Corba controls - A Review of the current status

- What is CORBA controls ?
- The CORBA controls workshop
- Who is using CORBA for controls ?
- Conclusions of the workshop
- Where is CORBA controls going ?
- What does this have to do with PC's ?

What is CORBA controls ?

- **CORBA** is a **network protocol** defined by the **Object Management Group**
- **CORBA** is the multi-platform **middleware** *par excellence*
- **Today more and more people are considering using CORBA for CONTROLS**
- CORBA provides us with a high quality solution which covers almost all of our needs
- Special needs of control systems are speed, footprint, realtime, robustness, low cost, ...

CORBA improves the past

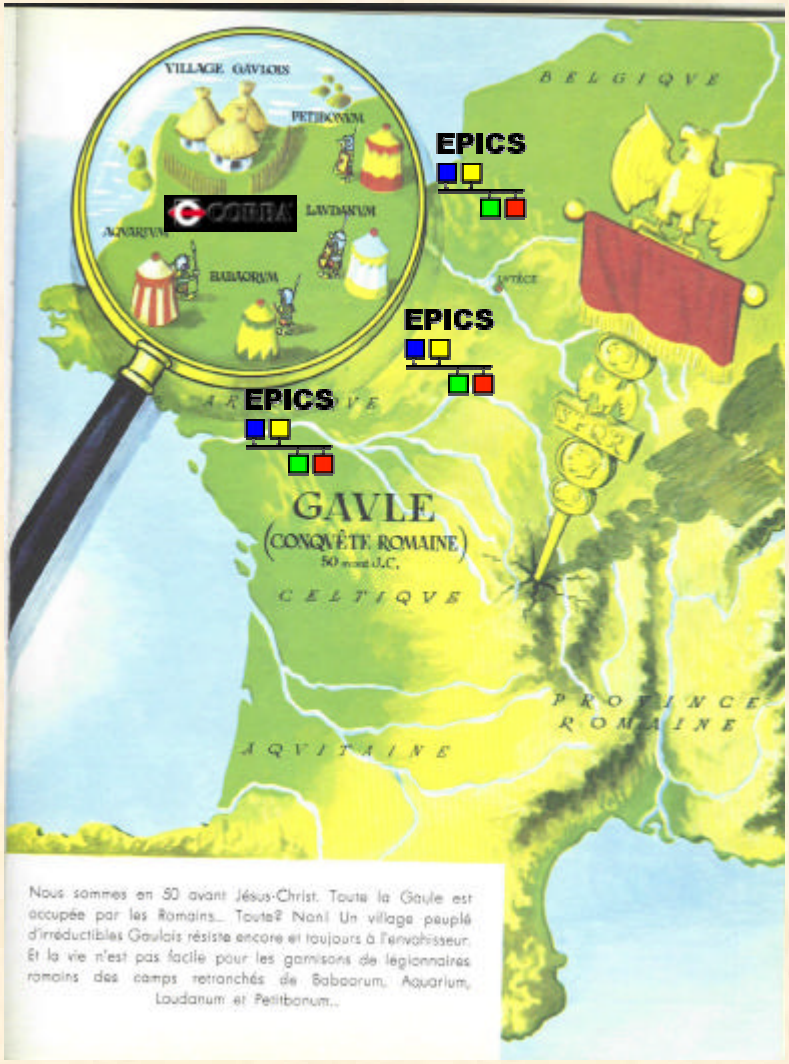
- **Berkeley sockets**
  - provided a connection for sending raw data over the network
  - Example EPICS

- **Remote procedure calls**
  - provided a mechanism for calling functions over the network
  - provided network data conversion
  - provided network port number management
  - Example TACO

