Session 7: System Applications

or

Putting the *Performance* into

High *Performance* Embedded Computing

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How to Improve Performance?

- Parallelism
- Specialized Hardware
- Challenges:
  - How best to take advantage of advanced architectures?
  - Better tools, better libraries

Algorithms Highlight Performance Needs

- **Missile Seeker Common Computer Signal Processing Architecture for Rapid Technology Upgrade**
  Daniel Rabinkin, Edward Rutledge, Paul Monticciolo
  MIT Lincoln Laboratory
- **Hybrid QR Factorization Algorithm for High Performance Computing Architectures**
  Peter Vouras , Naval Research Laboratory
  Gerard Meyer, Johns Hopkins University
- **Partitioning Computer Tasks within an FPGA + RISC Heterogeneous Multicomputer**
  John Bloomfield, Mercury Computer Systems, Inc.

Algorithms Exploit Parallelism

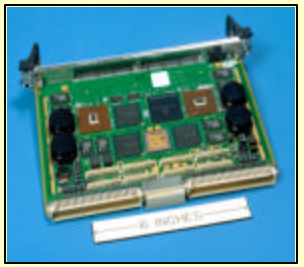
- Rabinkin, et. al
  Network of Workstations
  or Embedded G4 Processors

- Vouras, et. al
  SGI O3800, 4 processors

- Bloomfield
  PowerPC board + FPGA board

Testbeds

Network of Workstations



Quad G4 Embedded System

Performance from Parallelism

- Match algorithm to
  hardware, memory, I/O, system architecture
- Write once, run anywhere
  - same code for
    one processor, several processors,
    different architectures
- For performance
  - toolboxes of predesigned components that target specialized hardware architectures