Progress in control system

KEKB Controls Group

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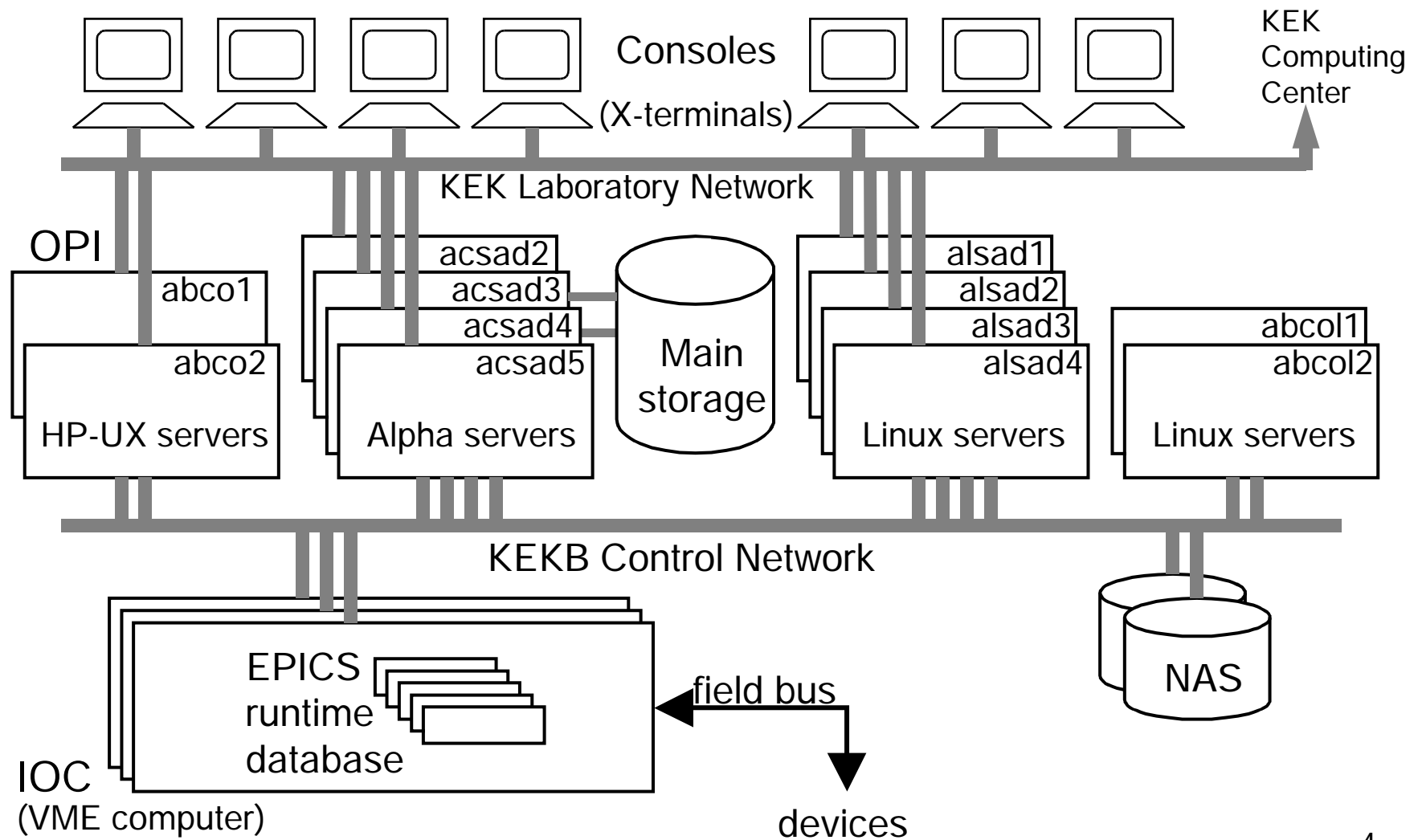
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KEKB/PF-AR Control System Overview