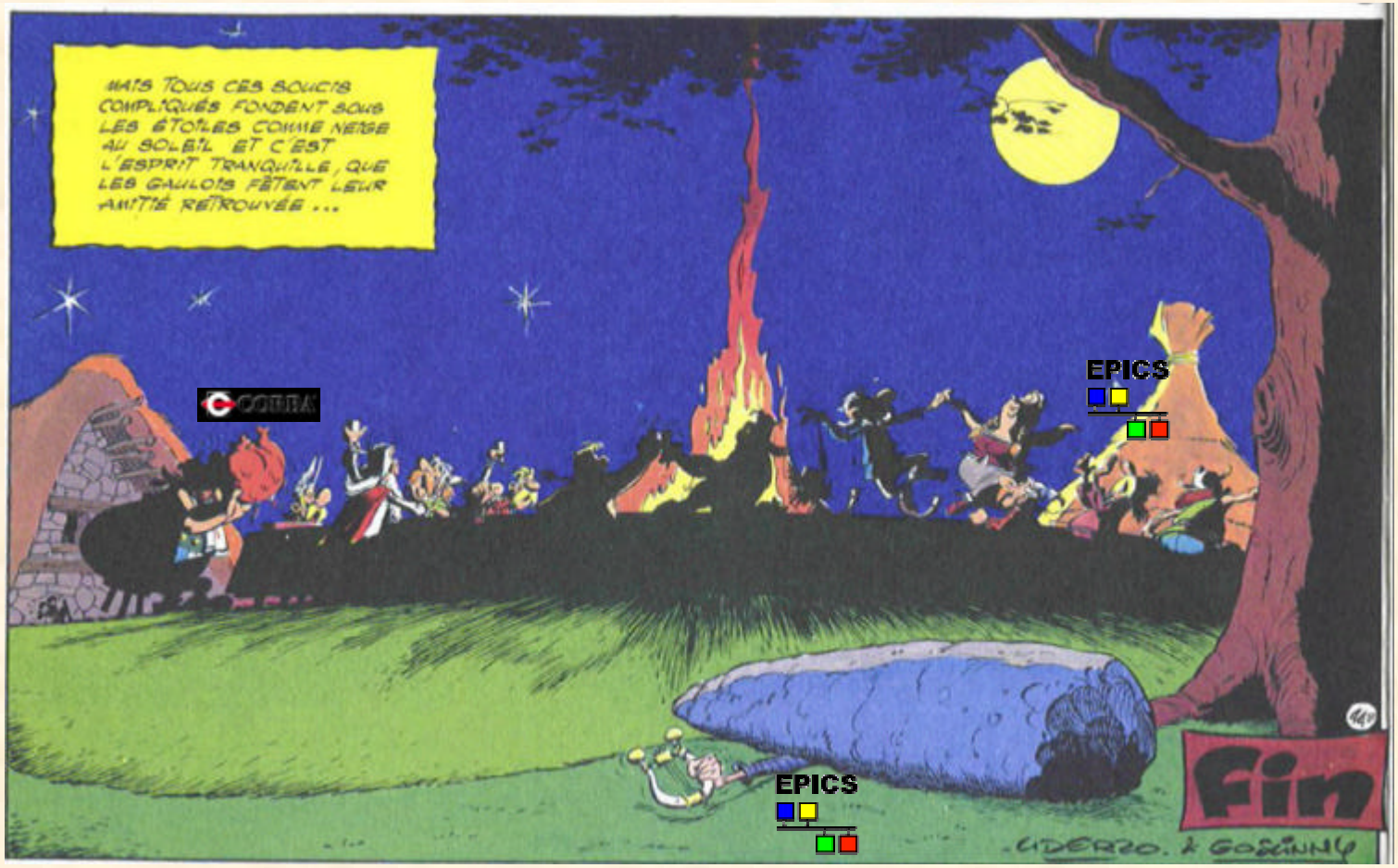
- **Common Object Request Broker Architecture**

  - provides an object oriented paradigm for networking
  - provides language bindings for C++, Java, Python, Ada, C, ...
  - provides services for Naming, Events, Notification, Trading, ...
  - is non-proprietary but there is no reference implementation

CORBA controls in the beginning ...



CORBA controls today ...



1st Corba controls workshop

- Corba controls workshop – ***Participants***

- Guest speakers :
  - Doug Schmidt
  - Duncan Grisby
  - Kay Römer
- Participants from :

Who is using CORBA Controls #1 ?

