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**Poseidon House  
Castle Park  
Cambridge CB3 0RD  
United Kingdom**

TELEPHONE:  
INTERNATIONAL:  
FAX:  
E-MAIL:

**Cambridge (01223) 515010  
+44 1223 515010  
+44 1223 359779  
apm@ansa.co.uk**

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**APM Business Unit**

## **JET briefing for GPT Transaction Workshop**

**Chris Mayers**

### **Abstract**

GPT wish to exploit the ANSA Distributed Multimedia Architecture. A joint workshop between GPT, Newcastle University, and APM has been arranged for the 20 and 21 May 1996, concentrating on transactions.

This presentation is a briefing about the deployment of the ORB in the JET project, concentrating on nucleus issues. It aims to provoke discussion how Newcastle's ideas could be integrated.

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19th May 1996

Briefing Note

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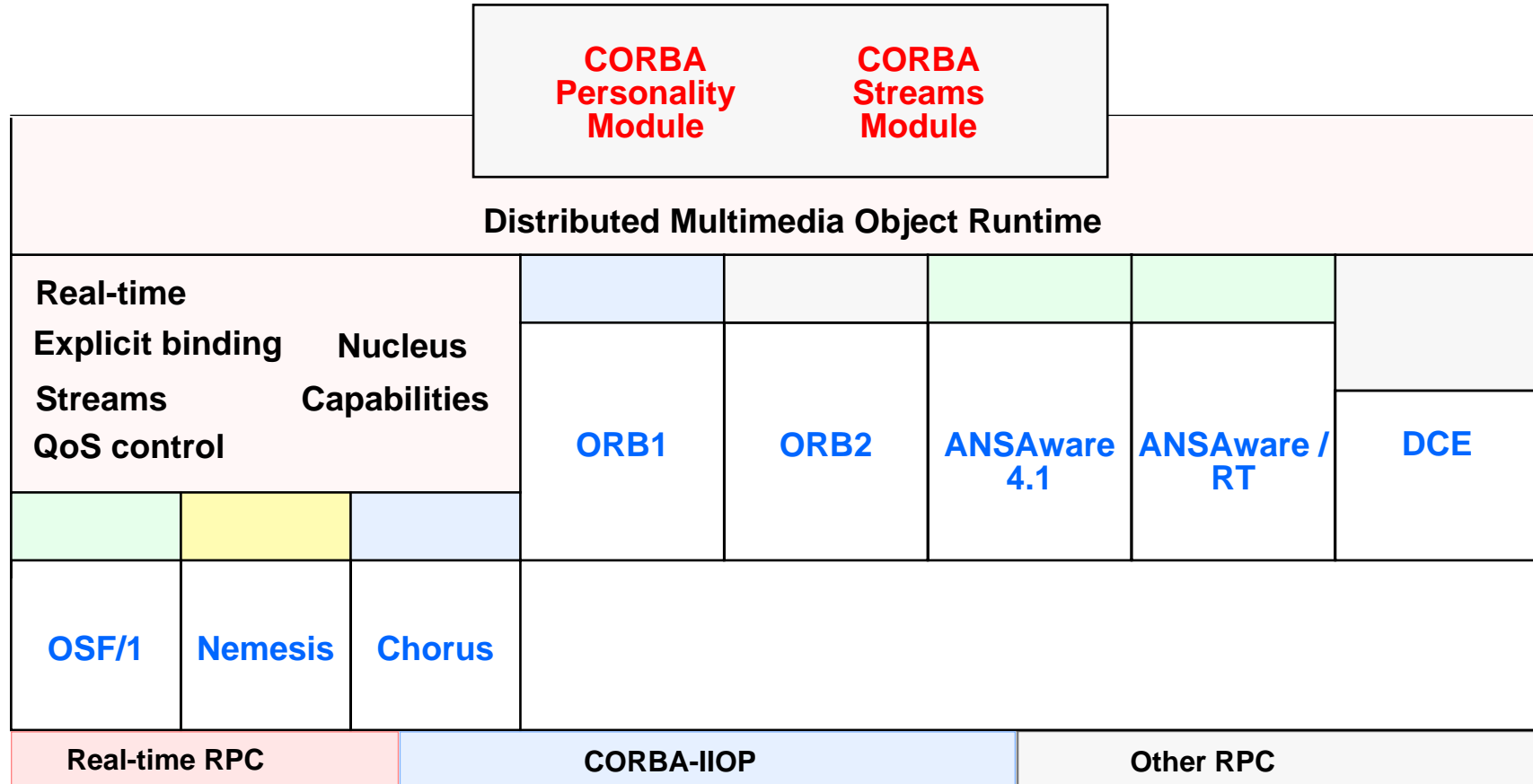
**Distribution:**

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# Distributed Multimedia Architecture



# Distributed Multimedia Architecture - the need

- **Extend CORBA to handle multimedia streams, peer-to-peer communication, and quality-of-service negotiation and control**
- **Add real-time capabilities to the ANSA/ODP architecture**
  - **without compromise to federation, diversity, and scalability**
- **Provide interoperability between real-time and non-real-time objects**
  - **predictable islands in an unpredictable sea**
- **Provide real-time guarantees in an asynchronous distributed system**
  - **for high-performance distributed systems**
  - **for predictable distributed systems**