- EPICS based
- UNIX Server Workstations (OPI)
  - 2 HP-UX servers (abco[1-2])
  - 4 Compaq Alpha servers (acsad[2-5])
  - 4 Linux servers (alsad[1-4])
  - 2 Linux servers (abcol[1-2]) for Data Archiving
- Operator Consoles (X-terminals)
  - Macintosh, PC/Windows, PC/Linux
- Networks
  - FDDI Switched Network + Ethernet (10Base-T, 100Base-TX)
  - KEK Laboratory Network is also used for Console terminals in CCR
- VME Computers (IOC)
  - 104 (10 for PF-AR)
- Field buses
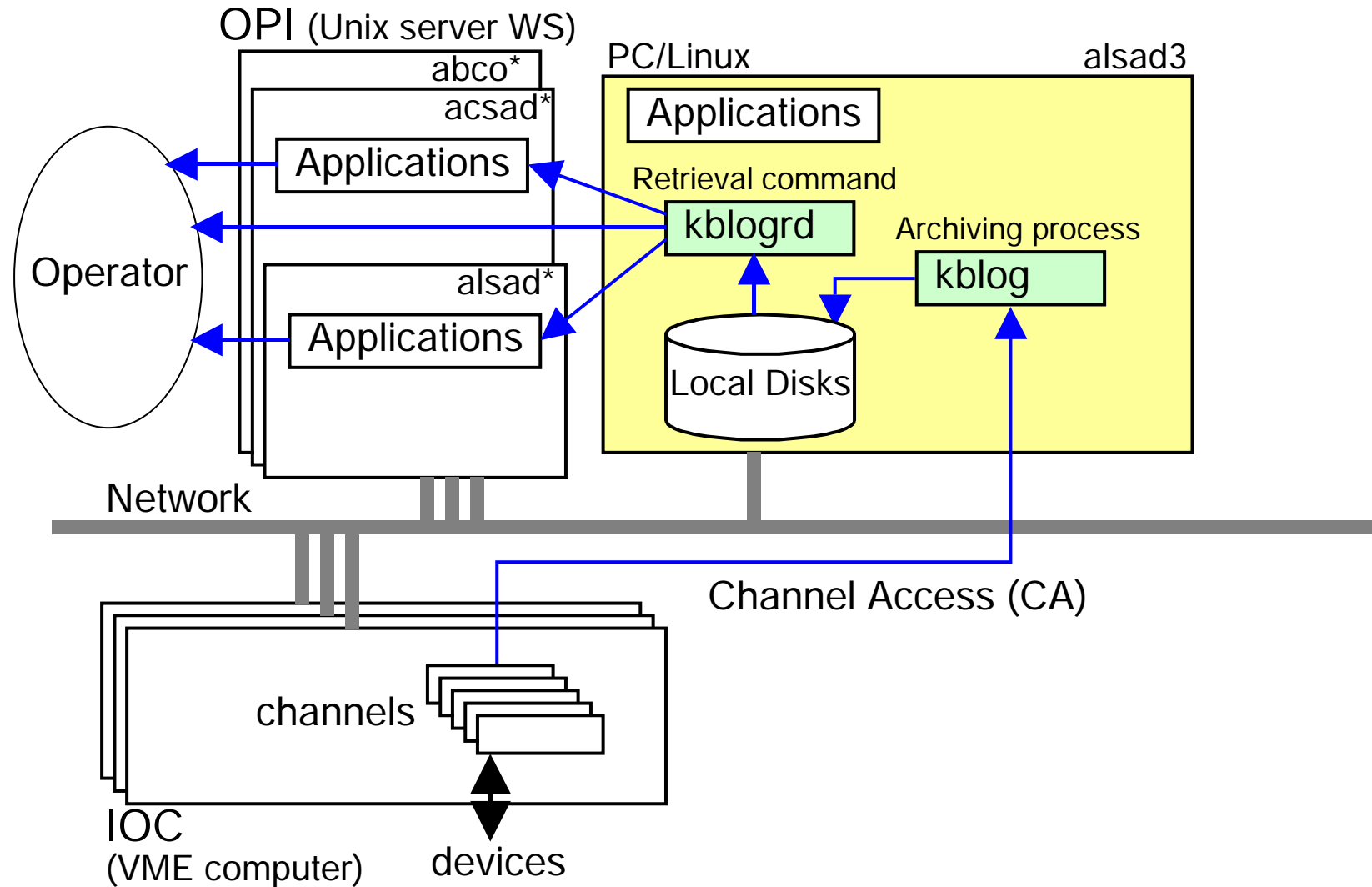 - CAMAC Serial Highway, ARCNET, VXI-MXI, Modbus plus, GP-IB, RS-232C

