Session VII_a: **Service Platforms**

Chair: Gerd Schuermann, *GMD Fokus*

Design and Implementation of the MESH Services Platform

Harold Batteram
John-Luc Bakker
Jack Verhoosel
Nikolay Diakov

Outline

- Introduction.
- MESH platform overview.
- Distributed Software Component Framework.
- Lessons learned.
- Future work.

MESH objectives

- To accelerate the introduction of advanced telematics services for the ESH.
- To study and explore new telematics services possibilities.
- To design, implement and validate a service platform for the ESH.

MESH partners

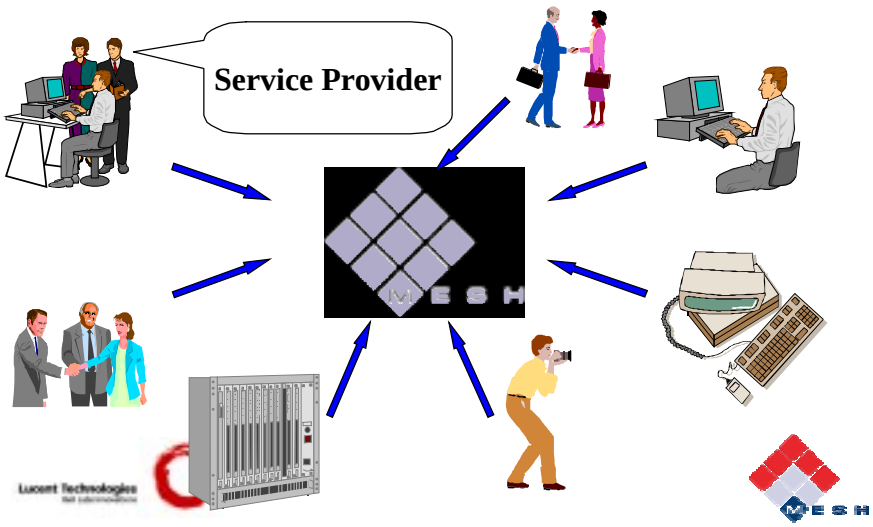
- Lucent Technologies
- SURFnet
- KPN Research
- Telematics Institute
- Centre for Telematics and Information Technology (CTIT)

(http://www.mesh.nl/extern/english.htm)

MESH users

- Academic Hospital University Amsterdam.
- Roessingh Research and Development.
- Delft University of Technology.
- University of Twente.

MESH business model



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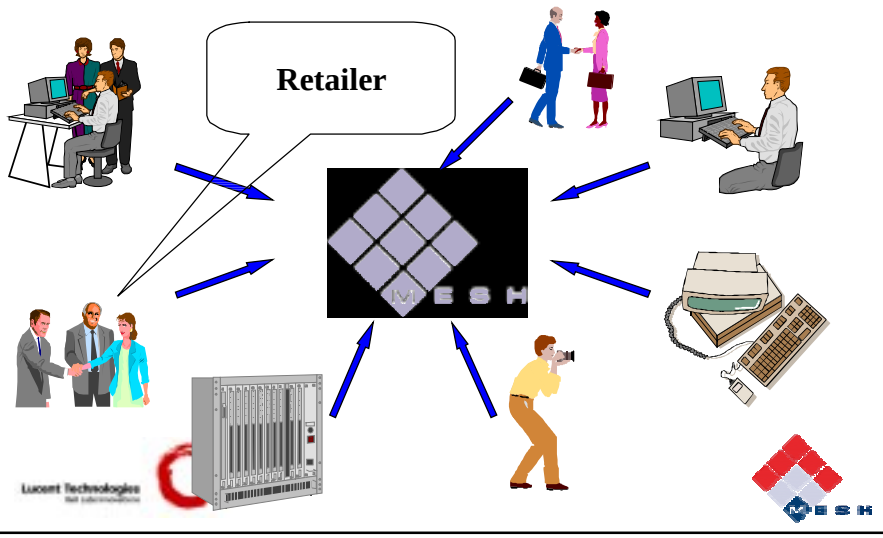

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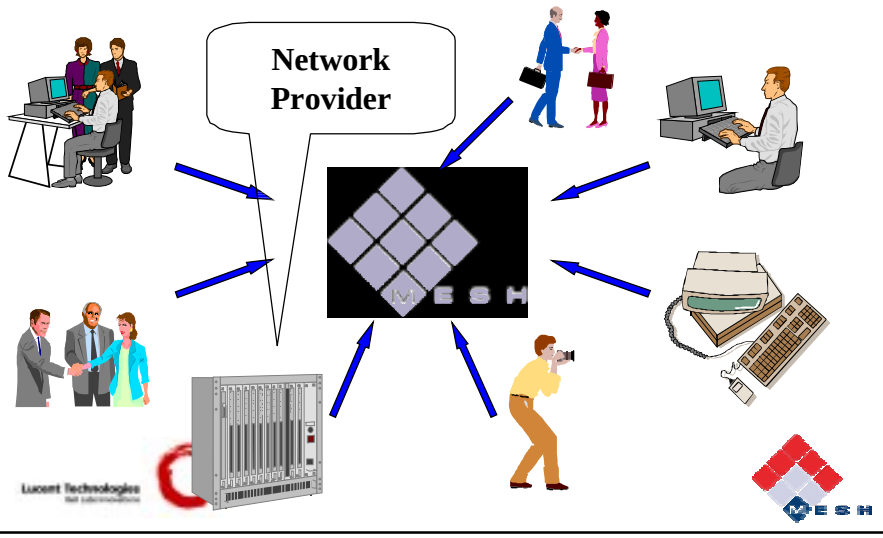

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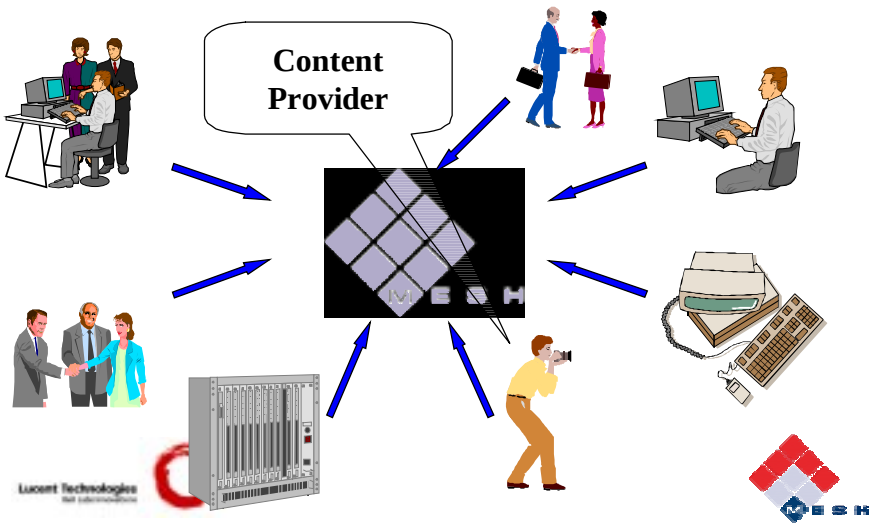

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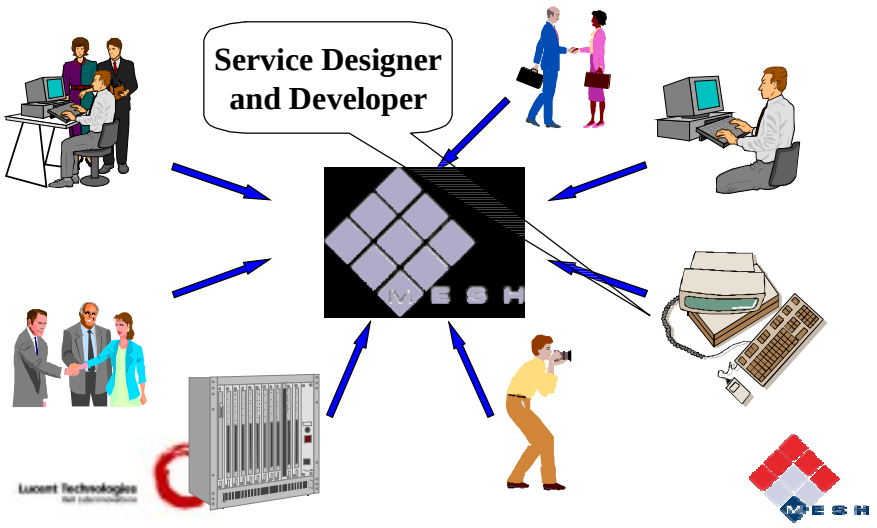

