Poseidon House
Castle Park
Cambridge CB3 0RD
United Kingdom

TELEPHONE: **Cambridge (01223) 515010**
INTERNATIONAL: **+44 1223 515010**
FAX: **+44 1223 359779**
E-MAIL: **apm@ansa.co.uk**

Training

ANSAwise - Introduction to CORBA and DCE

Chris Mayers

Abstract

Needing to select a environment within which to procure and build open distributed systems, organizations find it difficult to compare their features and benefits. Two important standards are CORBA and DCE.

This module of the ANSAwise training programme compares and contrasts the OMG's Common Object Request Broker Architecture (CORBA), and the OSF's Distributed Computing Environment (DCE), both in the way they are standardized, and also in the overall content and structure of their environments.

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Briefing Note

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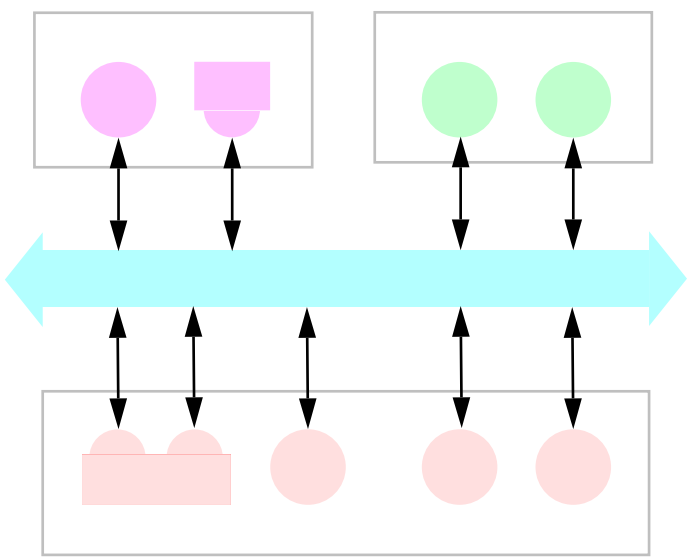
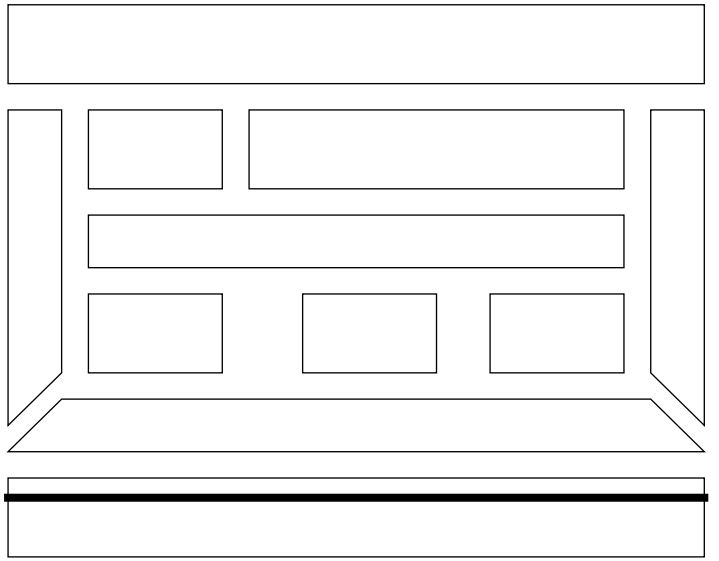
Introduction to CORBA and DCE





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In this session

- ***Describe the key features of two important open environments for distributed computing***
  - **CORBA (Common Object Request Broker Architecture)**
  - **DCE (Distributed Computing Environment)**
- ***Compare and contrast them***
- ***Indicate their place in your distributed systems strategy***