System Configuration

Consoles

(X-terminals)

KEK
Computing
Center

KEK Laboratory Network

OPI

abco1

acsad2
acsad3
acsad4
acsad5

alsad1
alsad2
alsad3
alsad4

abco2

HP-UX servers

Alpha servers

Main
storage

Linux servers

abcol1
abcol2

Linux servers

KEKB Control Network

EPICS
runtime
database

field bus

NAS

IOC
(VME computer)

devices

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Network Upgrade

- ## KEKB Control Network

  - ### 10 Base-T $\rightarrow$ 100 Base-TX

    - FDDI-Ethernet bridge in Fuji
    - 2 FDDI-Ethernet bridge in Central Control Building
    - Switching hub in CCR (Central Control Room)

- ## KEK Laboratory Network

  - ### Gigabit Ethernet (1000 Base-TX)
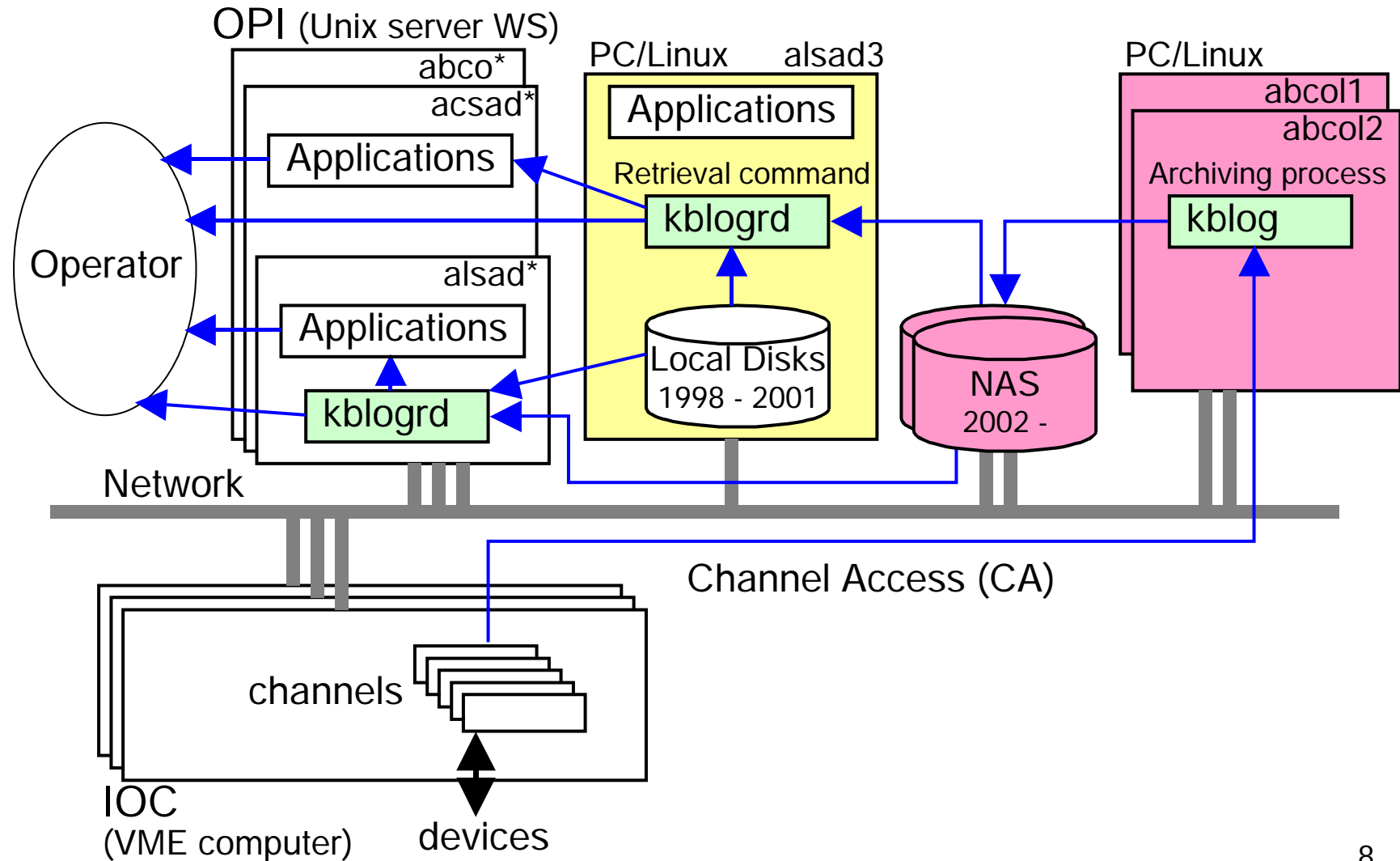
    - Switching hub in CCR

