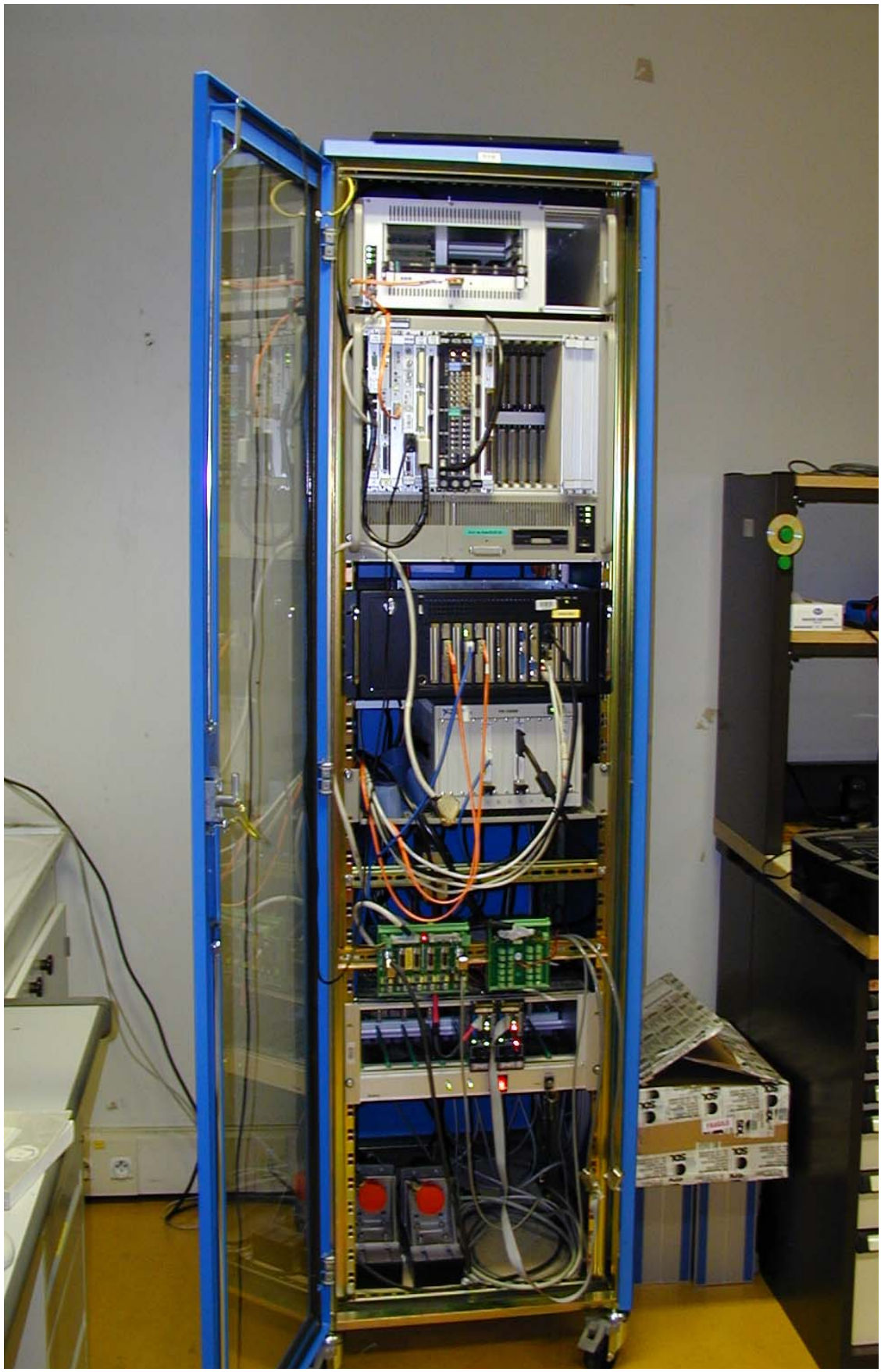
NI PXI-PCI8330, Cooper link

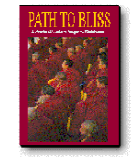
Transfer rate: 84 Mbytes/s

Setup with PCI, cPCI and VME boards



Instrumentation control setup connecting PCI, cPCI & VME busses





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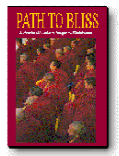
Industrial PC and cPCI crate