- ESRF synchrotron
  - TANGO - an object oriented toolkit
  - replacing existing ONC/RPC based system (TACO)
  - Linux, Windows + Solaris
  - C++, Java, Python, Matlab, Labview
  - in collaboration with Soleil
- ALMA telescope
  - ACS - an object oriented toolkit
  - green site
  - VxWorks, Linux, Windows
  - C++, Java
  - see talk by M.Plesko

Who is using CORBA Controls #2 ?

- GTC telescope
  - control system for 11 meter optical telescope
  - green site
  - VxWorks + Linux
  - C++ and Java
- NIF laser
  - control system for laser ignition facility
  - green site
  - VxWorks + Unix
  - Ada

Who is using CORBA Controls #3 ?

- CLRC Daresbury synchrotron

  - data acquisition
  - new beamline project (later Diamond ?)
  - OS9 and Solaris
  - C++, Java and Jython
- CERN PS accelerator

  - frontend and operator console modernisation
  - LynxOS, Linux
  - C++ and Java

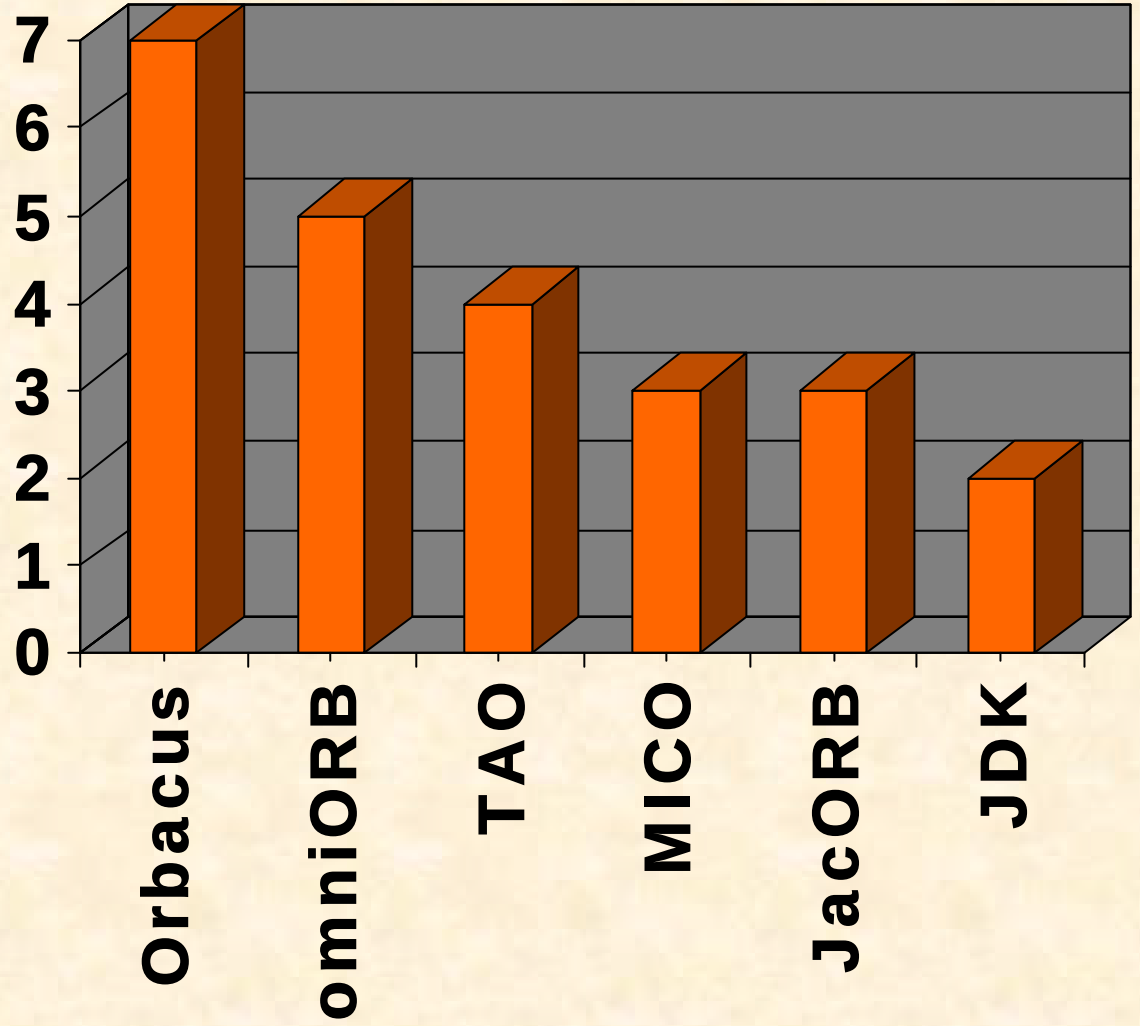
Who is using CORBA Controls #4 ?