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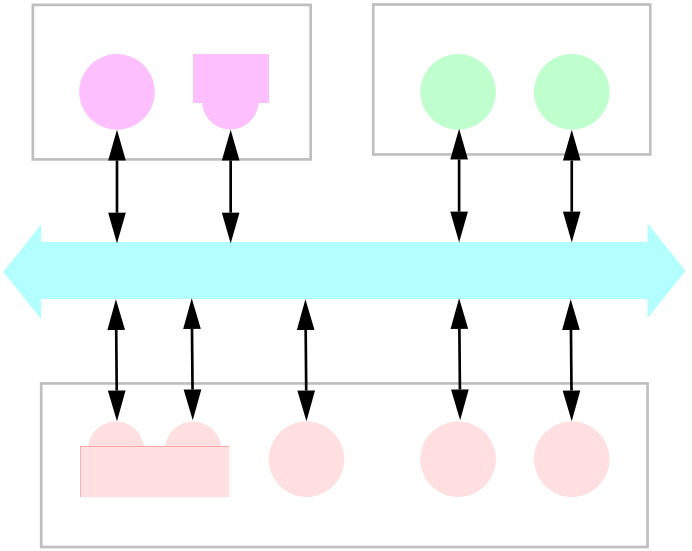
CORBA
(Common Object Request Broker Architecture)

- ***Architecture standardized by the Object Management Group (OMG)***



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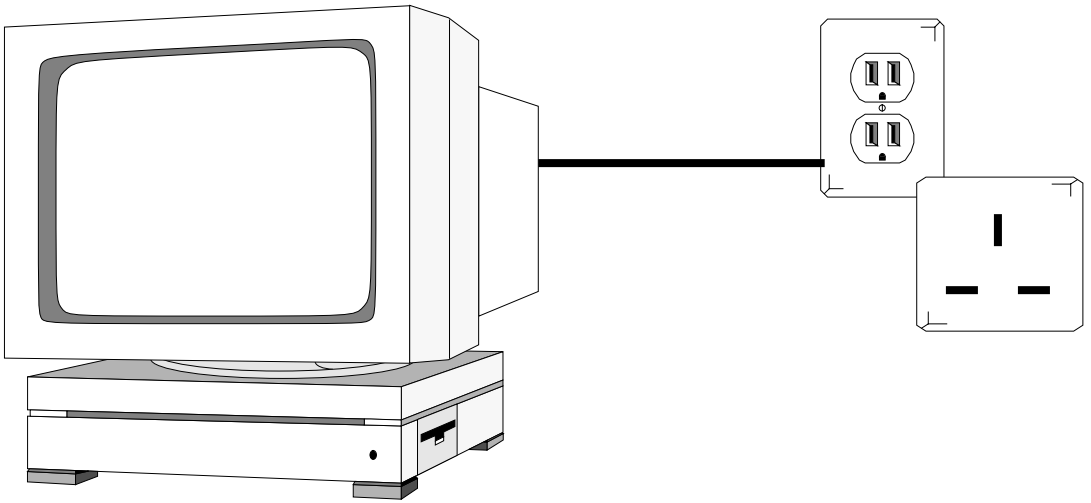
The OMG's Vision

- *The Global Information Appliance*



- *"It should be as easy to plug a computer into a world of computing services as it is to plug a computer into the world power grid"*

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The OMG's Focus

- ***Application integration***
  - **the same thing as distributed processing**
- ***Constructing information-sharing distributed systems from diverse sources***
  - **heterogeneous**
  - **networked**
  - **physically disparate**
  - **multi-vendor**

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The OMG's view of existing approaches

- *They are too low-level*
  - excellent building blocks, but not at the level the application developer is interested in
- *There is no standardized integrating framework for applications*

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The OMG's Approach

- ***Create consensus based on commercially-available software...***
  - **proposals for standards must describe technology that is *imminently available***
  - **paper-only standards are inadequate**
- ***... Create a marketplace for off-the-shelf standards-compliant software***

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The OMG's Method of Operation

- *Not-for-profit company*
- *Small staff; no internal development*
- *Object World subsidiary spreads the word through shows, conferences, market studies, seminars,...*
- *Now has more than 400 members*

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How CORBA Standards are Made

- *OMG selects interfaces*
  - through competitive selection from industrial proposals
- *OMG publishes interfaces*
  - the specifications are freely available to anyone who wants them
- *OMG controls interfaces*
  - they belong to OMG, not the submitter; OMG controls their evolution
- *OMG liaises with standards bodies*
  - so that specifications become standards