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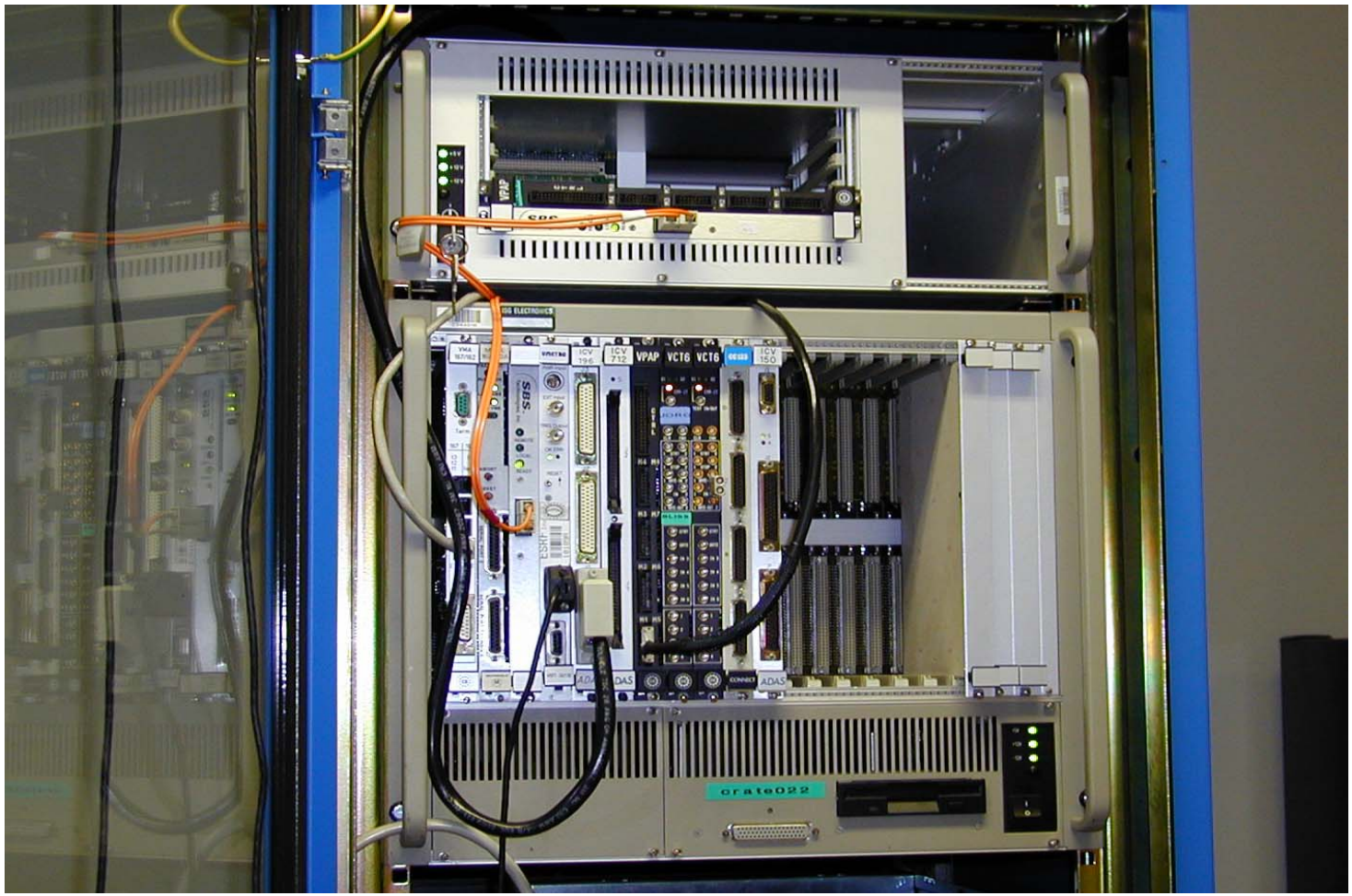
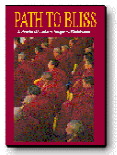
VME crates controlled by PCI & MVME Linux





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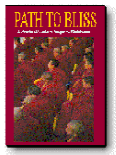
General features

Scalable functionality:

- Direct access to boards from SPEC (very fast)
- SPEC + device servers (TACO) on the same PC
- SPEC controlling remote device servers (network traffic)



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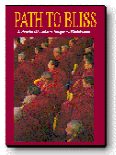
Hook facility

- Buffer for storing the experiment data
- Run-time configurable
- VME, PCI & cPCI boards included
- Kernel mechanism ⇨ good-performance:
  - 30 – 50 µs interrupt latency time
  - 3 µs VME single access time
- Triggered by software or hardware



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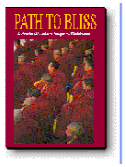
VME features

- No limitation in the number of boards per crate
- Full access to VME board functionalities
- VME crates can be switched Off/On, and boards can be added/removed
- Same code works on Intel x86 and Motorola 68k



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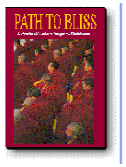
PCI boards Enumeration

Problem:

- Plug & Play ⇨ boards enumerated at boot time
- Most of the boards are indistinguishable
- Board added/removed ⇨ enumeration changes
- This also applies to VME crates!



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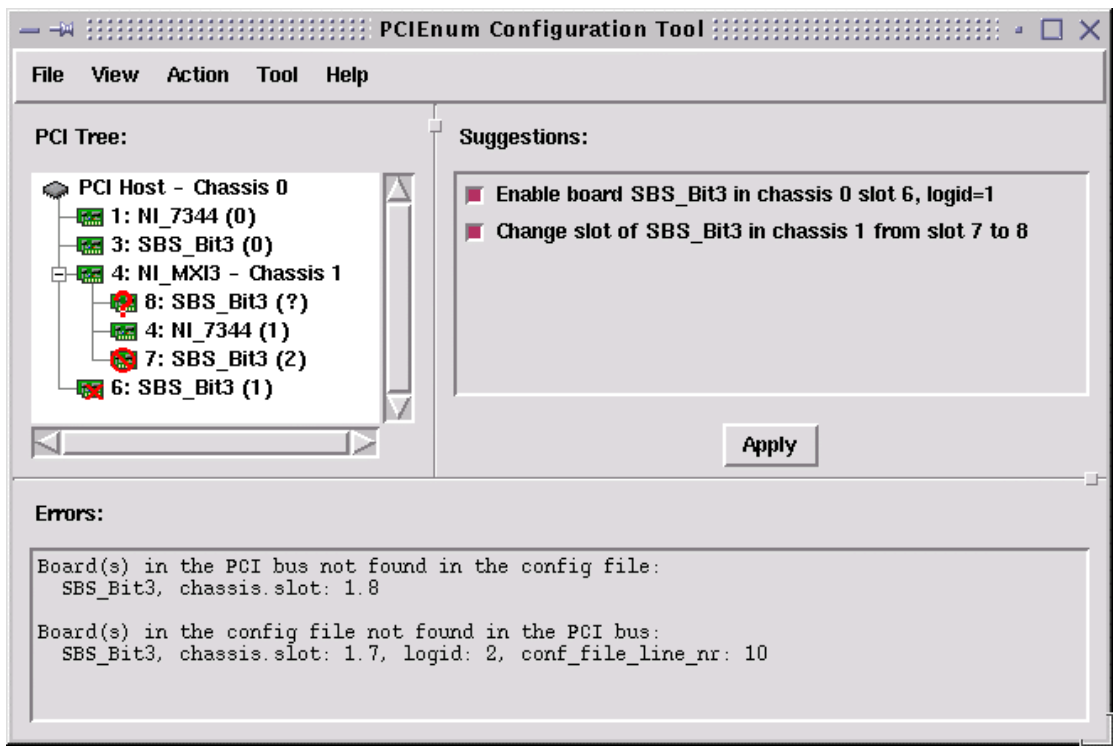
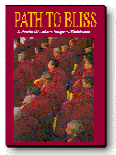
PCI boards Enumeration

Solution:

To keep track the position of the boards in the bus





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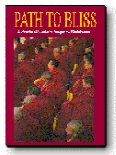
TACO

- Hook device server
- Define a model for exporting channel and/or board devices
- Optimize local calls



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Conclusions

- The project supports the VME/PCI transition at the ESRF
- New features will allow faster experiments and more flexible configurations
- Linux kernel provides the necessary functionality and stability