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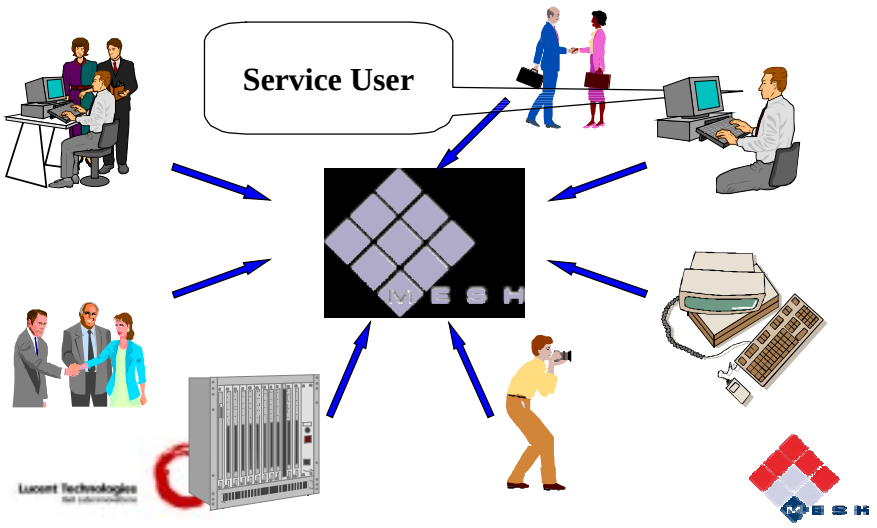
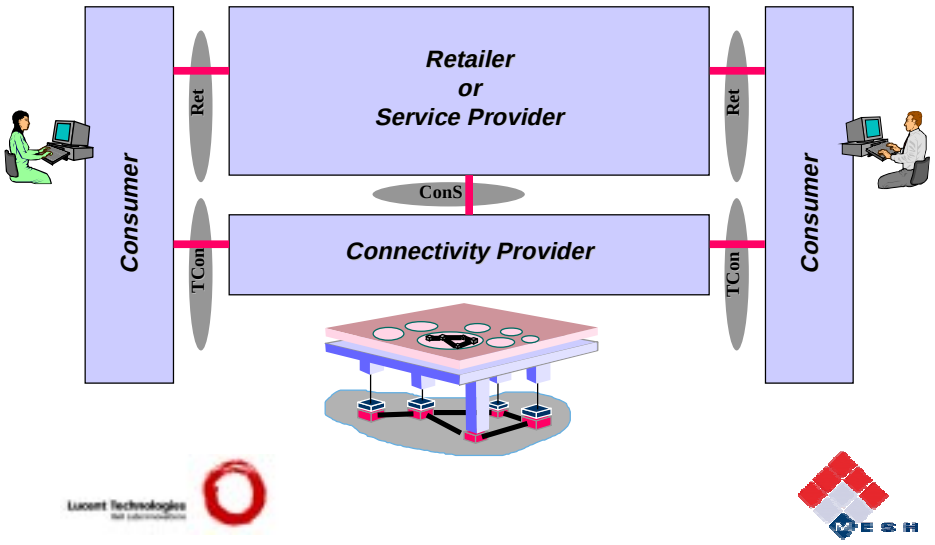
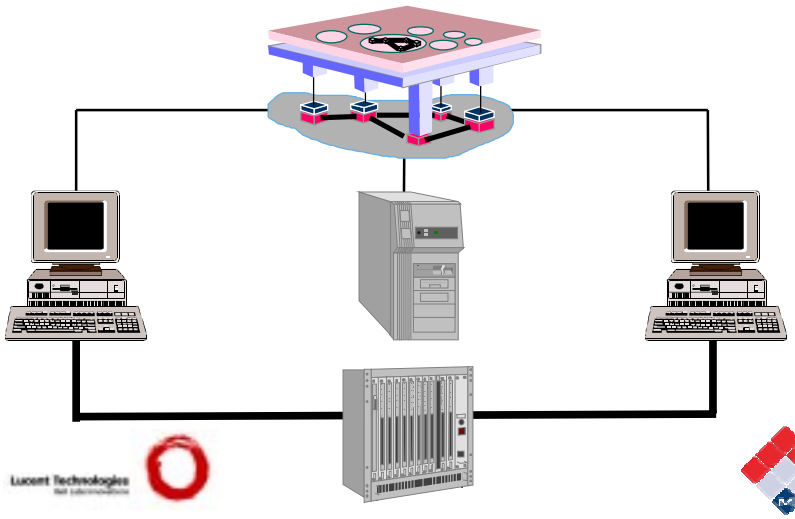


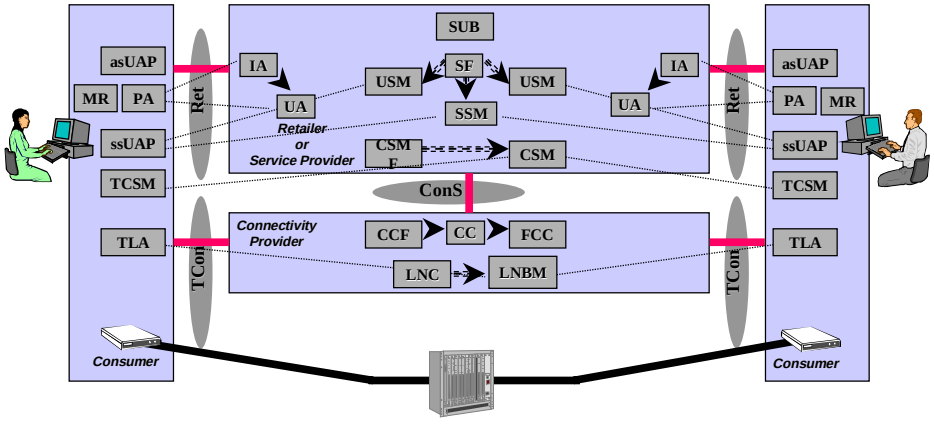
TINA Reference points



MESH infrastructure



TINA Service components



Problem description

- How to realize a working system based on the TINA specifications in a short time!

Approach

- Create a Distributed Software Component Framework
  - *To accelerate the design, implementation and testing of the MESH platform.*
  - *To shield developers from system level concerns.*
  - *To create a highly modular system.*

What is a component?

From Szyperski: *Component Software, beyond object oriented programming*

A software component is a unit of composition with contractually specified interfaces and explicit context dependencies only.

A software component can be deployed independently and is subject to composition by third parties.

Why components?

All other engineering discipline introduced components as they became mature - and still use them!

Software engineering is becoming mature

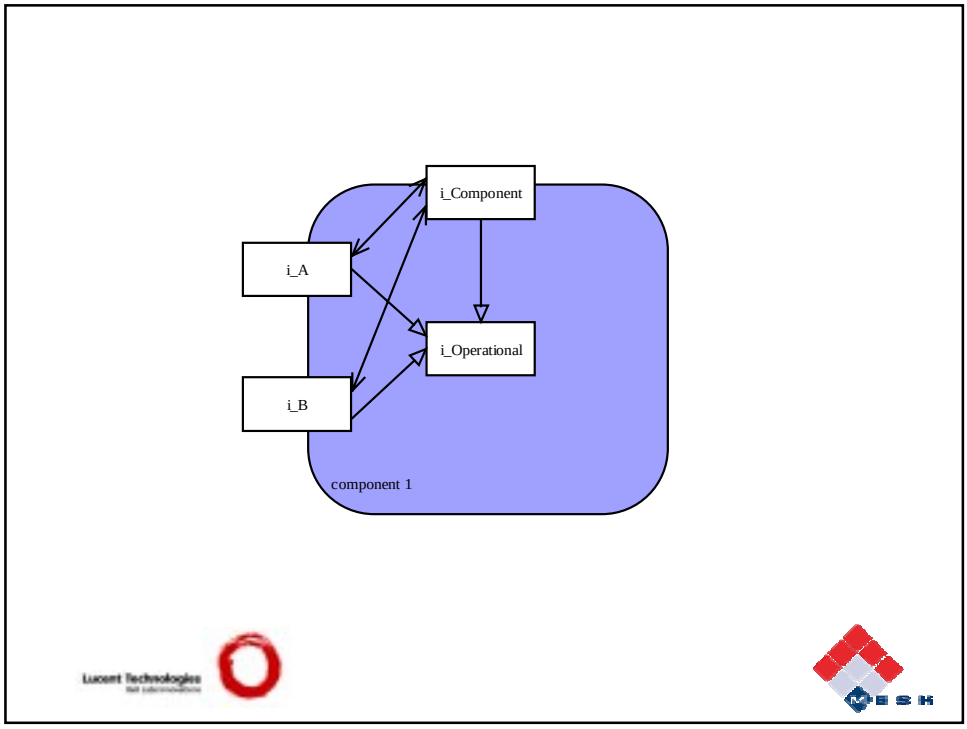
Component standards and markets are starting to emerge.

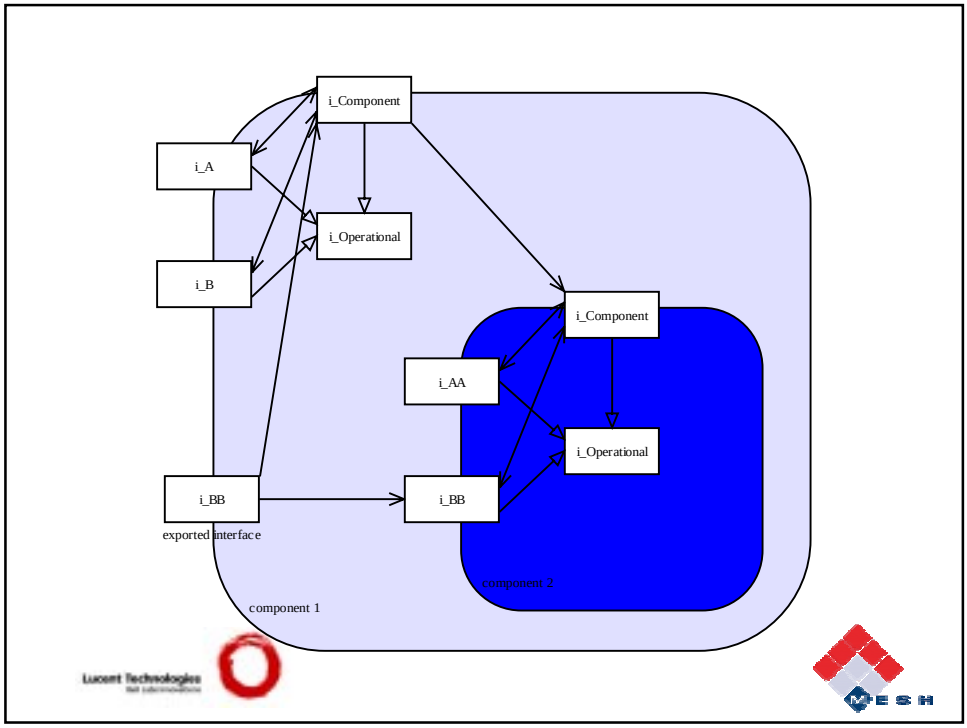
DSC features (1)

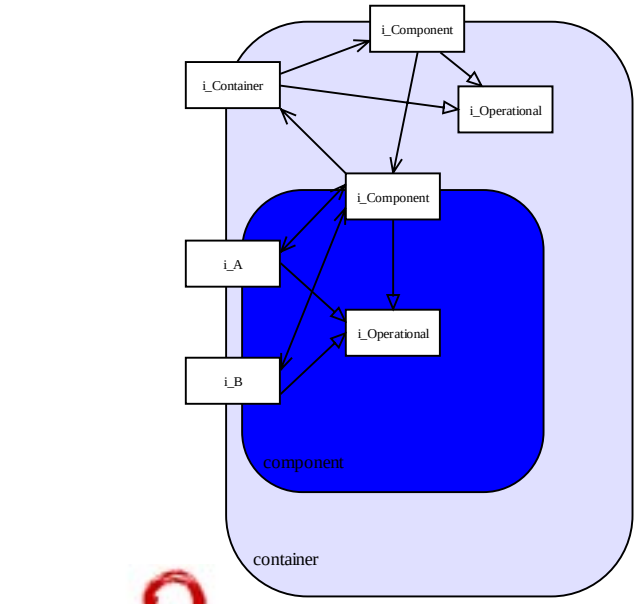
- Computational viewpoint framework
  - encapsulation of data and behavior
  - supports IDL interfaces for interaction
  - support for multiple interfaces
- Engineering viewpoint implementation
  - location transparency
  - concurrency transparency
  - runtime environment
  - ORB

