

Introduction to the Eleventh International Real-Time Ada Workshop

Joyce L Tokar, PhD
Program Chair

Over the last decade and 1/2, the International Real-Time Ada Workshops have provided a focus for identifying issues with Ada 83 and 95, proposing solutions for those problems and evaluating proposed language changes.

Since the standardization of Ada95, the International Real Time Ada workshops have assisted in the development of the real time portions of the Guidance in the Use of the Ada Programming Language for High Integrity Systems, and developed the Ravenscar Tasking Profile.

With the advent of Java and the development of Real Time specifications for Java, the Workshop has begun to consider the integration of embedded Ada and Java systems, and their interoperability.

The goals of the 11th IRTAW were to:

- examine and develop paradigms for using Ada 95 for real-time single processor, multiprocessor and distributed systems (including issues of hard and flexible scheduling);
- consider reports on experiences with using Ada 95 on actual real-time projects;
- identify the benefits and impacts of using object-oriented programming in multi tasking (potentially distributed) real-time systems;
- explore the use of Ada 95 in developing multi-tasking components which are resilient to software design errors and hardware failures;
- refine criteria for the use of Ada 95 in high integrity systems, especially those with real-time or embedded attributes;
- review the interactions between exceptions in Ada with those from other languages such as Java and C++;
- examine the issues around the interoperability of Ada and real time Java embedded systems.

The 11th International Real-Time Ada Workshop was held in Mount Tremblant Canada April 8-11, 2002. The Workshop was organized as a group of sessions based on the position papers submitted by each attendee.

SESSION 1 – Future of the Ada Language and Language Changes such as the Ravenscar Profile

This session began with a short report from Jim Moore, convener of WG 9 -- the ISO working group on Ada, on the status of the standard. The purpose of this presentation was to provide us with an understanding of what is happening with the language so that we have the appropriate context for use in the consideration of language changes we may propose.

Following this presentation the session reviewed the other proposed changes to the language that are being considered including:

- AI-249 – Ravenscar Profile for High-Integrity Systems
- AI-265 - Partition Elaboration Policy for High-Integrity Systems
- AI-250 – Extensible protected types
- AI-264 – Exceptions as types
- AI-266 - Task Termination procedure

The group evaluated these changes and made recommendations for modifications. Several attendees agreed to generate revised proposals for submission to the Ada Rapporteur Group (ARG).

As part of this session, the User Experiences related to the Ravenscar Profile were considered.

Papers associated with this session include:

- “User Experiences with the Aonix ObjectAda RAVEN Ravenscar Profile Implementation,”
- “Experience Report on the Implementation of Extensible Protected Types for GNAT.”
- “Practical Implementations of Embedded Software Using the Ravenscar Profile.”

SESSION 2 – Safety Improvements for Consideration

The purpose of this session was to open discussions on issues related to safety and what needs to be done to address these issues in the language.

As part of this session, the following topics were presented:

- Experiences with certifying VxWorks.
- Software Related Accidents.
- Using partitions for space-based security.

Papers that were considered during this session include:
“Software Portability Gains Realized With MetaH and Ada95.”

SESSION 3 – Real-Time, Fault Tolerance AND Distribution

The purpose of this session was to open discussions on issues related to real-time, fault tolerance & distribution and what needs to be done to address these issues in the language.

Papers contributing to the discussion in this session include:

- “Using Ravenscar to Support Fault Tolerant Real-Time Applications,”
- “Precise Response Time Analysis for Ravenscar Kernels,”
- “Modeling and Schedulability Analysis in the Development of Real-Time Distributed Ada Systems.”

SESSION 4 – Scheduling, Modeling & Analysis, Language Changes

The purpose of this session is to review work that has been done in the area of scheduling, modeling and analysis, and hardware modifications to determine what may be recommended for changes & additions to the language.

Papers to be considered during this session include:

- “Protected Ceiling Changes,”
- “Accessing Delay Queues.”
- “Application Defined Scheduling in Ada,”
- “Language Issues of Compiling Ada to Hardware.”

SESSION 5 – Analysis of the Real-Time Specification for Java (from the Real-Time for Java Expert Group)

The purpose of this session was to identify areas in which the experience with real-time Ada might influence the RT Java specification, review how well that specification meets the requirements of real-time applications on which we have Ada experience, and review how Ada needs to interact with the emerging Java technology.

Paper for to be considered during this session is:
“Asynchronous Transfer of Control in the Real-Time Specification for Java.”