Using ADA in Integrating ATC Systems

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Abstract

To be able to integrate systems as complex as ATC systems a number of aspects has to be taken into account during the design of those systems. THOMSON-CSF/SIGNAAL takes these aspects into account during the design of their family of ATC systems EUROCAT 2000. Besides a controlled way of software design ADA is used as highly structured programming language supporting modularity, extendability and maintainability. This paper describes the way of software design and integration of the EUROCAT 2000 systems and the use of ADA therein.

1. INTRODUCTION

After the merge of the Air Traffic Control (ATC) division of Hollandse Signaalapparaten (SIGNAAL) in The Netherlands with the ATC department of THOMSON-CSF in France the strengths of both companies are combined into a new system concept of ATC systems.

In this paper a description is given of the development of a new family of ATC systems, called EUROCAT 2000, using this new system concept. During this development the fact that the components of the system have to be integrated into a complete working system is constantly taken into account.

Because there is a direct relation between the number and complexity of the interfaces in a system and its integration the first part of the paper gives a short description of a EUROCAT 2000 system.

The second part of the paper gives a description of the way system level software interfaces are defined during the design of the system. The third part of the paper describes the definition of lower level software interfaces.

The fourth part focusses on the preparations that are done before the integration and the activities that are done during the integration. Especially the preparations before the integration are very important to control the interrelated integration activities.
The fifth part describes how the components of a THOMSON-CSF EUROCAT 2000 system can be integrated into other systems (e.g. in ATC simulators).

The paper concludes with the list of references.

In the paper use is made of an example to illustrate the text. This example shows extracts of the definition of the system track interface between the radar data processing part and the display data processing part of a EUROCAT 2000 system. A system track is the logical representation of an aircraft that is detected by a number of radars.

2. EUROCAT 2000 SYSTEM DESCRIPTION

To be able to handle the currently increasing air traffic density and the increasing aircraft performance THOMSON-CSF/SIGNAAL has developed a new family of ATC systems, EUROCAT 2000.

The figure below shows the context in which such an ATC system operates.

Figure 1 ATC systems context

Systems of the EUROCAT 2000 family are distributed real-time systems that are characterized by their use of standards and their system modularity.

The real-time character of the systems is shown by the strict performance requirements (it does not make sense to present an aircraft on a display a number of minutes after it has been detected by a radar) and the degree of availability (both hardware redundancy and graceful degradation are supported).

The architecture of the systems is distributed in two ways:

1. the total system functionality is distributed over multiple processors,
2. the controllers using the system all have their own