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Advanced Software Tools

Space Station Focused Technology

April 18, 1985

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Advanced Software Tools

Drivers

Space Station data management system:

- highly distributed
- payload users controlling experiments and processing payload data from home facilities

Software:

- closely coupled modules separated by great distances (e.g. ground and space systems)
- requires specialized testing and validation
- need to characterize maintenance & evolution

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Advanced Software Tools

RTOP Thrusts

- Evaluate available Ada software development environments and tools
- Enhance the capability of currently available software development tool environments to meet requirements for Space Station
- Design advanced software tools for testing of distributed systems

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Progress To Date

Environments Acquired:

- -DEC VAX Ada (Beta Site Version)
- -Ada Language System (SofTech)
- -Data General Ada Development Environment
- -Telesoft_Ada

Evaluations Initiated:

- -Ada environments
- -Ada pilot projects
- -alternative implementation languages

Coordination:

- -Ada User's Group (formed at GSFC)
- -JSC Ada Beta Test Site
- -Space Station Software Working Group

Environment Evaluation - Tools

	Compiler	Editor	Linker	Exporter	Debugger	File Manager	Command Language	User-supplied Tool-Interface	Formatter	Analyzers
SofTech ALS	x	x	x	x	x	x	x	x	x	x
DEC VAX Ada	x	x	x		x		x			
Telesoft_Ada	x	x	x							
DG ADE	x	x	x		x				x	
Verdix Ada	x	x	x		x					

Environment Evaluation - General

Environment		Comments
SofTech Ada Language System	-	Severe performance limitations
	+	Rehostable; retarget capability
	-	Needs more robustness in tools
VAX Ada	+	Integrated with VMS 4.1
	+	Good performance (depending on user loading)
	-	No retargeting capability
Telesoft_Ada	-	Incomplete versions used for year
	-	Not yet validated for VAX
	-	Marginal performance
Data General Ada Dev. Environment	+	Complete environment for DG computers
Verdix Ada	+	Rapid compilation
	+	Good error diagnostics
	+	Production-quality code
	+	Split-screen debugging
	-	Uses UNIX BSD 4.2

Environment Evaluation Criteria

Consistency - predictability,
portabilty of Ada user code

Efficiency

User friendliness

Portability of knowledge of tools

Supports division of labor in software development

Configuration management capabilities

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-Elisabeth Brinker

Pilot Ada Projects

	Size (LOC)	Environment Utilized	Comments
Attitude Dynamic Simulator for Gamma Ray Observatory	40,000	VAX Ada	Parallel development in FORTRAN
Network Control Program	5,000	VAX Ada	VAX, 8086 Target
Demultiplexer for POCC	1,000	ALS	

Use of Ada Evaluation Criteria

- Time to obtain a working knowledge of Ada syntax and methodology
- Training methods to be used
- Methodology to be applied
- Time required for program design, coding, debugging
- Modularity
- Program size
- Features of the language actually utilized

-Robert Murphy

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Extending the Environments

- Examine issues related to inclusion of user-supplied tools in APSE's

- Develop requirements and preliminary design
  of a tool for testing and validation
  for distributed system developments

  - current debuggers are for uni-processor applications

  - capture and replay intertask communication
    in multi-tasked, distributed processor systems

FY85 Plans

Complete evaluation of Ada Environments

Complete language evaluation task

Specify tools required for debugging distributed software

Continue coordination with
- -Software Working Group
- -Software Development Environment
- -JSC Ada Beta Test Site