

FlexiNet Work Plan 1997

This note follows on from the FlexiNet workshop held at APM on Friday December 13th 1996 to discuss the scope and timing of ANSA activities relating to flexible networks.

From the discussion, the sponsors present identified three important areas of study:

- developing the FlexiNet scenario
- modular dependability
- interactive multi-media.

FlexiNet Scenario

To further develop the FlexiNet concept APM will develop an extended scenario based on the “surveillance system” example discussed at the workshop.

The scenario will:

- describe the system components and interfaces needed to allow for the dynamic introduction of the surveillance system into a network and the dynamic upgrading of the service in real-time
- develop the module, binding and reflective network concepts introduced at the workshop.

A simple animation of the system will be built in Java to test and demonstrate the key ideas.

The result of the work will be a

- a report describing the scenario in terms of concepts, features, risks and benefits
- the animation as a proof of concept demonstrator
- a plan for progressing to a full scale demonstration of FlexiNet.

These will be delivered by the end of March 1997 and provide the basis for onward planning of FlexiNet investigations and developments.

One person will work on this activity.

Modular dependability

APM’s work to date has shown the benefits of reflective techniques as a way to add dependability features to Java application objects in a transparent way. In the workshop the question was asked if the concept could be developed into a framework of composable meta classes for all the ANSA transparencies.

An investigation will be under taken to

- identify the feasibility of a common set of meta class modules for constructing the ANSA transparencies
 - concurrency control
 - atomicity
 - replication
 - checkpointing
 - persistence
 - security
- develop a binding language for expressing transparency requirements
- develop a framework for selecting and combining appropriate meta class modules to implement the transparency requirements expressible in the binding language
- develop examples of key meta class modules and evaluate the approach with respect to transparency, usability, flexibility, scalability and performance.

The deliverables will be:

- A feasibility study and proposal for further work by the end of March 1997
- A definition of the binding language and framework by the end of June 1997
- A representative set of key meta class by the end of December 1997
- An evaluation report by the end of March 1998.

Two people will work on this activity.

Interactive Multimedia

This aspect of the FlexiNet activity will continue the investigation of distributed object models for interactive multi-media applications started in the DIMMA activity of previous years. The foundation of this work will progressively move away from CORBA towards Java and Java remote Method Invocation. The focus will be on quality of service and support for multi-party interaction. Results from APM's involvement in the associated DCAN, RETINA and PEGASUS projects will be leveraged where possible.

The areas to be explored are:

- interfaces to connection oriented networks for quality of service control and multi-party interaction
- operating system support for meeting quality of service guarantees
- programming abstractions for writing software that meets temporal quality of service targets.

The following activities will be under taken:

- extending the DIMMA model to enable its integration with the RETINA connection model for connection-oriented networks
- extending the DCAN model to enable its integration with the DCAN connection model for light weight ATM networks
- in both cases showing
 - support for setting up multi-party bindings
 - support for dynamic addition or removal of parties from a binding
 - how to ensure type safety can be maintained
 - how to structure a library of composable binding templates
- extending the DIMMA resource model to enable user defined “plug-in” policy modules for allocating and scheduling resources (buffers, endpoints, objects, threads)
- show how to map the extended model onto current operating systems
- investigate how to adapt the model for the new generation of “resource aware” microkernels (Pegasus, Exokernel, SPIN, L3).
- investigate the state of the art on network quality of service negotiation, set-up and management (Lancaster, CNET, Retina, XBIND, etc.)
- show how network quality of service relates to the extended DIMMA resource and binding models in achieving end-to-end quality of service guarantees.
- investigate the integration of technologies for writing modules with predictable timing (e.g., using reactive C or reactive Java) into the DIMMA framework for writing quality of service sensitive protocols and applications.

This work will be delivered as technical reports and a robust integrated prototype incrementally merged into the current DIMMA code base. Four people will work in this area. The results will be delivered according to the following schedule:

- resource management abstractions - end March 1997
- microkernel investigation - end May 1997
- binding abstractions - end July 1997
- QoS review - end August 1997
- integration of QoS binding and resources - end Oct 1997
- predictable modules end Dec 1997

(This assumes from easter onwards there will be a progressive transfer of people and technology from DIMMA into FlexiNet.)