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OMG is Neutral

- ***OMG does not deal with implementations***
  - **it does not create, sell, or resell implementations**
- ***OMG does not test implementations***
  - **this is done by X/Open, who have a strong reputation in conformance testing**

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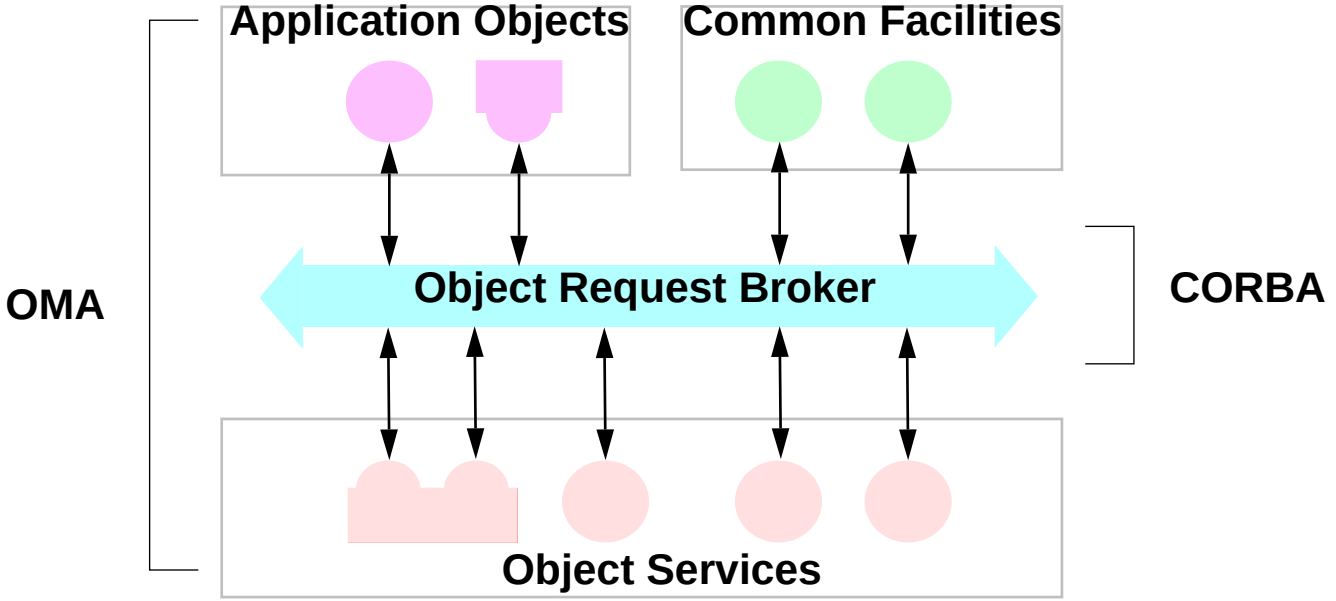
The Object Management Architecture



- *Consists of the Object Request Broker (ORB), plus objects*
  - Objects are Object Services, Common Facilities, or Application Objects

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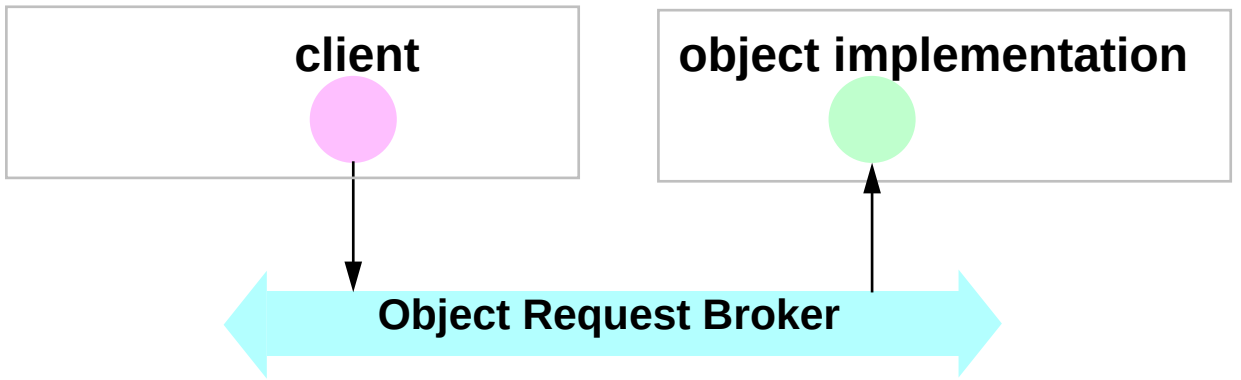
The Object Request Broker (ORB)

