Multi-Aspect Adaptive Middleware for Distributed & Embedded Real-time Mission-Critical Systems

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Motivation: The COTS Hardware & Software Crisis

Context:
- Lack of reliable resource management
- Lack of middleware layers and optimizations
- Hard to evolve to new environments/requirements
- Hard to map to the COTS technology curve
- Most mission-critical systems require QoS

Problems:
- Accidental middleware complications and COTS middleware is not mission-critical systems
- Middleware are global and important and COTS hardware is middleware

Proposed Solution:
- Decoupling functional path from QoS path and applying QoS meta-data
- Achieving horizontal & vertical QoS integration
- Developing & integrating customizing COTS

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Concluding Remarks

- R&D on distributed & embedded real-time mission-critical applications must address many similar challenges.
- Successful R&D efforts must apply components, frameworks, patterns,
  and architectures to resolve these challenges and create adaptive middleware that integrates multiple QoS aspects.
- Many research challenges must be addressed to ensure that middleware for next-generation mission-critical DoD systems and product lines will simultaneously satisfy multiple cross-cutting QoS aspects.

Pioneer new strategies and tactics for multi-aspect adaptive middleware.
- e.g., real-time component, integrate high-level real-time modeling & low-level middleware techniques.
- Establish vibrant middleware research community.

Greatly reduce effort & cycle-time and improve key aspects of DoD mission-critical systems and product lines.
- e.g., dependability, performance, and evolvability.
- Create self-sustaining COTS market for DoD software.