

1. Record Nr.	UNINA9910132350003321
Autore	Larrieu Nicolas
Titolo	Rapid prototyping software for avionics systems : model-oriented approaches for complex systems certification / / Nicolas Larrieu, Antoine Varet
Pubbl/distr/stampa	London, England ; ; Hoboken, New Jersey : , : ISTE : , : Wiley, , 2014 ©2014
ISBN	1-119-05063-4 1-119-05064-2 1-119-05057-X
Descrizione fisica	1 online resource (154 p.)
Collana	Focus Series, , 2051-249X
Disciplina	620.0042
Soggetti	Rapid prototyping
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover; Title Page; Copyright; Contents; Introduction; I.1. The use of model-based approaches; I.2. Structure of this book; Chapter1: Developing Model-Based Design Methods in Software Engineering; 1.1. The history of model-based design; 1.2. The Unified Modeling Language, a support for model-based methods; 1.2.1. The philosophy and history of the Unified Modeling Language; 1.2.2. The Unified Modeling Language normalized diagrams; 1.2.3. The advantages of model-based design; 1.3. Formal model-based validation techniques; 1.3.1. Model Checking; 1.3.2. Formal theorem proving 1.3.3. Code assertion1.3.4. Applying for certification for complex systems; Chapter2: Methodology for Rapid Prototyping Avionic Software; 2.1. The specificities of the avionic domain; 2.1.1. System virtualization: integrated modular avionics; 2.1.1.1. ARINC 653 APEX interface: application executive; 2.1.1.2. AFDX bus: Avionics Full-Duplex switched ethernet; 2.1.2. MILS: divide and conquer, to rule over a secure world; 2.1.3. Processing security and safety aspects simultaneously; 2.2. The certification of an avionic system; 2.2.1. The qualification of tools for certification 2.2.2. Model-based development approaches in aeronautics2.2.2.1. DO-178C: Software Considerations in Airborne Systems and Equipment

Certification; 2.2.2.2. DO-331: Model-based development and verification; 2.2.3. A sophisticated methodology for the development of complex onboard systems; 2.3. Methodology of rapid development in seven stages; 2.3.1. Presentation of the different stages; 2.3.2. Advantages of the methodology; 2.3.3. Example of the benefits of using our model-based methodology; 2.3.4. Instantiation of the methodology with different tools  
 2.3.4.1. Summary of compatible tool chains 2.3.4.2. Organization of the architecture of the software solution; 2.3.4.3. Design: modeling with Simulink and Stateflow; 2.3.4.4. Transforming into the language C with Gene-Auto; 2.3.4.5. Execution with a strengthened onboard operating system; 2.3.4.5.1. Glueing and compiling code; 2.3.4.5.2. Integration with Sysgo PikeOS; 2.4. Chapter summary; Chapter 3: Implementing the Prototyping Methodology to Develop a Next Generation Avionic Router; 3.1. Introduction to next generation aeronautical communication domains  
 3.1.1. Avionic and aeronautical network domains 3.1.2. Communication standards and protocols for next generation aeronautics; 3.1.3. The benefits of a next generation avionic router: secure next generation router; 3.1.3.1. Interconnecting avionic domains with a next generation router; 3.1.3.2. Mutualization of ground-board aeronautical links by a next generation router; 3.2. Implementing the SNG router; 3.2.1. Architecture of the SNG router software; 3.2.2. Routing functionalities (IPv4); 3.2.2.1. The principles of routing for the SNG; 3.2.2.2. Implementing routing functionalities  
 3.2.2.2.1. Description of the structure of the routing table

---

## Sommario/riassunto

The design, implementation and validation of avionics and aeronautical systems have become extremely complex tasks due to the increase of functionalities that are deployed in current avionics systems and the need to be able to certify them before putting them into production. This book proposes a methodology to enable the rapid prototyping of such a system by considering from the start the certification aspects of the solution produced. This method takes advantage of the model-based design approaches as well as the use of formal methods for the validation of these systems. Furthermore, the use

---