DSC features (2)

- Component interface
  - specialization through aggregation
  - dynamic composition
  - lifecycle services
  - configuration
- Dynamic and static interfaces
- Event services
- Dynamic downloading
- Test & debug support
- DSC development tools

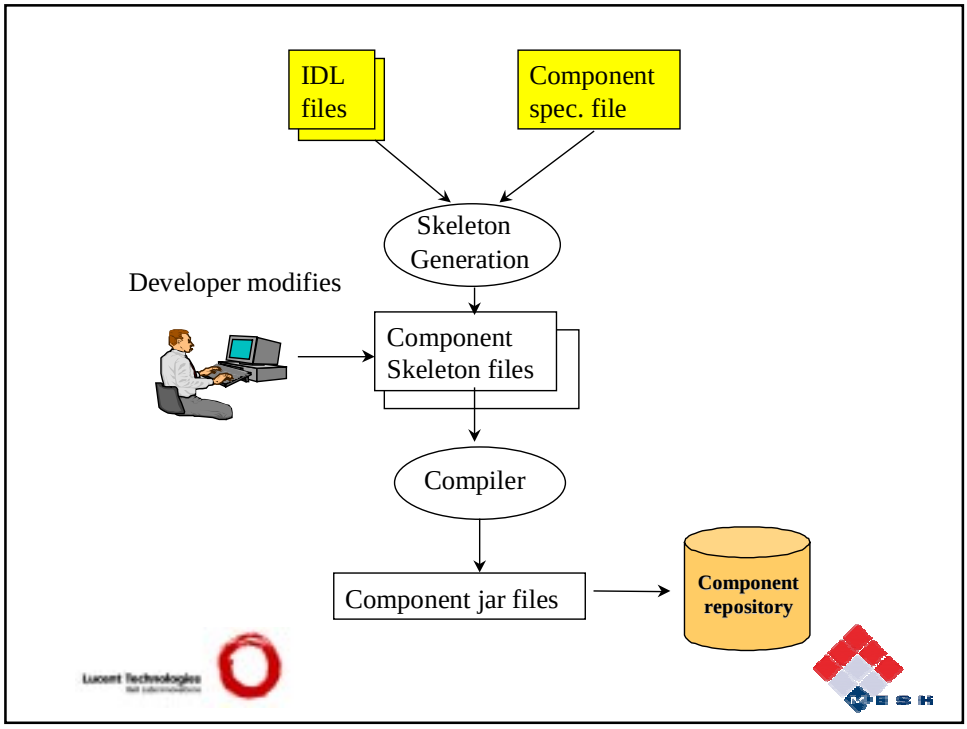

i_Component
i_A
i_Operational
i_B
component 1

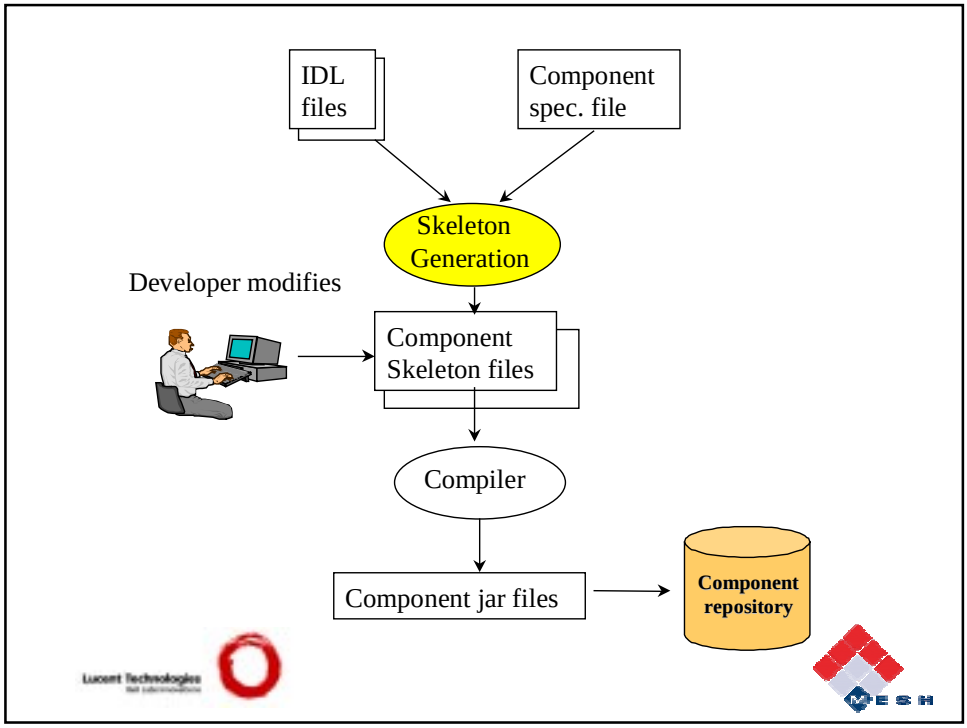

i_Component
i_A
i_Operational
i_B
i_Component
i_AA
i_Operational
i_BB
i_BB
exported interface
component 2
component 1



Component specification

```
component myComponent {
  interface i_Interface {
    fires interfaceEvent as octet
    accepts acceptedEvent as string
  }
  contains mySubComp { i_Exported }
  contains anotherComp { i_A, I_B }
}
```


