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ANSA Phase III

ISA Project Results

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Abstract

This presentation summarizes the main results of ANSA Phase II - the ESPRIT ISA Project. It reports on progress in standards, the evolution of ANSAware and the final set of deliverables which form the baseline for ANSA Phase III.

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Briefing Note

Distribution:
Supersedes:
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ISA Objectives

- **Stabilize the architecture**
  - **detail computational and engineering projections**
  - **initiate enterprise and information viewpoints**
- **Get ANSA on the standards agenda**
  - **pull together diverse strands in ISO / CCITT / ECMA**
  - **contribute to industry standards**
- **Demonstrate that ANSA is implementable**
  - **iterate ANSAware to include an instance of major architectural concepts**
  - **port to lots of platforms**
- **Try out in real applications**
  - **with new partners (Siemens, GESI, Alcatel, ...)**
  - **in several application domains (telecommunications, factory, office, ...)**
- **Extend the architecture**
  - **streams, quality of service**
  - **object migration, activation/passivation**
  - **management, monitoring and debugging**

Standards Achievements - ISO/CCITT

- **ISO initiated new work item on "Basic Reference Model for Open Distributed Processing"**
  - **subsumed CCITT "Distributed Application Frame work" (DAF) and ECMA "Distributed Application Support Environment" (DASE)**
  - **Four part standard, positioned as a framework**
  - **60-80% "pure ANSA"**
  - **setsof viewpoint languages (= ANSA projections) and defines set of infrastructure building blocks (trader, transparency mechanisms, etc)**
  - **Part 1 Overview (in preparation)**
  - **Part 2 Descriptive Model (2nd CD, editor Stefani of CNET)**
  - **Part 3 Prescriptive Model (1st CD, editor Herbert of APM)**
  - **Part 4 Architectural Semantics (quietly dying)**
  - **Also a separate Trader standard underway**
- **Gaining respect in other ISO, ITU-TS groups (management, IN, ...)**
- **Main players: UK, France, USA, Australia, Japan, Germany, Netherlands**
- **Very strong telecommunications input**

Standards Achievements - Industry

- **Open Software Foundation - Distributed Computing Environment**
  - took part in RFI stage (1988)
  - ANSAware 2.5 (1987) acknowledged by OSF as example of “what is required”
  - ported ANSAware to DCE in 1992
- **Object Software Foundation - Distributed Management Environment**
  - provided some consultancy (on security)
- **Object Management Group - CORBA**
  - took part in RFI, RFP stage (1992)
  - significant impact on final “combined” specification
  - ANSAware 3.0 (1991) is functionally a CORBA
  - Andrew Watson of APM chairs CORBA 2.0 Task Force
- **Object Management Group - Object Services**
  - took part in RFI stage
  - helped sponsors at RFP stage
  - got Trader on agenda
  - imposed some ANSA Architectural principles on Object Services
  - Andrew Herbert takes ODP into OMG

ANSAware

- New release each year of the project integrating previous year's results
- ANSAware 3.0 introduced "distributed objects" (interface references)
- ANSAware 4.1 includes:
  - IDL stub compiler
  - PREPC application generator interface to rpc, threads and exceptions
  - Trader and node manager configuration services
  - transparent replication (GEX)
  - transactions (Arjuna)
  - persistent objects, object migration
  - prototype distributed object programming tools (DPL)
- ANSAware has been ported to:
  - HP-UX, SunOS, Ultrix, SCO Unix, AIX
  - VMS, MVS, VME
  - MSDOS, MS-Windows, [Windows NT]
  - OSF DCE
  - Chorus/Mix and basic Chorus
- Most aspects of the architecture demonstrated at some stage
  - streams on IMAC variant of ANSAware 3.0

Applications - Achievements

- **AEG OSI networking product line**
  - **reliable OSI routers, use ANSA inside each router as a multi-processor ipc system**
  - **use ANSA - ANSA rpc between routers for efficiency**
- **NASA ADS system**
  - **applications integration, communication and configuration management substrate for system that links multiple databases to multiple scientists**
  - **Ellery systems provided user interface and local tuple store**
  - **Heterogeneous databases and clients across USA, some international links**
  - **15 databases, 10000 nodes registered, 15000 “logins” a month**
  - **Scientists became more productive and started building distributed applications**
- **GESI Hospital patient care record handling systems**
- **Siemens CIM demonstrator**
- **Alcatel ANSA over MVS, VMS, SNA and OSI (VACOMS)**
- **ICL DAIS & RIBA products**
- **BNR ODS platform for telecomms applications in Northern Telecom**

