

LOCKHEED MARTIN

Systems Integration



Multidimensional Performance Modeling for Advanced Embedded Signal Processors

**Michael Stebnisky
Carl Hein**

**Lockheed Martin Advanced Technology Laboratories
1 Federal Street • A&E Building 2W
Camden, New Jersey 08102
mstebnis@atl.lmco.com**

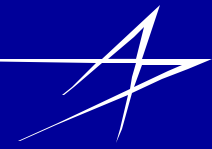
Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

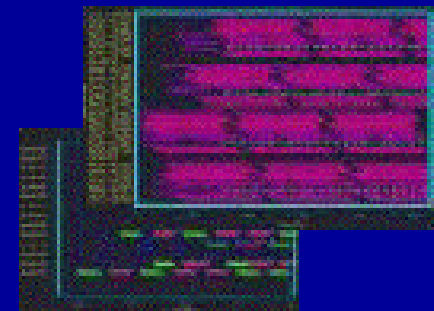
1. REPORT DATE 21 MAY 2003		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Multidimensional Performance Modeling for Advanced Embedded signal Processors				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Lockheed Martin Advanced Technology Lab., 1 Federal St., A&E Bldg 2W, Camden, NJ 08102				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Multidimensional Performance Modeling

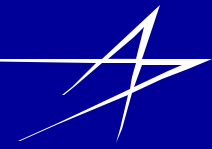


DoD missions/systems require new approaches/ tools to exploit emerging reconfigurable technologies to form polymorphous/power aware systems.

- **Problem:**
 - Traditional performance modeling approaches are unable to address emerging requirements and component technologies. This is a result of an increased awareness and need for dynamically adaptive or reconfigurable systems, particularly in the area of power dissipation/performance.
- **Goal(s)/Objectives(s)**
 - Define methods/algorithms to accurately model and optimize reconfigurable architectures and functions (services) required to support multidimensional performance modeling.
 - Apply ideas developed from InfoPad, ACS, PAC/C, DARES, PCA, and MSP to develop a unique new rapid prototyping/optimization capability.
- **Approach**
 - Define features required to support accurate performance and multidimensional modeling and optimization of DRAs.
 - Evaluate algorithms/methods for performing intelligent, reactive dynamic scheduling.
 - Evaluate algorithms/methods for performing offline analysis, data reduction, pattern recognition, and execution planning.



DARPA Tech Demo



PCA Virtual Processor
State and Activity

System State and
Task Flow

Total active
processor
count display

Stream
Processors
indicated by
filled boxes

GP Processors
indicated by
outlined boxes

Dynamic bar
chart indicating
total active
processors,
active stream
processor
active GP
processors and
active threaded
processors

Mission
Assignment

Threat
Avoidance

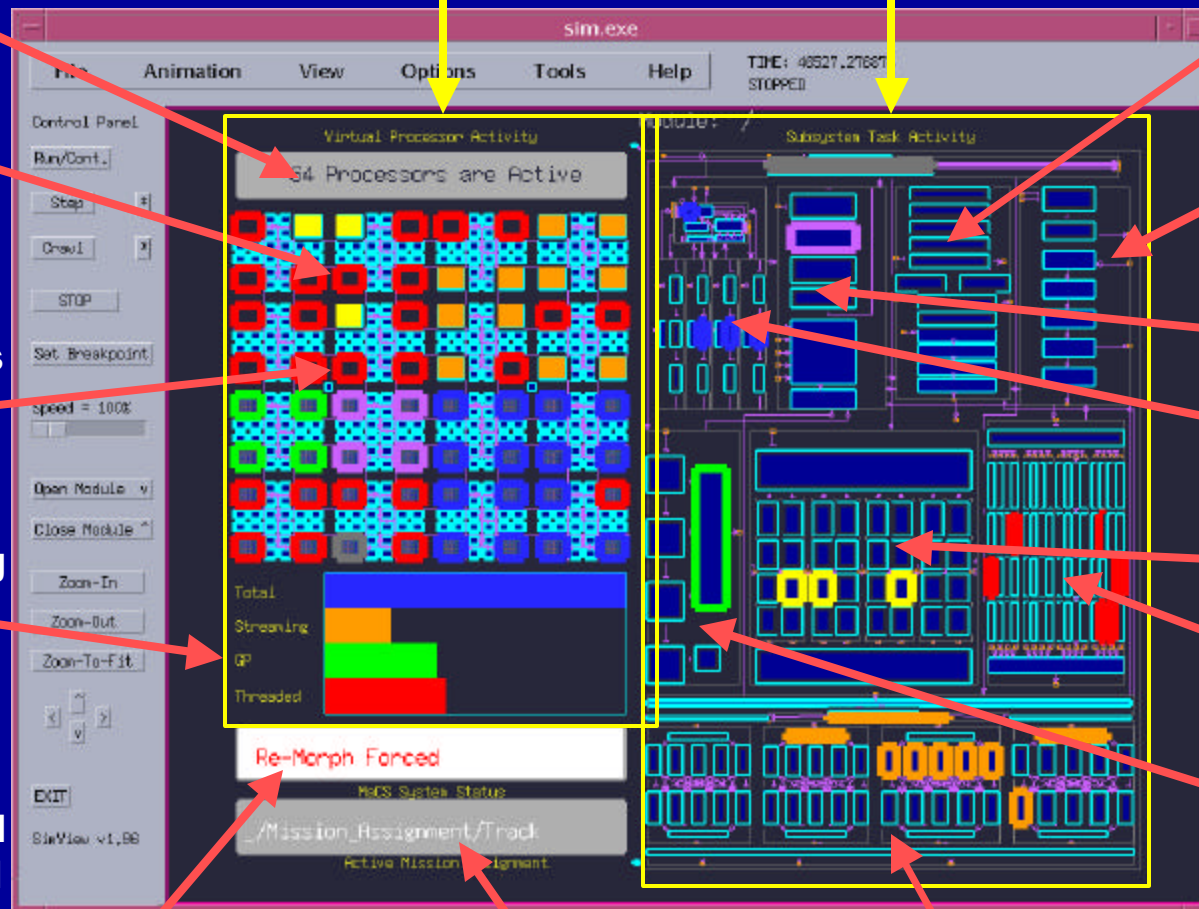
Communi-
cations

Flight
Control

Imaging

Route
Planning

Self Test
and MaCS



MaCS messages
and status

Mission status

RADAR Tasks



Real-time Systems Group, University of Pennsylvania