IDL files
Component spec. file
Skeleton Generation
Developer modifies
Component Skeleton files
Compiler
Component jar files
Component repository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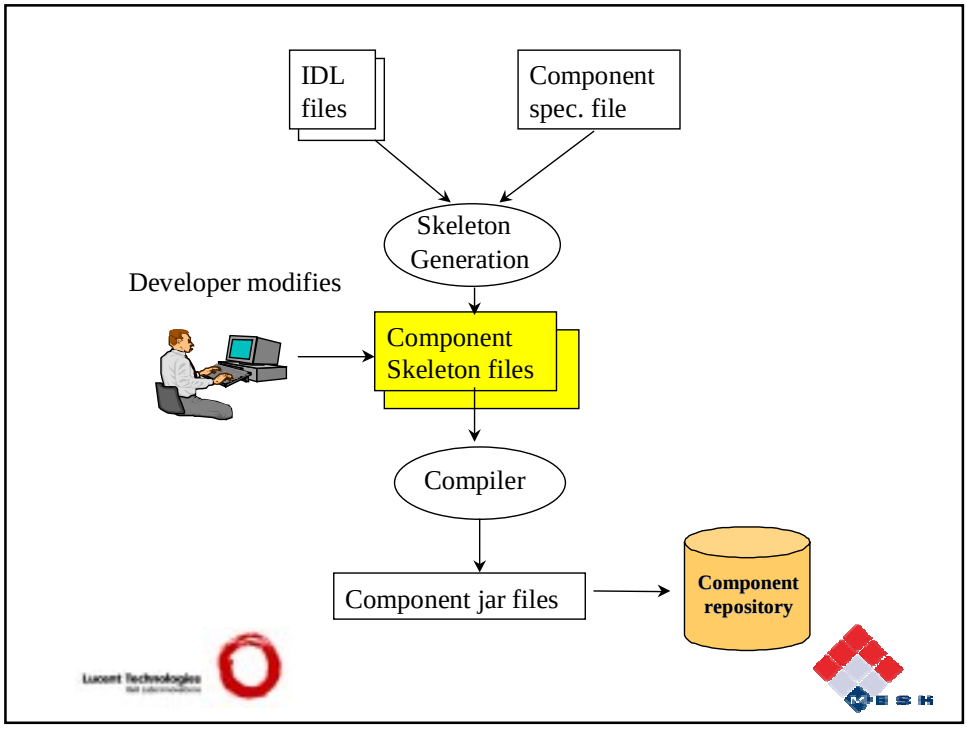
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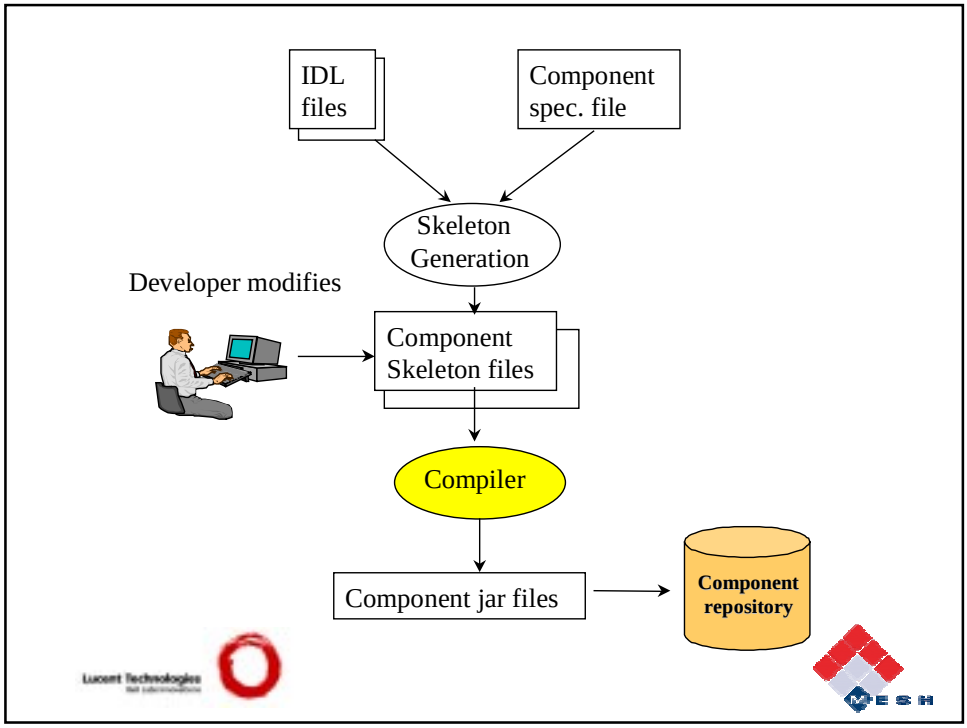
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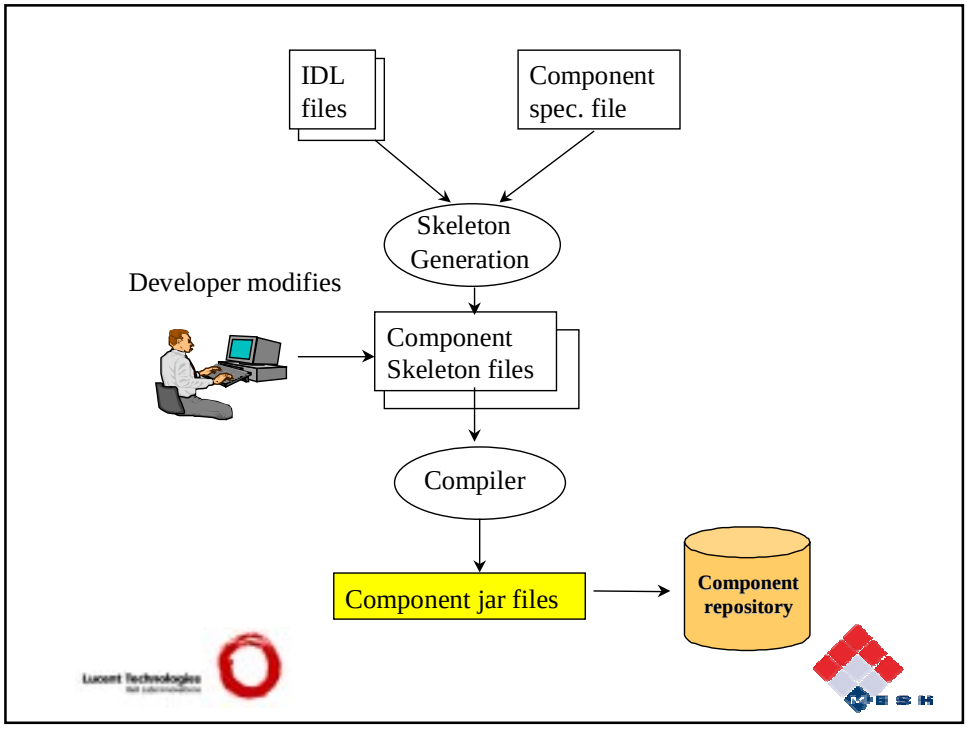
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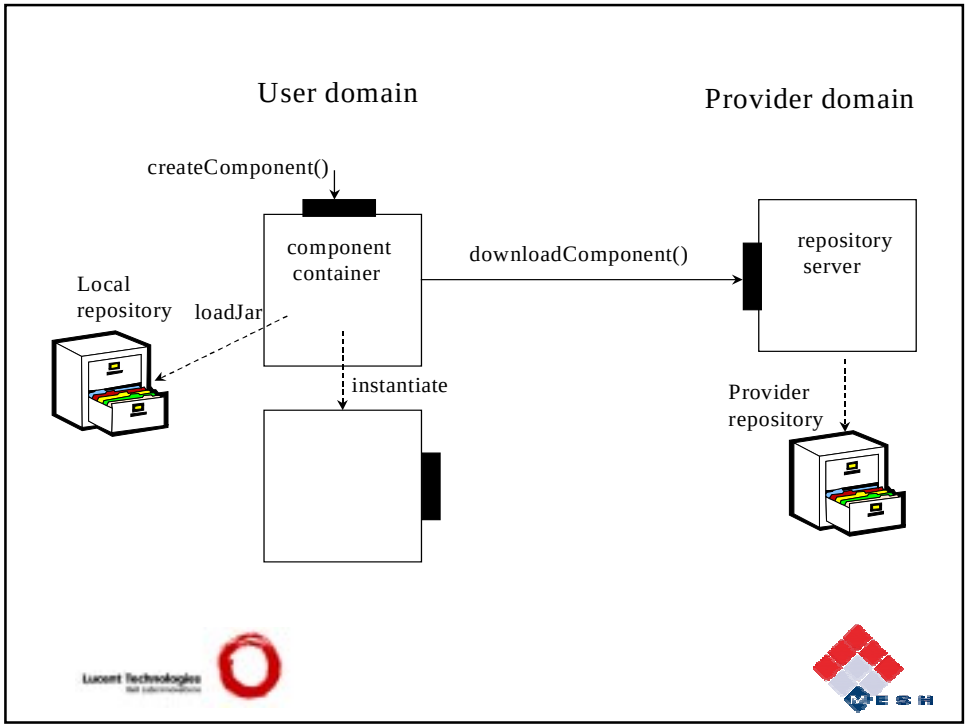
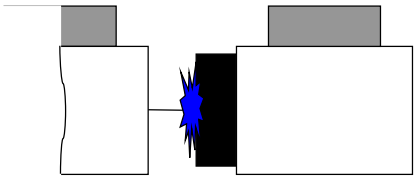

User domain
Provider domain
createComponent()
component container
downloadComponent()
repository server
Local repository
loadJar
instantiate
Provider repository

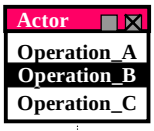
Component level diagnostics

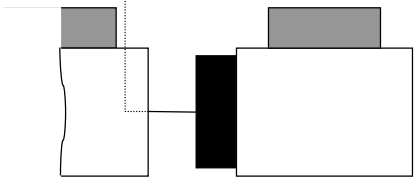
- Interception per interface.
- Shows IDL method call and parameter values.
- Allows method call trace through the system.



Interface tester

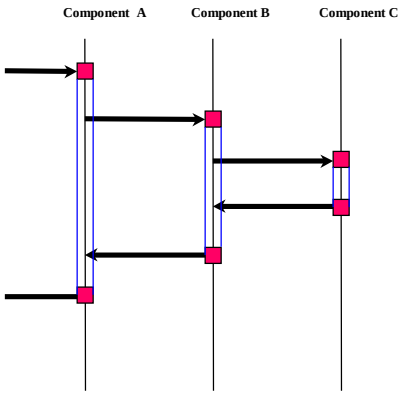
- One generated actor component per interface
- Useful for behavior and regression testing