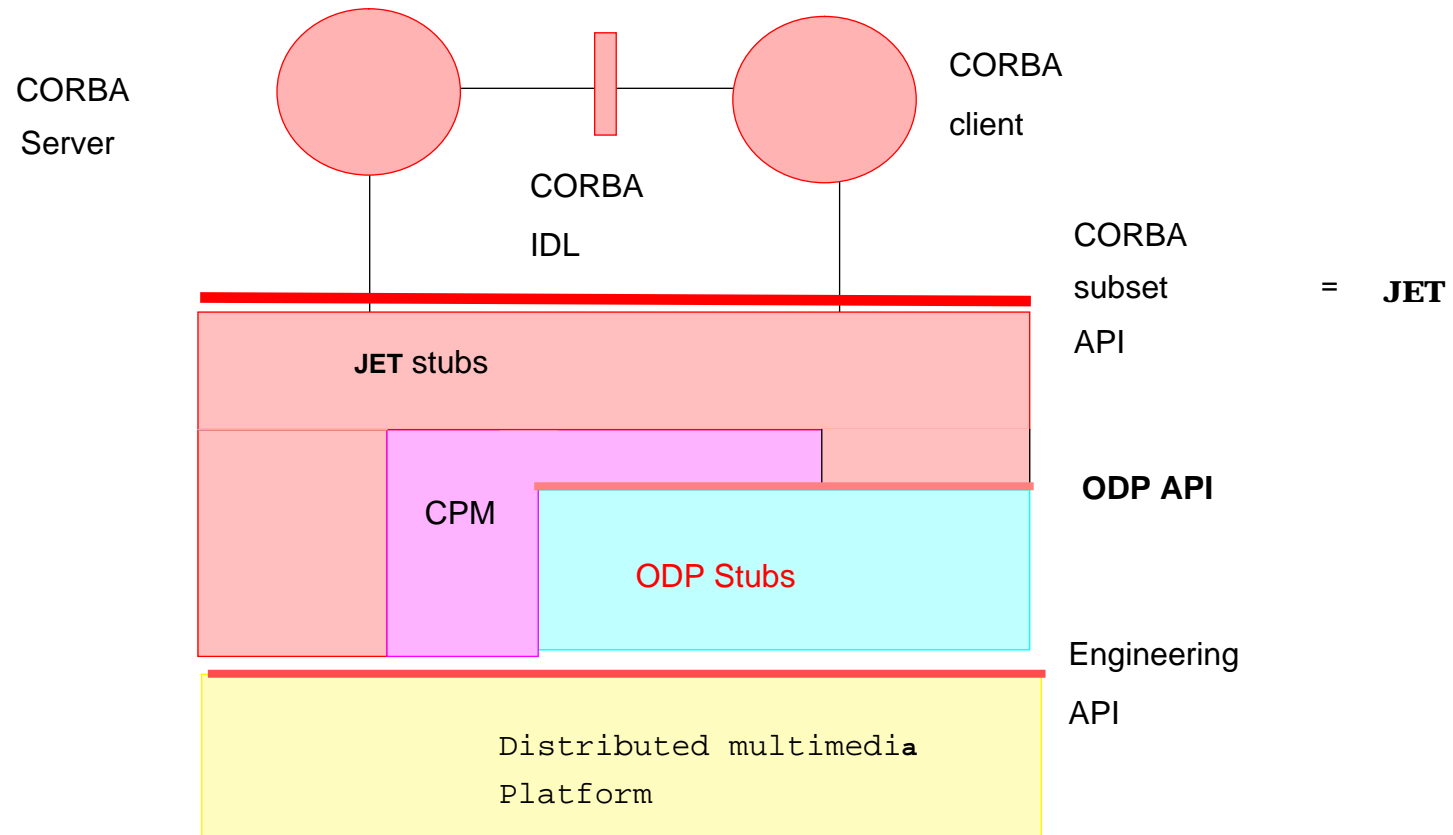


# Distributed Multimedia Architecture - the key technologies

- **ATM (Asynchronous Transfer Mode) and broadband networking**
  - for multimedia streams with quality-of-service guarantees
- **Lightweight operating systems with multithreaded real-time support**
  - for high-performance, low-cost platforms
- **Distributed Processing Environments (CORBA and others)**
  - for distributed applications



# CORBA support (JET)



# Key Features of Distributed Multimedia Architecture

- **Modular, Generic, and Layered**
  - separation of computational and engineering layers
- **High Performance**
  - exploiting real-time platform features
  - using a nucleus designed for this



# The nucleus -1

- **Generic communication framework**
- **Buffer management**
- **Interface reference management**
- **Binders**





## The nucleus - 2

- Thread management
- Memory management
- Time management
- Error handling
- Stubs



# Stub support

- Stubs are C++ code generated from IDL compiler
- Stubs are protocol-independent
  - protocols are stub-independent



# Issues for the CORBA Personality Module

- **CORBA C++ Mapping has complex rules for memory management**
  - for example, for inout parameters
- **Some CORBA features require complex infrastructure**
  - for example, type any requires the Interface Repository (for type safety)
- **We are implementing a CORBA subset**
  - no Dll, type any, Interface Repository



# Binding and CORBA Object Adapters

- **The CORBA Basic Object Adapter**
  - lacks support for flexible explicit binding
  - lacks support for streams
  - lacks support for portable implementation registration and activation
- **Instead, we provide a local binding interface which**
  - simplifies implicit binding
  - generalizes explicit binding
- **This allows control of priorities and QoS as in ANSAware/RT**



# Implementation techniques

- For each component, define an abstract API class, plus one or more derived implementations
- Exploit C++ inheritance and templates extensively
- Exploit C++ exceptions extensively
- Use type-safe local indirection (via pointers) for flexibility



# Optimizations

- **Being implemented are**
  - **local procedure call where possible**
  - **sharing interface references between interfaces**
  - **(local) garbage collection**
- **Not under current consideration are**
  - **sharing parts of stub code for identical signatures**
  - **compiler-level techniques (for example, inlining)**



# Summary

- **Implementation relies on thorough implementation of C++**
- **CORBA is a reasonable match to the underlying APIs**
- **There is further scope for optimization**
- **Ability to retarget to other operating systems draws on many years' design experience**