- *Objects request the services of other objects via the ORB*
  - the ORB is responsible for locating the object implementation, and all the communications mechanisms that support the request
  - client and object implementation can be written in different languages, and run on different types of machines



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Object Services (CORBAservices)

- *(Common) Object Services are basic 'system-level' services*
  - but they are themselves *objects*
  - they have interface specifications, just like all objects...
  - so alternative implementations are possible, with different quality-of-service, say
- *Example Object Services*
  - Transactions
  - Security
  - Events

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Common Facilities (CORBAfacilities)

- *Common Facilities are application-level objects that can be shared between applications*
- *Horizontal-market, for example:*
  - e-mail
  - printing
  - compound documents
- *Vertical-market, for example:*
  - geo-spatial data processing
  - system management
- *Common Facilities support interoperation of third-party products*
  - they may be highly specialist

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Application Objects

- ***Application Objects are application-specific***
  - **provided by third-party ISV (Independent Software Vendor)**
  - **provided by end-user**

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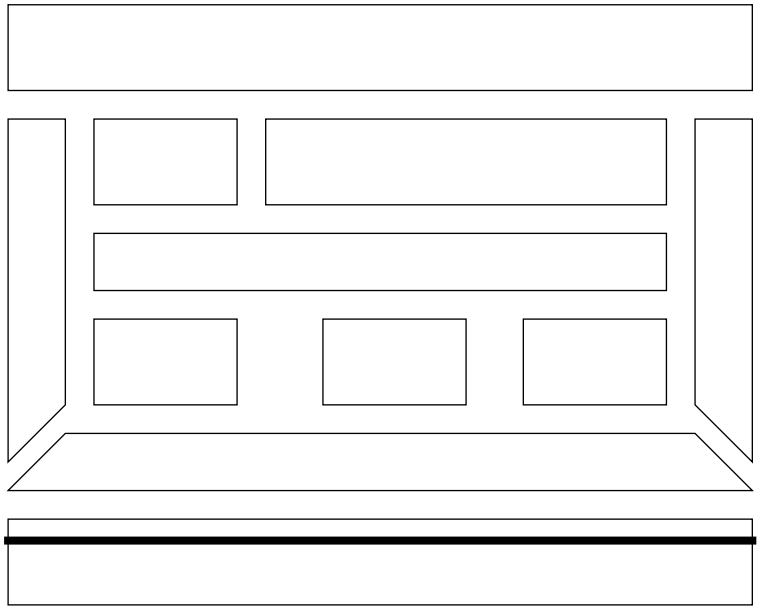
DCE (Distributed Computing Environment)

- ***Architecture produced by the Open Software Foundation (OSF)***



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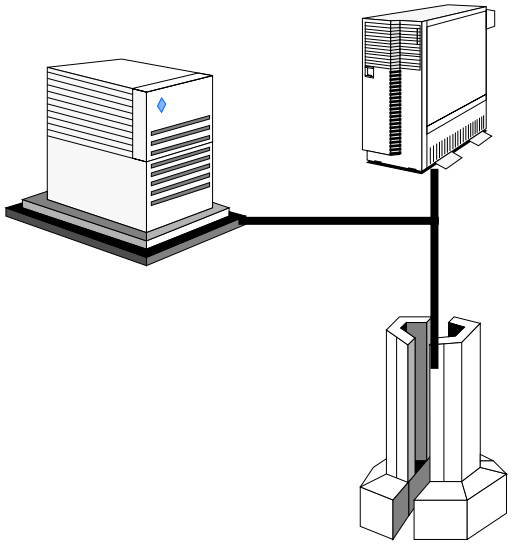
The OSF's Focus