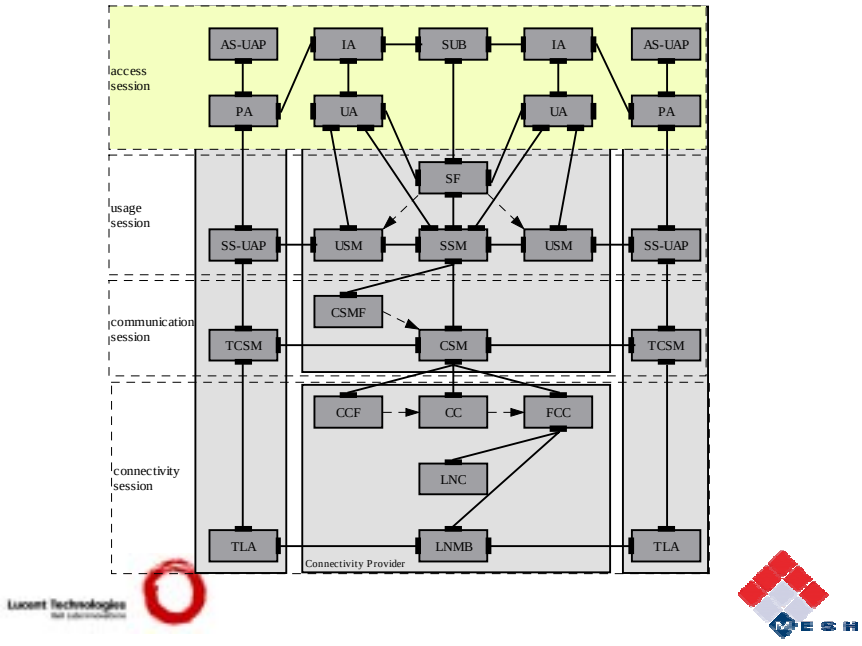


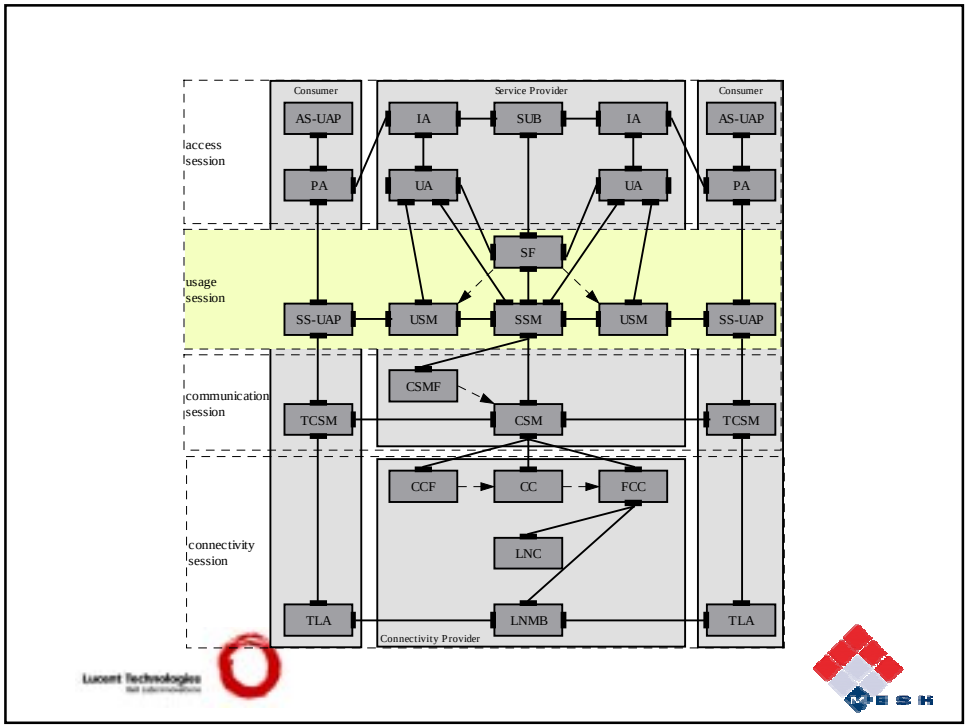


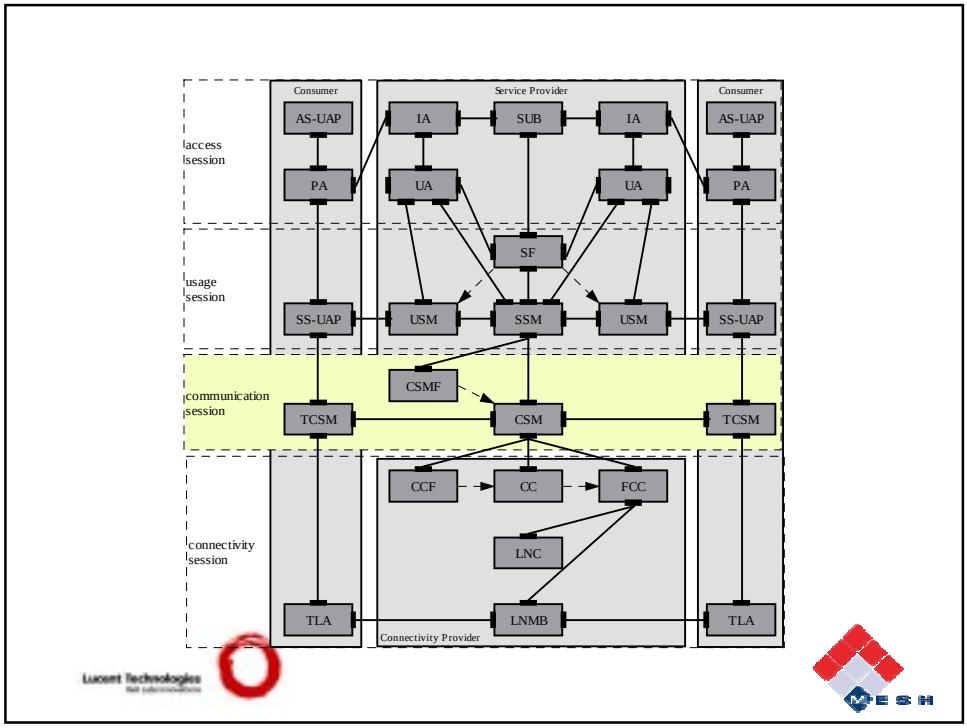
Call flow diagram

- Dynamic generation of call flow diagrams
- Verification of actual behavior with message sequence diagrams






Consumer
Service Provider
Consumer
AS-UAP
IA
SUB
IA
AS-UAP
access session
PA
UA
UA
PA
SF
usage session
SS-UAP
USM
SSM
USM
SS-UAP
CSMF
communication session
TCSM
CSM
TCSM
CCF
CC
FCC
connectivity session
LNC
TLA
LNMB
TLA
Connectivity Provider
Lucent Technologies
MESH


Consumer
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Consumer
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access session
PA
UA
UA
PA
SF
usage session
SS-UAP
USM
SSM
USM
SS-UAP
CSMF
communication session
TCSM
CSM
TCSM
CCF
CC
FCC
connectivity session
LNC
TLA
LNMB
TLA
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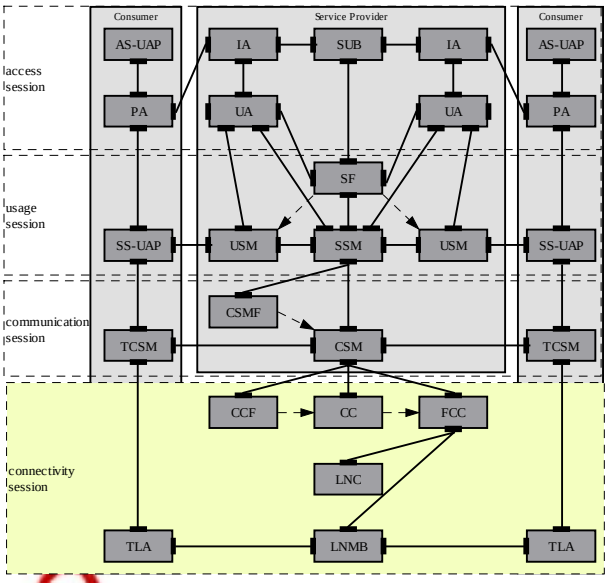
Lucent Technologies
MESH



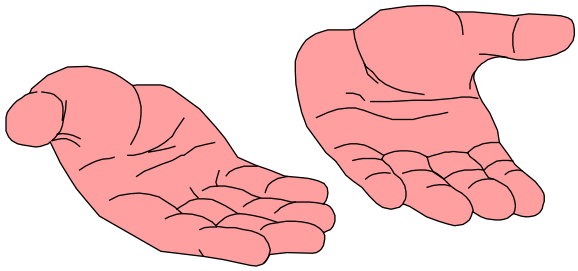
Conclusion

- TINA is complex but conceptually sound and useful to us.
- IDL specifications must be improved.
- The DSC framework enabled us to create a working system based on the TINA specifications.

Future work

- New project FRIENDS.
- Focus on service creation and deployment at a larger scale.
- Based on the TINA and MESH experiences.

Questions?



EURESCOM Services Platform

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Aart van Halteren, 15 April 1999

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Pan European Infrastructure for Service Experiments

- EURESCOM: European Institute For Research and Strategic Studies in Telecommunications
- EURESCOM Services Platform: P715
- Research topics
  - Platform Building
  - Service Management
  - Stream Management
  - End-User Services

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European Institute for Research and Strategic Studies on Telecommunications

- P+T Iceland
- Telenor AS
- Tele Danmark A/S
- Telia AB, Sweden
- Telecom Finland Ltd.
- ATC Finland
- Telecom Eireann
- BT
- BELGACOM
- PTT Nederland
- P+T Luxembourg
- Deutsche Telekom AG
- Czech Telecom
- Slovak Telecom
- France Telecom
- Swiss Telecom PTT
- PTT Austria
- Hungarian Telecom.
- Portugal Telecom S.A.
- Telefonica de Espana
- STET, Itlay
- CPRM Portugal
- OTE Greece

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EURESCOM Project 715

- European co-operation of six Public Network Operators:

BT

Deutsche Telekom

France Telecom

BROADCOM

FINNET

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EURESCOM Project 715

- Focus on Information and Communication Technology (ICT)
  - Middleware
- Key Questions:
  - Where are the opportunities for Public Network Operators in the open services market?
  - Can we apply available TINA service provisioning concepts using today's products and technologies?

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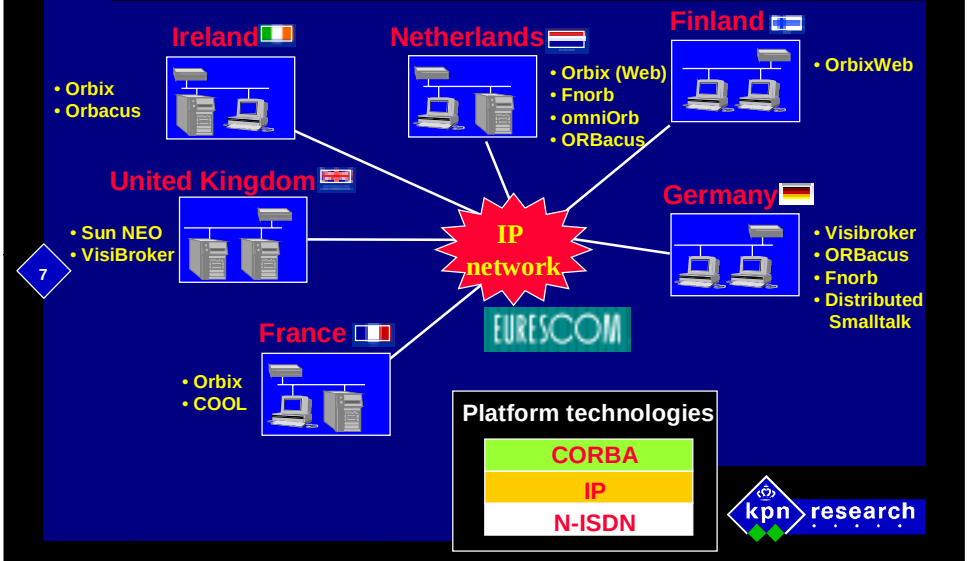
Heterogeneous ORB infrastructure



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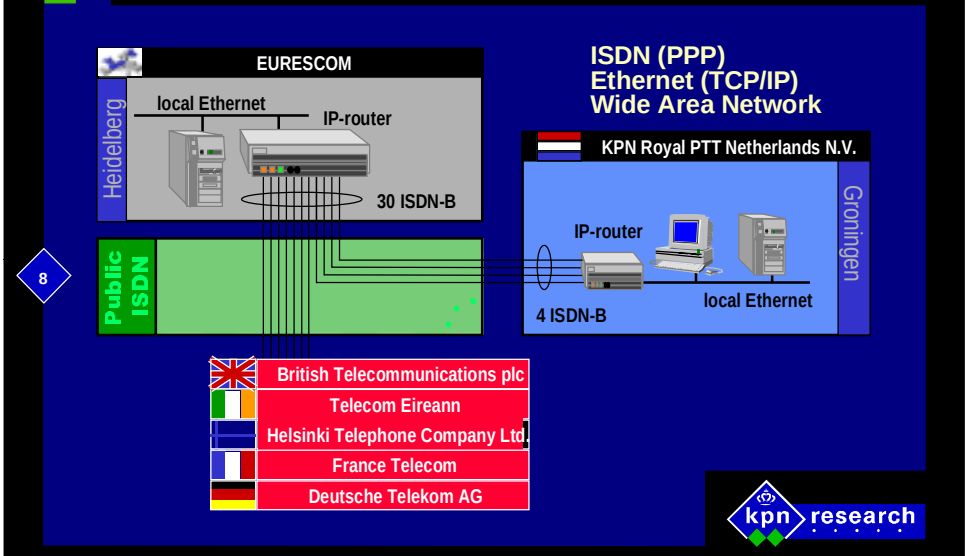
...TCP/IP on top of ISDN...