- **KEK linac**
  - web-based status display
  - browsers
  - Java
  - see talk by Kamikubota-san
- **SLAC accelerator**
  - AIDA data access system
  - Oracle + EPICS
  - Java and C++
- **SLS synchrotron**
  - beam dynamics and beamline
  - C++, Java and Tcl
  - see talk by Jan Chrin

Who is planning on using CORBA in controls (maybe) ?

- Elettra
- GANIL
- ILL
- Thomas Jefferson Lab
- LNL-INFN
- LLS
- IRAM

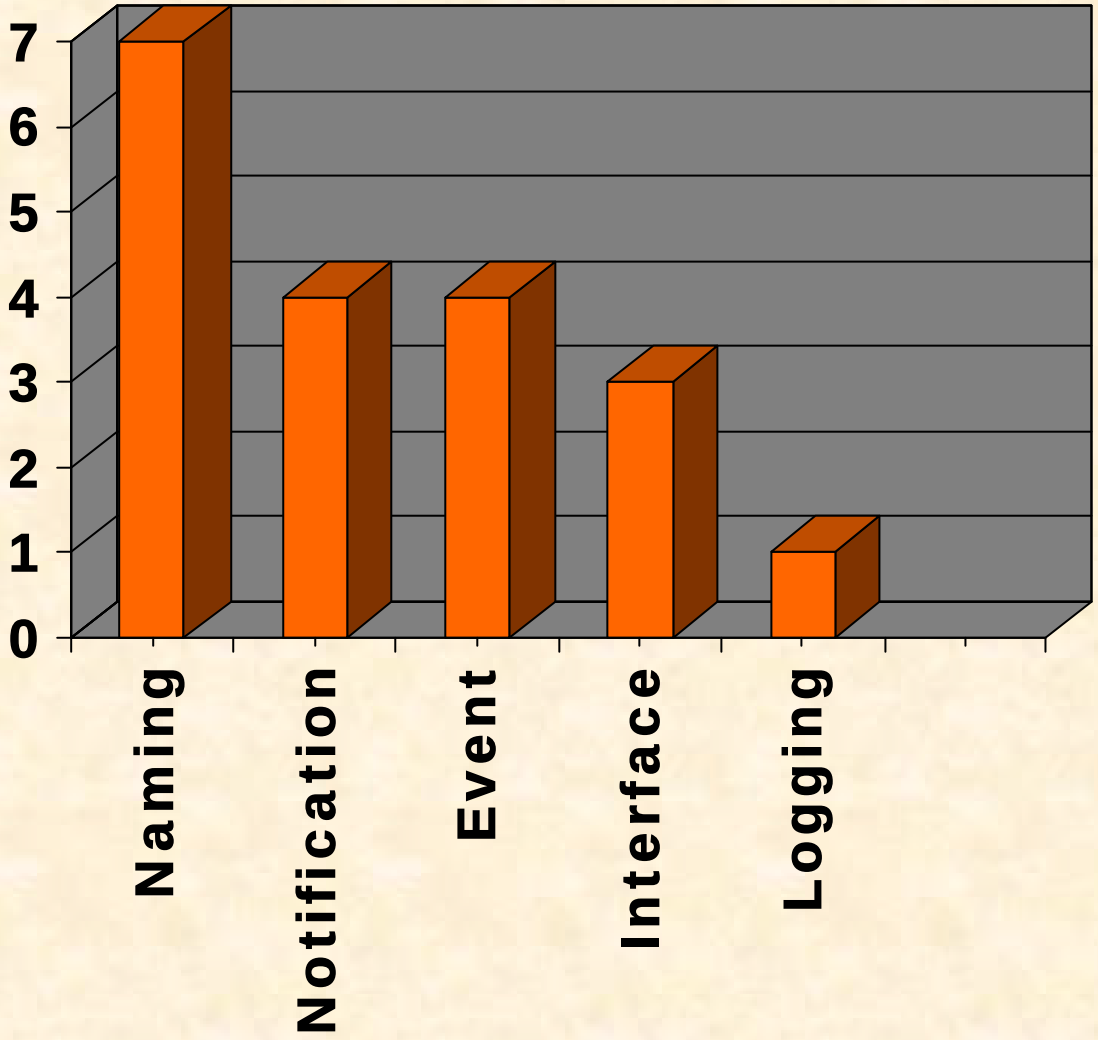
ORB statistics



ORBs rise and fall

- ORBACUS
  - mostly widely used ORB today
  - version 4.0.5 from OOC was free
  - 4.1.x bought by IONA
  - IONA introduced runtime licences
  - everybody is planning a migration path
- Free ORBs are taking over
  - TAO, omniORB, MICO, JacORB, openORB
- JDK has problems (no timeouts !)

CORBA Services statistics



CORBA Controls Workshop - Conclusions

- CORBA systems are either
  - used to provide a bridge to an existing system, or
  - being used from the top down to the frontend
- CORBA is being used more and more in the frontends

CORBA Controls Workshop - Conclusions

- CORBA is SLOW - fact or fiction ?
- FICTION !

- CORBA can be fast
  - omniORB is fastest ORB around
    - minimum copying, avoid stdlibc++, optimised by hand
    - 250 microseconds for a network call
    - 100 microseconds for a local call
    - faster than an rpc call !
  - MICO zero-copy
    - 75 MB/s data transfer rate over ORB

CORBA Controls Workshop - Conclusions

- CORBA is a memory hog - fact or fiction ?
- FACT !

- CORBA needs memory
  - 1-3 Mbytes in general i.e. use shared libraries
  - not much worse than libstdc++
  - 100 kbyte commercial versions for the embedded market exist but do not support all features
  - minimum comfortable memory requirements 32 MB

CORBA Controls Workshop - Conclusions