- ***Interoperability***



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The OSF's Method of Work

- *Obtain technology by soliciting offerings*
- *Integrate it*
- *License it to vendors*

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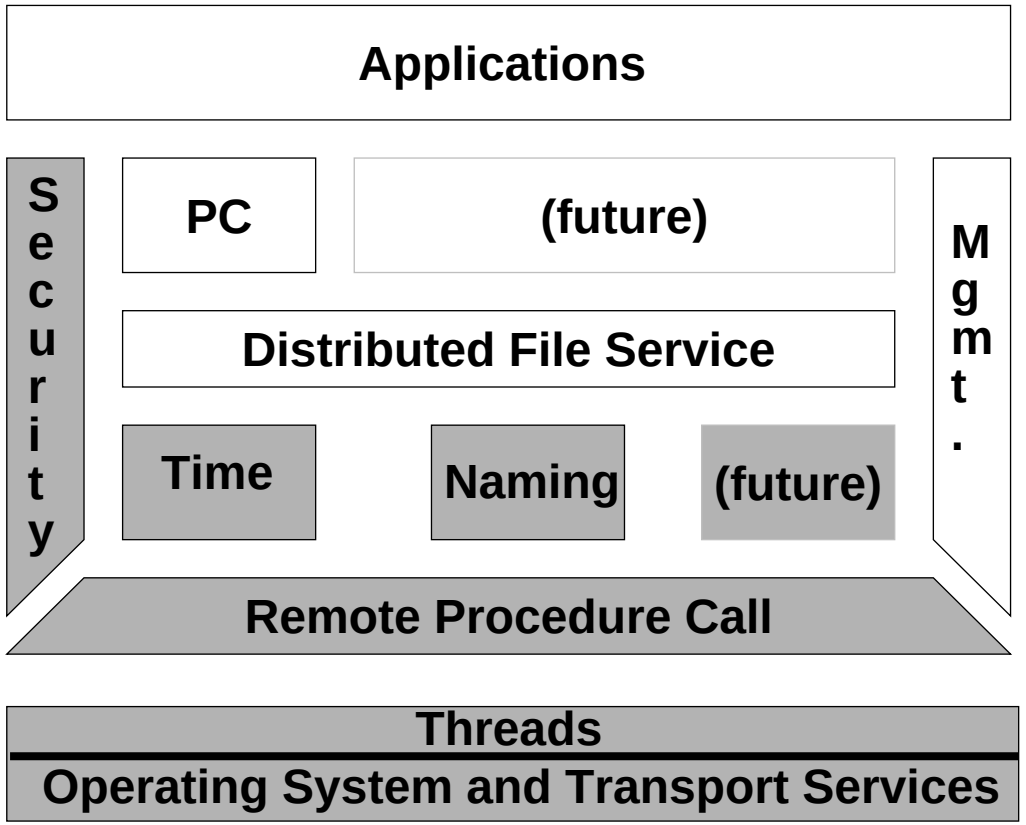
The DCE Component Architecture



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DCE Services

- *Uses a layered model*
- *Fundamental Services are explicitly used by applications*
  - for example, Distributed Time Services
- *Data-sharing services are integrated into the operating system*
  - for example, PC file and printer service
- *The 'secure core' services are required components*