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Interoperability of CORBA Services on the ESP

- Naming: OK (used in platform)
- Trader: mostly OK
- Security: OK but limited (SSL)
- Transaction: not yet!

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Federated Naming

- Naming service at each site
- Global root at Heidelberg
- Hierarchical namespace
- Wrapper at each site to resolve local/remote

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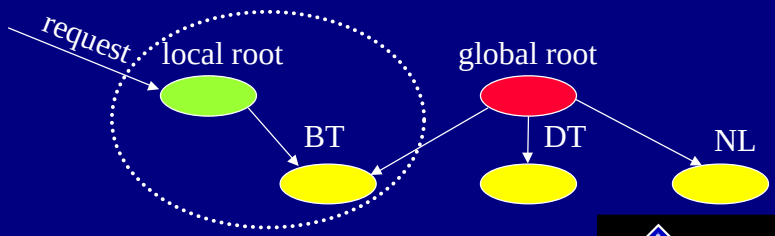

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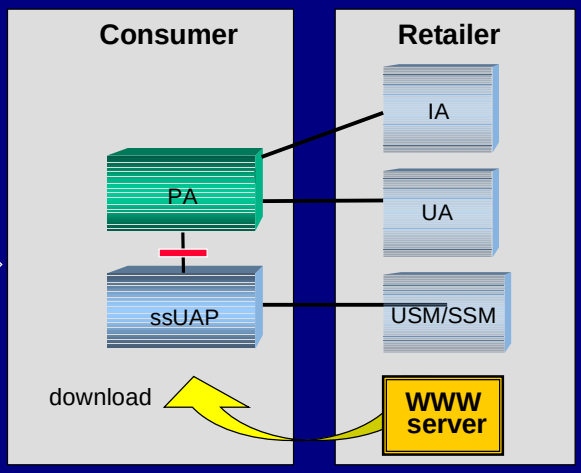
EURESCOM P715: Service Management platform



IA = Initial Agent
PA = Provider Agent
UA = User Agent
ssUAP = User Application
USM = User Session Mgr
SSM = Serv. Session Mgr

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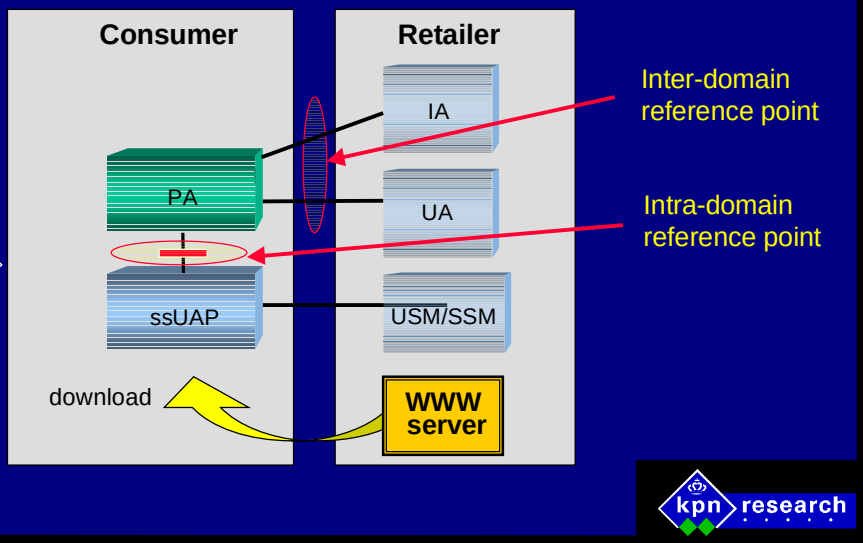
EURESCOM P715: Reference points



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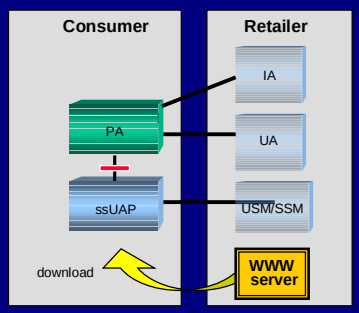
Interoperability: Basic Scenario

- start access session
- select service
- download (Java)
- start and use service



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Interworking results

- 5 partners involved
- 25 Consumer/Retailer interactions
- 2 Consumer ORBs
- 5 Provider ORBs
- All successfully completed

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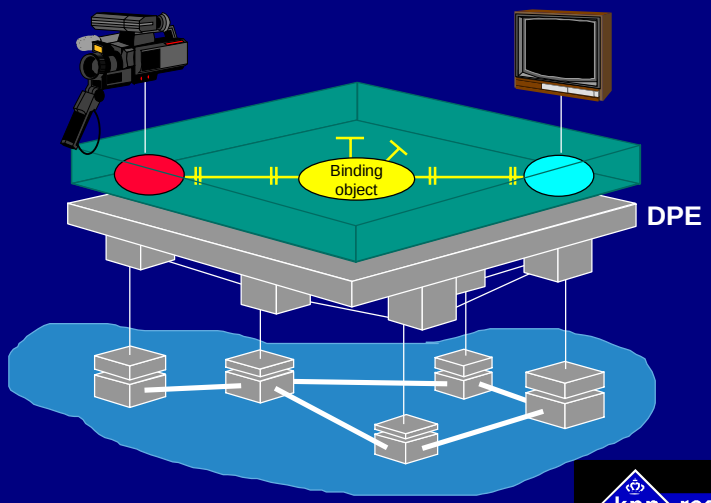
Binding object concept



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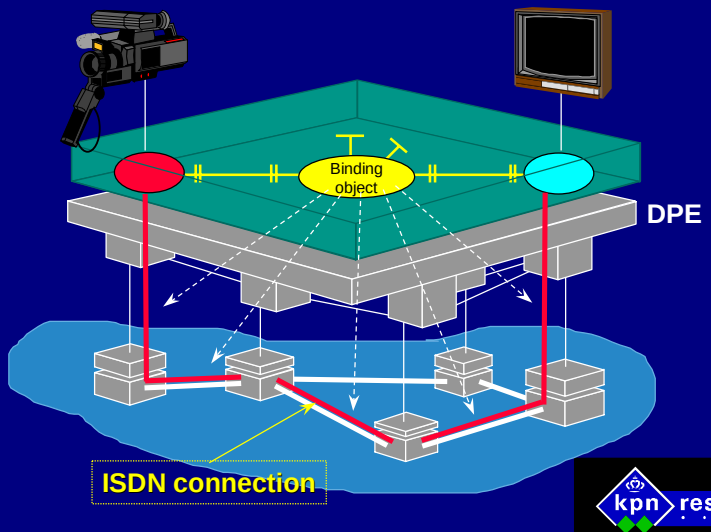
Binding object concept



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A/V Stream Binding

- 3 options for stream control
  - First party
  - Centralised
  - Hybrid
- OMG A/V Streams specification - Hybrid

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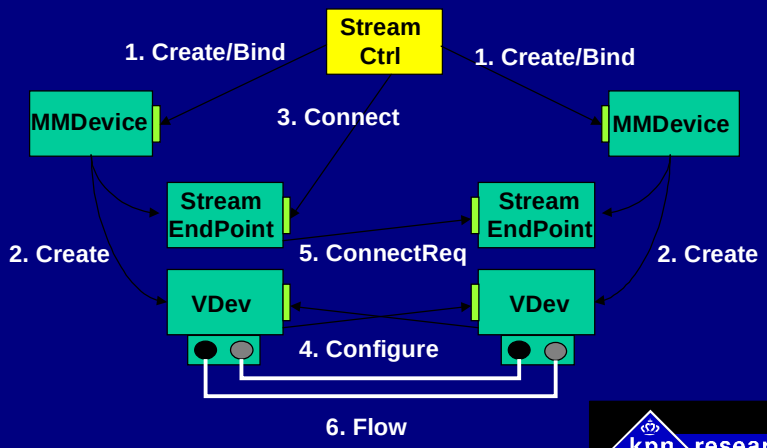
OMG A/V Streams



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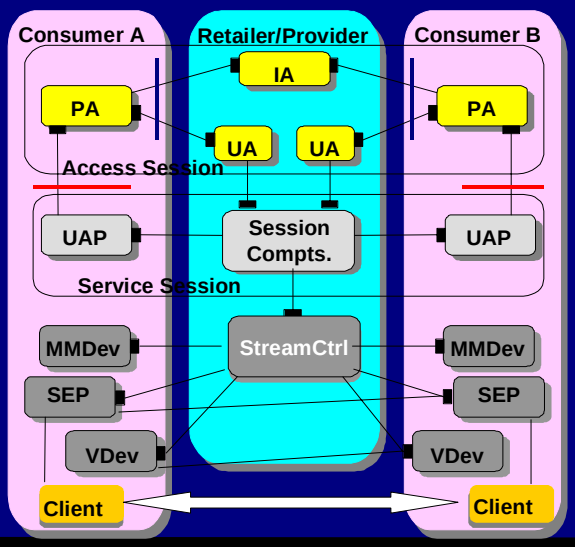
Integration



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End user Services/Legacy integration

- Surveillance camera
- Visualisation of CORBA Systems
- Distributed Scheduler
- Virtual World
- Audio Conferencing
- Video Conferencing
- Value Added Web
- Media on Demand

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EURESCOM Project 715

- Key Questions:
  - Where are the opportunities for Public Network Operators in the open services market?
  - Can we apply available TINA service provisioning concepts using today's products and technologies?

