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Middleware for Embedded Adaptive Dependability (MEAD)

Real-time Fault Tolerant CORBA

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Middleware Challenges

- **Distributed real-time embedded (DRE) systems must meet deadlines even in the event of a fault**
- **How can we combine real time and fault tolerance?**
  - RT CORBA and FT CORBA are separate standards
- **Data center support for high level failover**
  - Data centers can go down and reconfigure themselves
  - Software components can move from one data center to another
  - Applications don't know which components are running where
- **Add rapid failover at software component level**
  - Achieve application-transparent fault tolerance

What Real-Time Fault Tolerant Middleware Must Do

- **Handle RT- FT tradeoffs**
  - Order operations to support RT and FT requirements
  - Resolve non-deterministic conflicts (timers, multithreading)
- **Lessen the impact RT and FT have on one other**
  - Lessen the real-time impact of faults and fault recovery
  - Bound recovery time to avoid missed deadlines
  - Maintain replica consistency while meeting deadlines
- **Support scalability**
  - Scalable fault detection and recovery
  - Support nested (multi-tiered) applications
  - Tolerate network partitioning faults
- **Tolerate internal middleware faults**
  - Maintain ORB replicas, check state

Program Composition of Embedded Systems (PCES)

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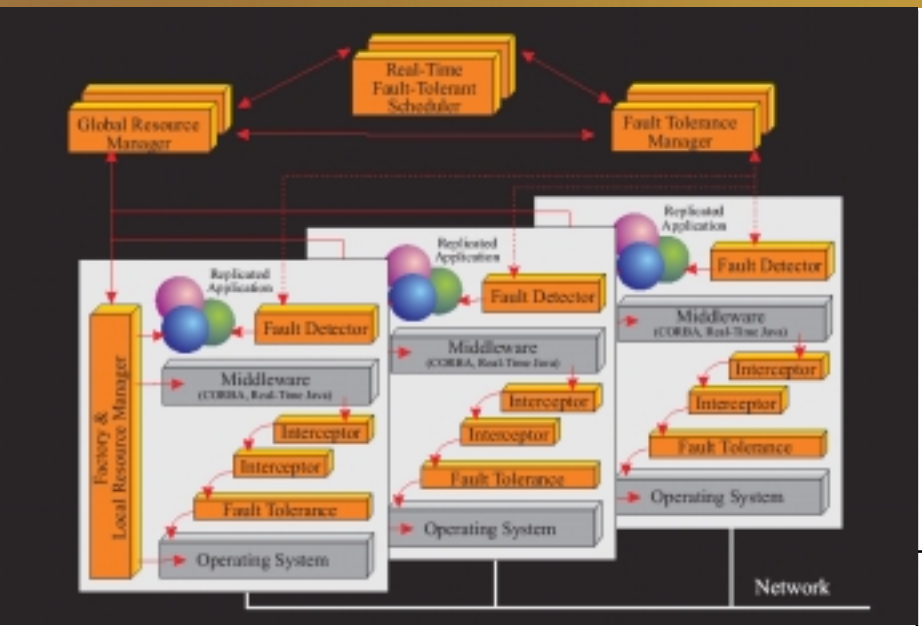

Middleware for Embedded Adaptive Dependability (MEAD)

Need: Real-time fault tolerant middleware to support fault tolerance in distributed real-time systems.

Objectives: Develop real-time fault tolerant CORBA. Pursue standardization and commercialization. Support technology transfer to target programs.

Applications: DD(X), surface radar, submarine combat systems, other distributed real-time embedded (DRE) systems.

Approach:

Develop, demo RT FT CORBA technology, tools.
Develop RT FT CORBA component model.
Evaluate RT FT CORBA performance.
Develop RT FT CORBA standard with OMG.
Seek commercial supplier among ORB vendors.
Release finished product to TAO community.