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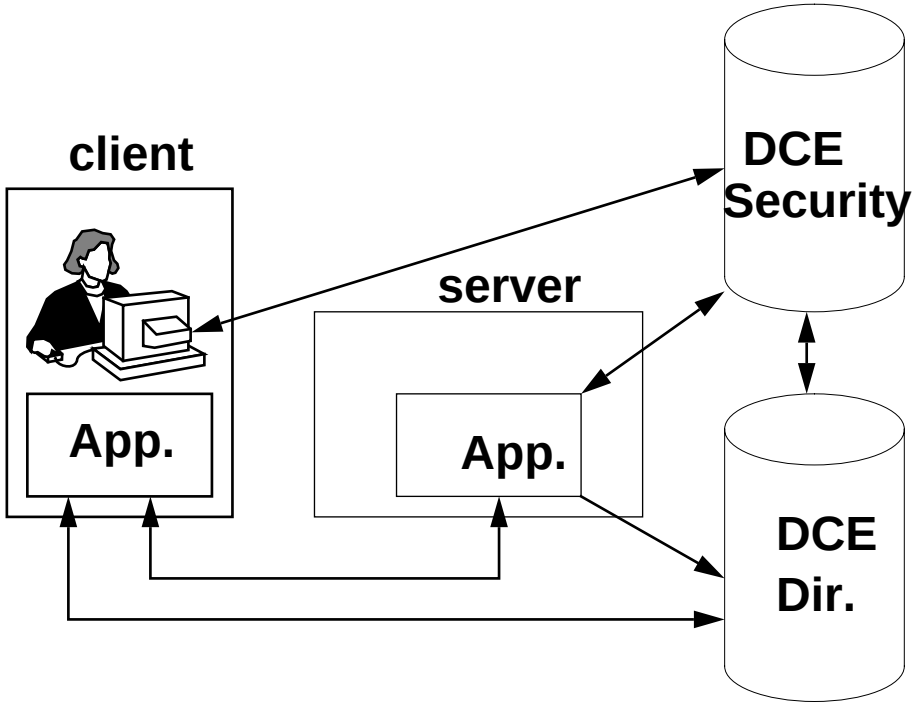
The DCE Environment

- *Clients and servers interact with the 'core services'*



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Portability in DCE and CORBA - Platforms

- *Both DCE and CORBA are portable*
  - implementations now exist for most platforms and operating systems...
  - ...mainframe, minicomputers, micros,...
- *For practical portability, you must take into account*
  - operating system version
  - compiler version and vendor
  - processor type

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Portability in DCE and CORBA - Programming Languages

- ***Both CORBA and DCE can be used with a range of programming languages***
  - **for both CORBA and DCE, and for each programming language, a mapping must be standardized**
- ***Currently these are standardized***
  - **DCE: C (C++ to follow)**
  - **CORBA: C, C++, Smalltalk, Ada (COBOL and others to follow)**

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CORBA and DCE - Programming Interfaces

- ***CORBA is object-oriented; DCE is mainly procedural***
  - **CORBA requires a commitment to object-oriented principles**
  - **DCE is cumbersome to use from an object-oriented language**
  - **DCE requires code 'scaffolding'**

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Portability, Diversity, and Interoperability

- ***Remember that you are not constrained to use the same platform and programming language everywhere***
  - **a client application can be written in Smalltalk on a PC...**
  - **... the server can be written in COBOL on a mainframe**
- ***You can change platform and programming language later***
- ***This relies on interoperability between distributed systems implementations from different vendors***
  - **both DCE and CORBA offer interoperability**

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Interoperability in DCE and CORBA - a key issue

- *How can distributed systems interoperate? Two approaches*
  - a common protocol
  - protocol gateways

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Interoperability in DCE

- *OSF selected a common protocol (the DCE RPC)*
  - This has now been made freely available to anyone, royalty-free
- *Microsoft have also selected the DCE RPC for use in Distributed OLE*

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Interoperability in CORBA

- *OMG also regarded interoperability as essential*
  - but this was not handled in CORBA 1.x
- *In CORBA 2.0, OMG did not select a common protocol because*
  - no single protocol could give optimal performance in all situations
  - there were existing implementations to consider

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Interoperability in CORBA 2.0

- *CORBA 2.0 interoperability comprises*
  - an overall architecture for CORBA-CORBA communications
  - an API for building bridges
  - a general multi-transport message format (GIOP: General Inter-ORB Protocol)
  - an API for gateways using other message formats (ESIOP: Environment-Specific Inter-ORB Protocols)