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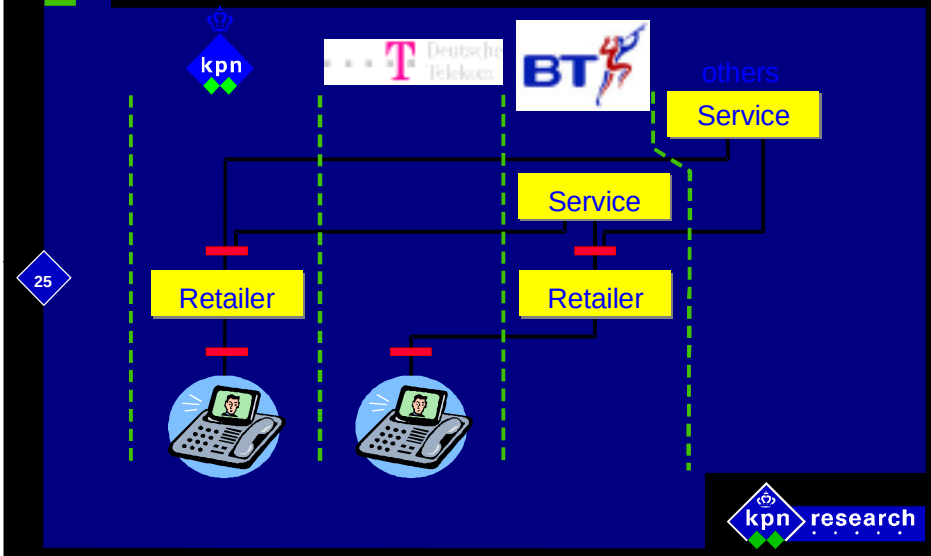
Open Services Market



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Benefits of the model

- The End User can freely select (and change) a Retailer without modifying the terminal
- Retailers can offer their users a wide range of services, including services from other Retailers and 3rd Party Service Providers
- Service Providers can sell their services through a wide range of competing Retailer channels
- All parties benefit from a competitive, open market for service provisioning

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Conclusions (1)

- P715 has shown that technologies are suitable to actually build the systems needed for the open services market
- P715 has shown that OMG's CORBA forms an excellent basis to create an open distributed environment for telecom services.
- P715 has shown that the results of TINA can be put into practice
  - service architecture
- however…

Conclusions (2)

- P715 has also shown that a number questions are waiting for answers
  - Can we scale these systems to the size needed for the telecom industry?
  - Can we actually operate and maintain large-scale object middleware systems in practice?
- Recommendations
  - CORBA systems need additional support for management, transactional behavior, scalability, security, maintenance, persistency, ...
  - More and better tools for specification, development, and testing of object middleware systems

EURESCOM Project 715

- European co-operation of six Public Network Operators:

Performance Testing of a TINA Platform

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Ina Schieferdecker, Theofanis Vassiliou-Gioles,
Mario Winkler

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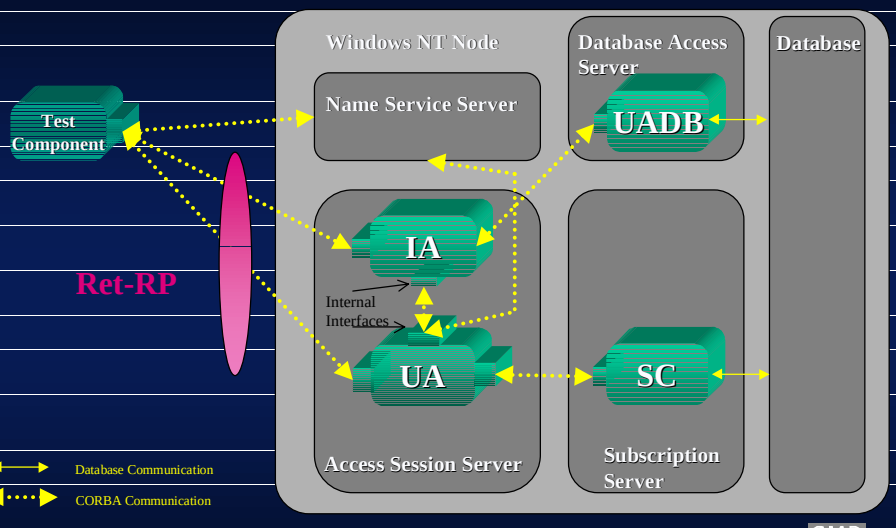
Overview

- Motivation
- System under Test: Access Session
- Test Objectives
- Distributed Testing
- Test Results
- Conclusion and Outlook

Motivation

- Next generation of telecommunication platforms is based on distributed object technology.
- TINA architecture are forming a common approach to develop telecommunictation services on distributed object technology.
- However most implementations are running in the labs only.
- Scalability and performance are preconditions for bringing TINA systems to practise
- Tests to show the scalability and performance of platforms based on the TINA Architecture are neccessary.

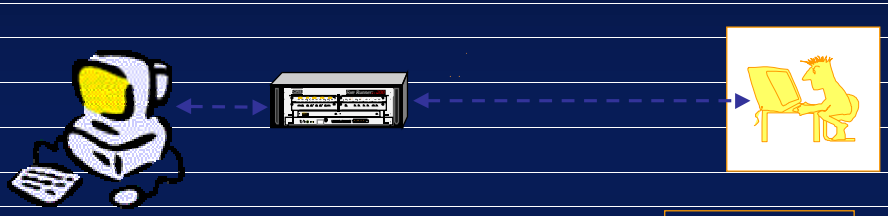
SUT: Access Session



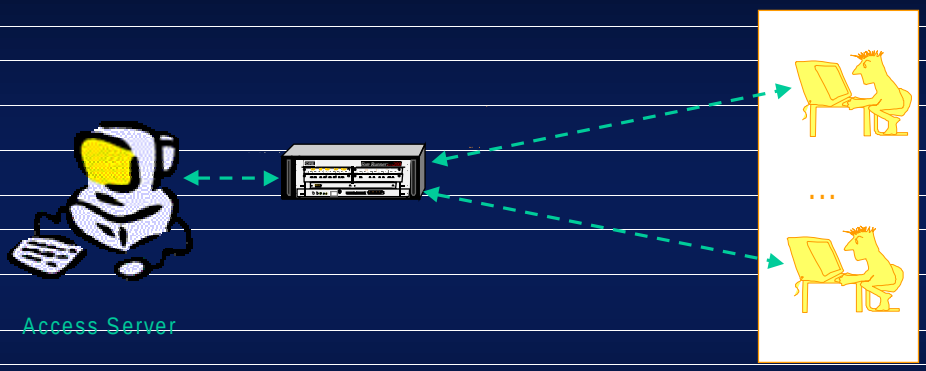
Test Objectives

- testing of functional aspects of the system under test, i.e. it is checked whether the system behaves in the target environment like expected and whether it is conform to reference points.
- testing of performance and robustness to determine whether the system also behaves correct under load.

Test Objectives



Test Objectives (cont'd)



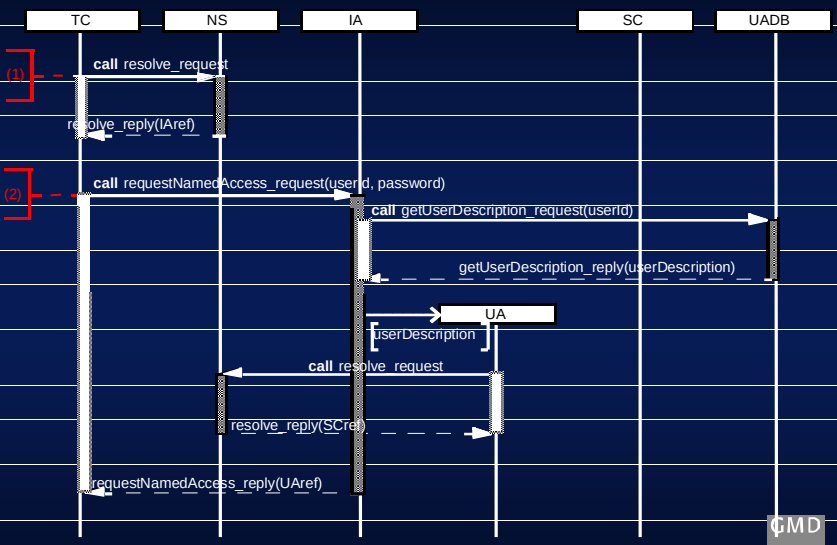
Test Objectives (cont'd)

The second objective can be divided as follows to check:

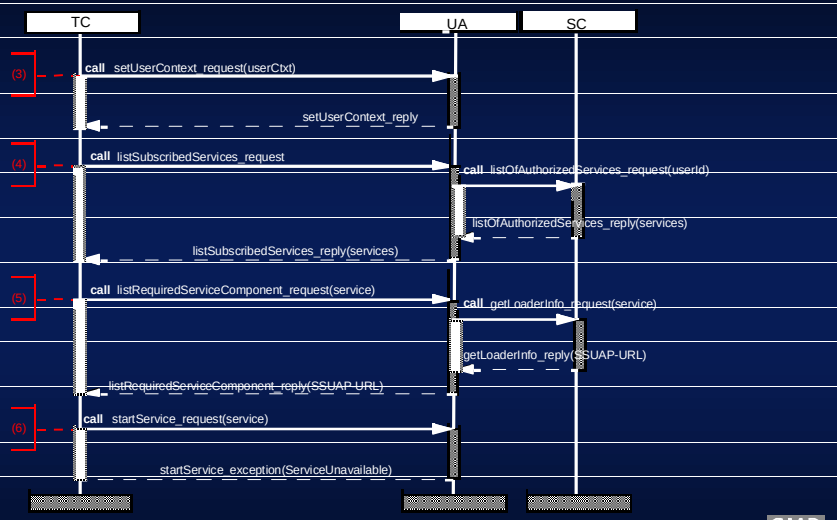
- the performance and partially the robustness and scalability of the TINA access session,
- QoS issues like response time of the TINA access session server to the user.

Therefore, parallel test components are used to emulate the behaviour of clients individually and to emulate the simultaneous access of several clients to the access session server.

