Status and Activity in the OMG Relevant to HPEC

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HPEC – September 2002

The Ultimate Performance Machine
Agenda

- Object Management Group (OMG) standards activities relevant to HPEC
- CORBA-based applications
- Impediments & risks
- Summary
HPEC-Related OMG Standards Activities

- Data Parallel CORBA
- Real-time CORBA
- Extensible transports
- High-performance enablers
- Deployment & configuration of components
- Embedded profile for components
- Lightweight services
- Software Defined Radio at OMG
Data Parallel CORBA

- Standardized to bring data parallel (SIMD) scalability to CORBA
- Moving many data-reorg ideas into mainstream standards
- Status: adopted, being implemented
  - See Schmidt/Gokhale/Gill HPEC presentation on Realtime/Data Parallel CORBA
- Usable in 2003?
Real-Time CORBA

- Distributed applications in embedded systems sometimes require deterministic performance
- Real-time CORBA 1.0 standardizes how ORBs can deliver this with fixed priorities (typical RTOS scheduling)
- Real-time CORBA 2.0 (dynamic scheduling) standardizes how advanced scheduling techniques can work (beyond fixed priorities)
- Status: 1.0 available, 2.0 being implemented
Extensible Transports

- A standard between ORBs (the middleware used by applications), and the underlying data transport layer (typically IP/TCP)
- Allows users or third parties to create/support non-TCP/IP transports without ORB supplier involvement
- It may enable transports to avoid data copies that are required by many today
- Status: RFP issued, drafts submitted
- A process to eliminate remaining performance inhibitors in CORBA
  - Data must be copied before being handed to the underlying “message transport” layer (which may also add extra copies)
  - There is no way for requests to be repeatedly issued from a pre-computed template
  - Data must be reformatted even between identical systems

- Status: RFP issued
Deployment & Configuration

- Completes the “component software” picture, making it complete and usable
- Initial CCM standard was weak here
- Moves more lines of code into the standard infrastructure
- Extends standardization into deployment issues
  - Packaging SW into the field
  - Installing and configuring for a target environment
  - Runtime environment for managing installed software
Standards process is combining inputs:
- CCM known weaknesses and defects
- JTRS/SCA embedded deployment issues
- Mercury/SCE heterogeneous, field-upgrade issues

Defined in UML as a PIM (an abstract standard not tied to CORBA) as well as a PSM (specific CORBA standard)

Status: RFP issued, first draft submitted (9/02)
Embedded Profile for CORBA Components

- Allows standards compliance with a subset appropriate to embedded applications
- Similar in spirit to minimum CORBA subset for embedded CORBA apps
- Removes mandatory E-commerce artifacts from current CCM standard
- Status: RFP drafted
Lightweight Services

- Defines embeddable subsets of several currently defined CORBA services (Name, Event, Time)
- Focuses on footprint and modular functionality
- Status: RFP issued
Dataflow for UML 2.0

- Part of the data-flow/component part of the UML 2.0 standard (activity diagrams)
- Targets data-reorg/data-flow specification at the model level
- Enables modeling of DP CORBA
- Status: draft standards submitted
Software Defined Radio (SDR)

- Separate OMG Domain Special Interest Group (DSIG)
- Pushing embedded issues into CORBA services
- Pushing SCA capabilities into CORBA Components
- Defining domain-specific (SDR) standards (e.g. RF Modem)
CORBA-Based Applications

- SDR applications, both government (JTRS/SCA) and commercial (SDR Forum)
- [insert others here]
  - Shipboard weapons control
  - Theatre High Altitude Defense (THAAD)
  - Helicopters
  - Naval electronics
  - Unmanned underwater vehicles
  - AWACS/Wedgetail
- The Chicken and Egg problem
  - The market is skeptical: distributed object computing (DOC) is/was big/slow
  - The investments need a market for lean/mean
  - This problem has been overcome, but more would be better (more trials, more products)

- The (e)commerce world invests in Java
  - Distracts from heterogeneous/embeddable
  - But Java/CORBA bridges are maintained

- The open-source parallel computing world is centered on MPI
  - SIMD/Parallel CORBA implementations begun
Summary

- Standards progress is enabling
  - Performance
  - Embeddable
  - Deployable

- Implementation progress is modest
  - HPEC market is small and fragmented
  - Commercial overlap (DOC/components) reduced by Java

- Adoption is modest
  - More standards needed to fully enable standards base
  - JTRS/SCA is a significant milestone, and is moving to merge with OMG standards