- The BIG DEBATE - « *wide vs. narrow* »
- has been renamed **« *specific vs. generic* »**
- example of **specific** interface :
  - *module PowerSupply { void on(); void off(); }*
- example of **generic** interface :
  - *module Device { void command(in string cmd); }*
- CORBA controls community split 50/50
- both generic and specific are needed the question is how do you implement them
- CORBA naturally offers specific
- generic is often used for legacy systems

CORBA Controls Workshop - Open Questions

- How to manage the object lifecycle
- How to implement security
- How to implement asynchronous calls
- How to implement logging

CORBA Controls Workshop - Next Step

- Mailing list
  - corba_controls@esrf.fr
- Website
  - http://www.esrf.fr/corba_controls
  - will maintain a database of CORBA control systems
  - will provide useful information and links
- CORBA Controls Patterns
  - document and publish a list of common patterns
- Interfaces
  - create a database of existing IDL interfaces
  - define common IDL interfaces e.g. Device

CORBA Future

- CORBA 3 is coming
  - is more network aware than CORBA 2
  - Objects by Value
  - CORBA Component Model
  - Quality of Service
  - Asynchronous messaging
  - Fault tolerance
- New specifications
  - Data Parallel Processing
  - Domains e.g. controls (?)

CORBA Controls - Conclusion

- CORBA has turned out to be a stable standard
- performant free ORB implementations exist
- any distributed control system which has to support multiple platforms should consider using CORBA
- in my opinon in the accelerator world the choice is **CORBA** or **EPICS** or **both**!
- *sockets* have joined the ranks of *assembly code*
- all of this runs on PC's !
- **CORBA+PC**'s might just be with us for the next decade !