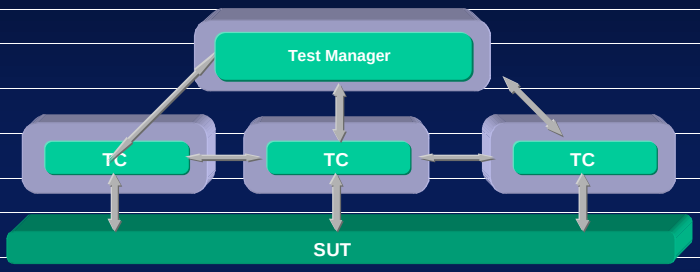
Test Objectives (cont'd)



Test Objectives (cont'd)

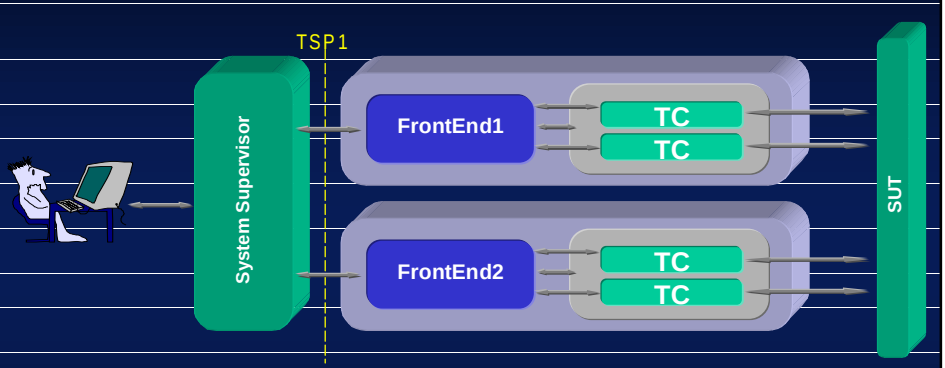


Distributed Testing



- Many Testing Devices
- Distributed Time
- Coordination Message Exchange crosses Boundaries

Distributed Testing



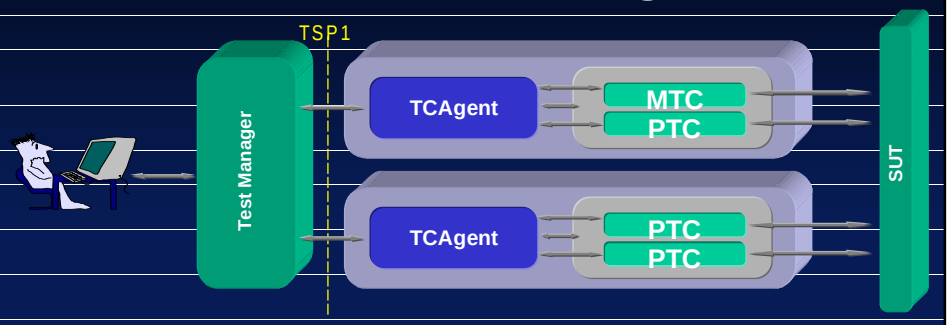
TSP1 - Test Synchronization Protocol 1
TC - Test Component

Distributed Testing

TSP1 defines Procedures for

- Test Setup,
  - – Setting Up Configuration
  - – Distributing Parameters, etc.
- Test Execution
  - – Start, Stop and Cancel
  - – Routing of Coordination Messages
- Test Reporting

Distributed Testing



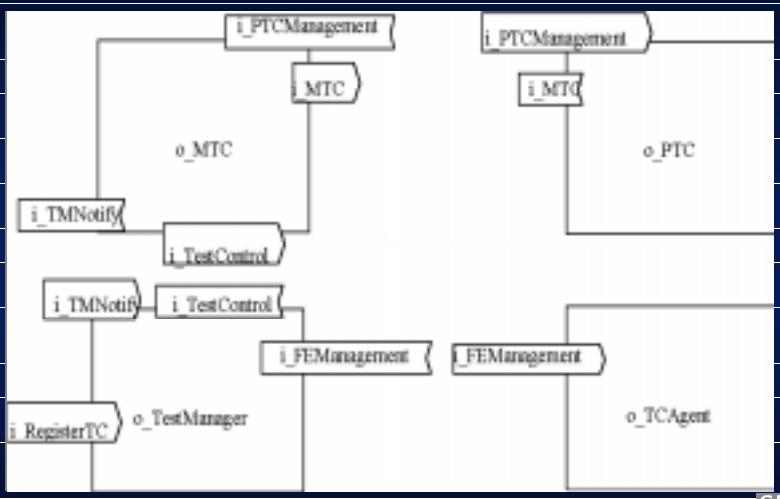
Test Manager - establishes the required configurations,

TCAgent - runs on every node and acts as a demon to start the test components on behalf of the Test Manager

MTC - manages the specific test, sets the test parameters, select the test case, initiates the test and collects the result

PTC - executes the test itself

Distributed Testing



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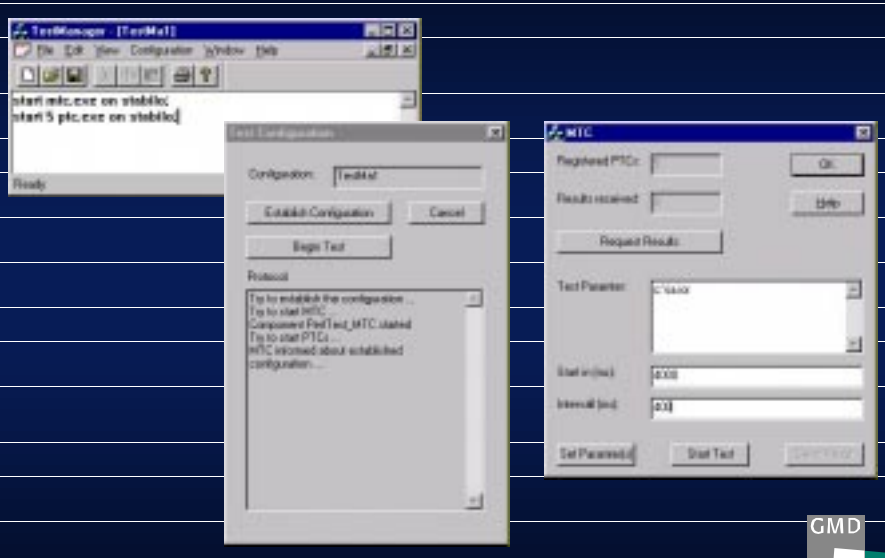
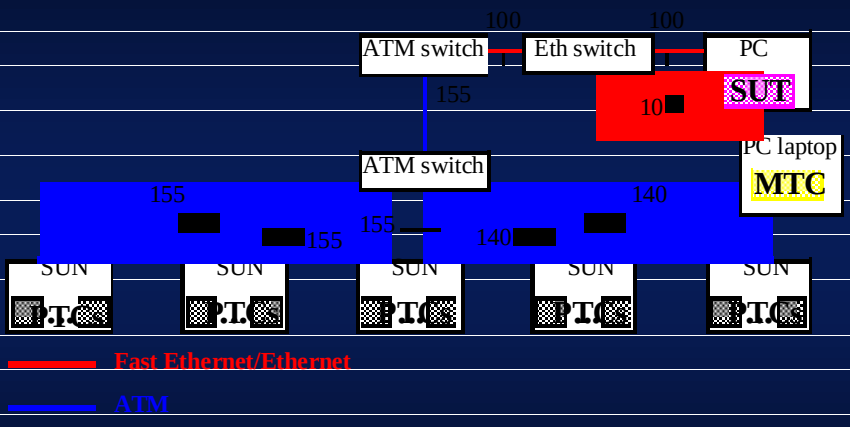
Distributed Testing



GMD FOKUS

Distributed Testing



Test Results

a) local testing only, i.e. both the test system and the system under test are executed on the same computer

b) distributed testing including the PC laptop for the system under test and the main test component and up to two SUN workstations for up to 40 PTC´s

c) local and distributed testing whereas the system under test do not perform any database access; the data are transient

Test Results

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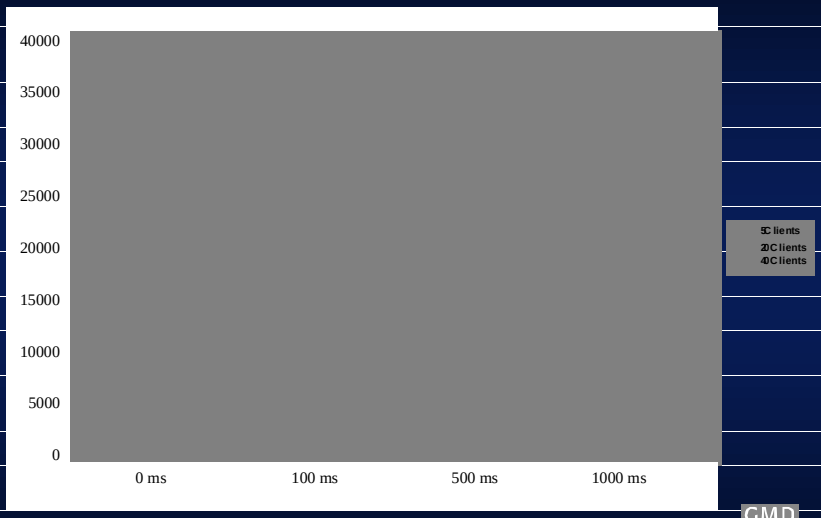
Test Results



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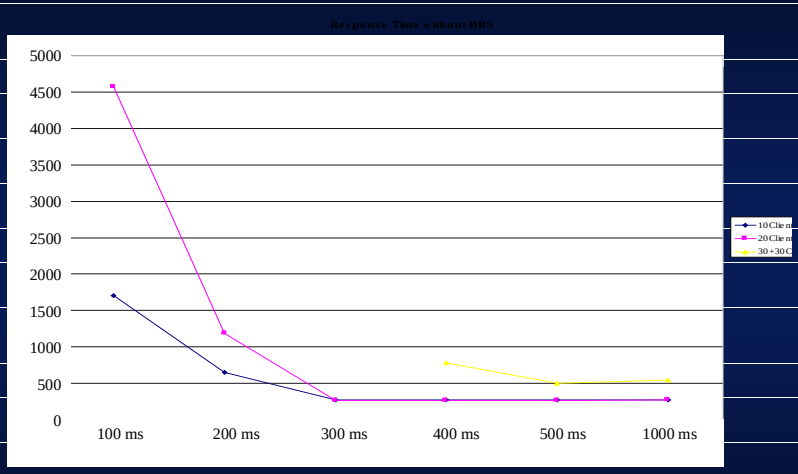
Test Results



Conclusion and Outlook

- Performance testing of real applications in realistic test scenarios and test configurations is of major importance for the assessment, evaluation ~~and overall acceptance of TINA technology (and of distributed object technologies in general)~~.
- The presented performance test approach is generic and can be used to cope with various test objectives.
- ~~The performance test results can be used to determine optimal~~ parameter settings for the server such as thread count, main memory, etc.
- New features in the future such as on-line performance monitoring and load balancing in distributed process environments will support the routing of client requests as well as the migration to less loaded servers.
- Performance testing can be used to fine-tune the load balancing and migration algorithms but also to evaluate their efficiency.

Contacts

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