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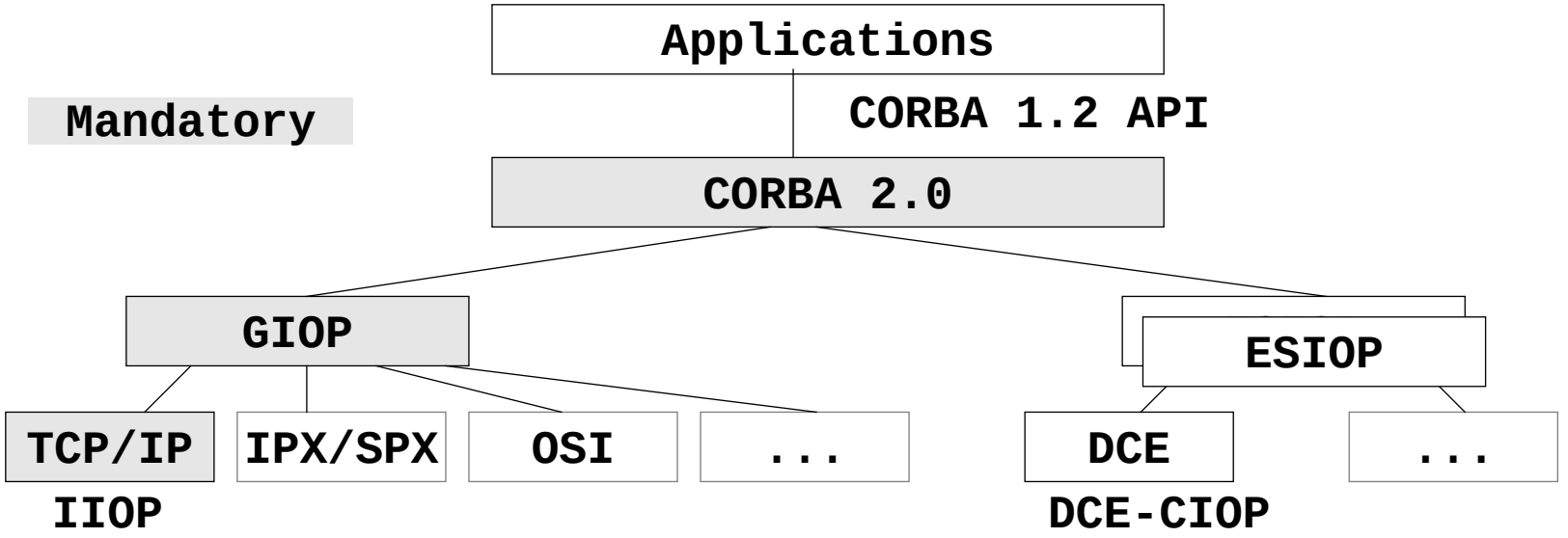
CORBA Interoperability Architecture



- *The IIOP (Internet Inter-ORB Protocol) is mandatory*
  - guarantees interoperability between any ORBs
- *The DCE-CIOP (Common Inter-ORB Protocol) is optional*
  - if provided, guarantees interoperability with likewise ORBs

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Interoperability between DCE and CORBA?

- ***The CORBA DCE-CIOP does* not *give service interoperability between DCE and CORBA***
  - **it only gives protocol interoperability for requests and responses**
- ***Service interoperability could in principle also be achieved....***
  - **... like all high-level gateway solutions, transparency is difficult**
  - **... the two architectures are different**

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CORBA and DCE - Usability

- *DCE provides services that the CORBA OMA does not yet provide*
  - **But the OMG are filling in the gaps fast**
- *DCE programs are large and tend to be slow*

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CORBA and DCE - Markets

- *DCE implementations are mainly from large vendors*
- *Some large vertical markets have settled on DCE*
- *CORBA implementations include smaller vendors*

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Summary

- ***CORBA and DCE are two of the open environments for distributed computing***
  - **take care to assess your needs, and compare like with like**
- ***Both CORBA and DCE acknowledge the influence of ANSA***
- ***For more on this topic***
  - **on CORBA, see *Object Management Architecture Guide* (Object Management Group Inc.)...**
  - **... see also *First Class* magazine, published by OMG**
  - **on DCE, see *Introduction to DCE* (Prentice-Hall)**

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