Upgrade of Data Archiving System

- Data Archiving System "**KEKBLog**"
  - "**kblog**" : Data archiving program
  - "**kblogrd**" : Data retrieval program (command line tool)
- Hardware in 2001
  - PC/Linux server "**alsad3**" (general purpose)
  - 640GB (software RAID5) in **alsad3** for KEKBLog
- Hardware upgrade in 2002
  - **alsad3** was not so stable and hard to maintain.
  - We need additional storage.
- Upgraded hardware
  - Independent servers for archiving, storage and retrieval
  - Redundant configuration

Configuration of KEKBLog in 2001

OPI (Unix server WS)

abco*
acsad*

Applications

Operator

alsad*

Applications

PC/Linux   alsad3

Applications

Retrieval command

kblogrd   Archiving process

kblog

Local Disks

Network

Channel Access (CA)

channels

IOC
(VME computer)   devices

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Configuration of KEKBLog in 2002

OPI (Unix server WS)

abco*
acsad*

Applications

alsad*

Applications

kblogrd

Operator

Network

PC/Linux   alsad3

Applications

Retrieval command

kblogrd

Local Disks
1998 - 2001

NAS
2002 -

PC/Linux

abcol1
abcol2

Archiving process

kblog

Channel Access (CA)

channels

IOC
(VME computer)   devices

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Archived Data

- Archived data are often referred for the post mortal analysis of the events. Sometimes the long term backward survey of the data is helpful.

- 28 archiving processes are running.
- 86150 Channels are monitored.
- 2700MB/day. (snap shot on Jan. 23, 2003)
  - $\rightarrow$ about 800GB/year.

- Currently we have 1360GB storage.
  - Disks (RAID5) in **alsad3**   640GB
  - 2 NAS (RAID5)   360GB x 2

Storage for the Archived Data

- We add new storage device every year.
  - Storage device (ex. NAS) becomes cheaper.
  - Old data (>1year old) are not necessary in most case. But in some case they are requested.
  - Data reduction (ex. re-sampling) seems complicated job because of the non-uniformity of the data.
- Backup: HPSS system in KEK computer center.
  - HPSS (High Performance Storage System)
  - Hierarchy storage --- tape library with staging disks
  - 38 tapes (1.5TB) are assigned for KEKB archive. (Total capacity is 120TB mainly for physics experiment groups.)
  - We can add more tapes every year

Other Progresses

- Evaluation/Test
  - Test of Tornado 2.0 in abco1
  - Installation and test of MRTG (network traffic monitor) in abco1
- System software
  - Kernel parameter tuning of abco2
  - Installation of SQLNet (oracle 7.3.4) in abco2
  - Installation of PostgreSQL in abco2
- Control software tools developed in KEK
  - Version up of GDL (GPIB Definition Language)
  - Version up of general purpose graphic modules
  - Electric Logbook ported from Linac Control System
  - etc.
- Software development for new instruments
  - OctoPos monitor (CAMAC   VME)
  - Bunch train monitor (GPIB Oscilloscope)
  - Bunch purify system in PF-AR (GPIB devices)
  - etc.
- Hardware
  - Replacement of console displays in CCR: CRT $\rightarrow$ LCD
  - Replacement of large-size displays in CCR: PDP $\rightarrow$ DLP
- Communication with the Facility Control System
  - Gateway IOC: PC/Linux

Activity of the Collaboration

- EPICS group in KEK Accelerator Lab.
  - The control group traversal over the accelerators in KEK (KEKB, PF-AR, PF, Linac, KEK-PS, JPARC)
- Collaboration with Laboratories in China and Korea
  - EPICS Seminar/Meeting
    - at SSRC in 2000, at IHEP in 2001, at IHEP in 2002
  - Exchange visitors from China and Korea