Ada Issue 00355 Priority Specific Dispatching including Round Robin

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!summary

A means of specifying priority specific dispatching is provided so that FIFO is not the only 'within_priorities' scheme supported. A Round_Robin_Within_Priorities dispatching policy is defined.

!problem

Although Ada defines a number of mechanisms for specifying task dispatching policies, only one, FIFO_Within_Priorities is guaranteed to be supported by all implementations of the Real-Time Systems Annex. Many applications have a mixture of real-time and non-real-time activities. The natural way of scheduling non-real-time activities is by time sharing the processor using round robin scheduling. Currently, the only way of achieving this is by incorporating yield (e.g. delay 0.0) operations in the code. This is ad hoc and intrusive.

This AI proposes a new scheduling policy which allows one or more priority levels to be identified as round robin priorities. A task whose base priority is set to one of these levels is scheduled in a round robin manner with a user-definable quantum.

The method proposed is a general one and will allow any priority level/band to have a specific scheme defined (e.g. FIFO, Round_Robin, EDF, etc.). This not only extends the facilities of Ada but also provides a well defined means of combining different dispatching schemes. This is a need that is increasingly identified in OS provisions and application surveys.

!proposal

Section D.2 (Priority Scheduling) currently (as modified by AI-321) has 4 subsections:

D.2.1 The Dispatching Model
D.2.2 Pragma Task_Dispatching_Policy
D.2.3 Preemptive Dispatching
D.2.4 Non-Preemptive Dispatching

Two new specific policies are proposed (Round Robin in this AI and EDF in AI-357). In addition a means of specifying mixed scheduling is proposed in this AI.

This AI deals with modifying D.2.2 and D.2.3, and adding a new D.2.5 (it assumes EDF is also to be supported, in D.2.6).

In addition a new package is added to D.2.1 for parameters of dispatching policies.

!wording

Add before Dynamic Semantics in D.2.1 (as updated by AI-321).

Static Semantics

The following language-defined library package exists:

```
package Ada.Dispatching is
  pragma Pure(Dispatching);
  Dispatching_Policy_Error : exception;
end Ada.Dispatching;
```

Dispatching serves as the parent of other language-defined library units concerned with dispatching.

Modify D.2.2 to the following:

D.2.2 Task Dispatching Pragmas

This clause allows a single task dispatching policy to be defined for all priorities, or the range of priorities to be split into sub ranges that are assigned individual dispatching policies.

Syntax

The form of a pragma Task_Dispatching_Policy is as follows:

```
pragma Task_Dispatching_Policy(policy_identifier);
```

The form of a pragma Priority_Specific_Dispatching is as follows:

```
pragma Priority_Specific_Dispatching (policy_identifier,
        first_priority_expression, last_priority_expression);
```