Architectural Achievements - Framework

- **Mostly captured in ISO Basic Reference Model for Open Distributed Processing (ISO 10746-2, 10746-3)**
- **System Designer's Introduction**
- **Application Programmer's Introduction**
- **TR38 Architecture and Design Frameworks**
  - **uses of projections**
  - **sketches out scope of enterprise and information projections**
- **TR33 The Challenge of ODP**
  - **motivates the computational and engineering models**
- **AR0 Architecture Overview**
  - **a road map to the ARs and TRs**
- **AR3 The ANSA Naming Model**
  - **Pins down terminology**
  - **Argues for context relative naming as foundation, global names as a local optimization**
  - **formalized in TR21 A Formal Model for Naming**

Architectural Achievements - Computational Model

- **AR0 - Computational model**
  - **kernel semantics for distributable programs**
- **Reversed assumptions - TR42 Abstract and Automate**
  - **motivates the restrictions imposed by the computational model**
- **TR31 DPL Programmers Manual, TR32 DPL Reference Manual**
  - **DPL is a prototype language for testing computational model concepts**
  - **best though of as a tool for writing “distributable objects” and distribution wrappers for “applications objects” in other languages**
  - **proof that the computational model is implementable**
  - **proof that programmers can stay away from implementation specifics**
- **TR18 Distributing Objects, TR36 Mapping ANSA Concepts to C++**
  - **Reconciliation of computational model with Object Orientation in general and C++ in particular**

Architectural Achievements - Atomicity and Replication

- **AR4 ANSA Atomicity Model and Infrastructure**
  - **how to add transactions to an RPC-based system**
  - **how to do so transparently with appropriate language support**
  - **critical engineering interfaces and components (atomic operation manager, deadlock detector, version store, etc)**
- **TR22 Using Path Expressions as Concurrency Guards**
  - **declarative fined grained locking for objects**
- **AR2 A Model for Interface Groups**
  - **how to do transparent active replication**

Architectural Achievements - Configuration

- **AR5 The ANA Model for Trading and Federation**
  - **how to describe and find services**
  - **separate type management from offer management**
  - **federating autonomous traders**
- **TR43 ORB Interoperability**
  - **how to cross technology boundaries**

Architectural Achievements - Management and Monitoring

- **AR10 Monitoring is Distributed Systems**
  - **management of the monitoring process**
  - **consistency of monitored information**
- **TR39 Management in Object-Based Federated Distributed Systems**
  - **“objects manage themselves”**
- **TR40 Ordering Algorithms for Monitoring**
- **TR41 Visualization of Distributed Systems**

Architectural Achievements - Others

- **AR8 A Framework for Federating Secure Systems**
  - **requirements and techniques for securing autonomous systems**
- **AR9 ANSA Security Services**
  - **how to secure autonomous systems**
  - **“objects defend themselves”**
- **AR11 A New User Interface Architecture**
  - **pipeline of bidirectional translators**
- **TR28 Integrating Multimedia into the ANSA Architecture**
  - **treat stream interfaces as first class citizens**
  - **link stream events to program events**
  - **synchronize across events**
- **TR37 ANSAware use of DCE/POSIX threads and RPC**

Changes from Original Objectives

- Formal methods strand put down
- User interface strand allowed to wind down
- Reconciliation with OSI protocols ceased to be an issue
- IBM PC version of ANSAware became as important as Unix version
- Technology transfer to partners became more important
- Need to increase acceptability to telecommunications culture became imperative
- Need to position relative to many other intiatives became necessary
- All these are signs of focus and “coming to age” of the technology

ANSA and ODP

- **ODP is a summary of ANSA**
  - **written in standards speak**
  - **therefore loses the rationale and guideline aspects**
  - **and gets warped by the committee process in both content and time-lag**
  - **but gets some useful clarification on the way (e.g. streams)**
  - **and shows that other people support and are prepared to use the concepts**
- **ODP has done its job in getting the communities driven by ISO and CCITT to recognize the requirement and the technology**
- **It provides a framework for pointing out what is missing from current offerings, both in terms of functionality and in terms of integration of that functionality**
- **Industry standards are where the detailed designs will get thrashed out**
  - **faster process**
  - **less stable result, but at least it's a result**
- **Establishing user pull to match vendor push is next priority**

ANSA and TINA

- **TINA is the telecomms industry building a robust prototype of INA technology**
- **TINA is explicitly linked to ODP**
- **TINA and ANSA have common sponsors (GPT, HP, BNR, BT, CNET)**
- **Have supplied baseline documents and consultancy to TINAC**
- **Taken part in TINAC document reviews and planning**
- **ANSA Management Committee agreed onus is on joint sponsors to give lead in transfering technology**