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for practitioners, including architects, developers, integrators, validators, certifiers, first-level technical leaders, and project managers.

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Architecture, and is an excellent reference for practitioners, including architects, developers, integrators, validators, certifiers, first-level technical leaders, and project managers.

?Model-Based Engineering with AADL: An Introduction to the ...

Model-Based Engineering with AADL: An Introduction to the SAE Architecture Analysis & Design Language (SEI Series in Software Engineering) by Peter H. Feiler (2012-10-05) Hardcover - January 1, 1890. by Peter H. Feiler;David P. Gluch (Author)

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The AADL is a unifying framework for model-based software systems engineering that you use to capture the static modular software architecture, the runtime architecture in terms of communicating tasks, the computer platform architecture on which the software is deployed, and any physical system or environment with which the system interacts.

Model-Based Engineering with AADL

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first guide to using this new international standard to optimize your development processes. Coauthored by Peter H. Feiler, the standard's author and technical lead, this introductory reference and tutorial is ideal for self-directed learning or classroom instruction, and is an excellent reference

Model-Based Engineering with AADL

AADL and MBE Feiler, Oct 20, 2014 © 2014

Carnegie Mellon University Model-based

Engineering in Practice Modeling is used in practice • Modeling, analysis, and simulation in mechanical, control, computer hardware

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engineering Current practice: modeling and software - Remember software through pictures - MDE and MDA with UML

AADL and Model-based Engineering

An Integrated Approach to Model Based Engineering with SysML, AADL and FACE

2018-01-1942 Multiple model-based engineering (MBE) frameworks have emerged to cover the many requirements for the engineering of avionics systems: from early requirement capture to the final system and embedded software generation, through refinement and V&V activities.

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*An Integrated Approach to Model Based
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The Architecture Analysis & Design Language (AADL) supports software architects and developers in the predictable model-based engineering of real-time and embedded computer systems. The SAE AADL standard consists of a language with a precise semantics that allows users to define software and hardware components and their interactions.

AADL and OSATE: A Tool Kit to Support Model-
Page 12/50

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Standards-Based: CAMET Library tools consume models represented in the SAE standard Architecture Analysis & Design Language (AADL) known for its ability to model embedded system software. Several tools support other standards such as Future Airborne Capability Environment (FACE™) and System Modeling Language (SysML). Tools, Training, and Reference Materials for using AADL with FACE are on CAMET Library and available publicly here.

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Abstract. Multiple model-based engineering (MBE) frameworks have emerged to cover the many requirements for the engineering of avionics systems: from early requirement capture to the final system and embedded software generation, through refinement and V&V activities. In this paper, we consider the SysML, AADL and FACE standards.

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@inproceedings{Feiler2012ModelBasedEW,  
title={Model-Based Engineering with AADL},  
author={P. Feiler and D. Gluch}, year={2012}  
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Feiler & Gluch, Model-Based Engineering with AADL: An ...

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Model-based Engineering for Embedded Systems
The AADL framework allows the analysis of system designs (and system of systems designs) prior to development and supports an architecture-centric, model-based development approach throughout the system lifecycle.

Architecture Analysis and Design Language

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Architecture For self-directed learning or classroom instruction, and is an excellent reference for practitioners, including architects, developers, integrators, validators, certifiers, first-level technical leaders, and project managers.

Model-Based Engineering with AADL eBook by Peter H. Feiler ...

Model-Based Engineering with AADL is the first guide to using this new international standard to optimize your development processes.

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Conventional build-then-test practices are making today's embedded, software-reliant systems unaffordable to build. In response, more than thirty leading industrial organizations have joined SAE (formerly, the Society of Automotive Engineers) to define the SAE Architecture Analysis & Design Language (AADL) AS-5506 Standard, a rigorous and extensible foundation for model-based engineering analysis practices that encompass software system design, integration, and assurance. Using AADL, you can conduct

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Architecture and rigorous analyses of critical real-time factors such as performance, dependability, security, and data integrity. You can integrate additional established and custom analysis/specification techniques into your engineering environment, developing a fully unified architecture model that makes it easier to build reliable systems that meet customer expectations. Model-Based Engineering with AADL is the first guide to using this new international standard to optimize your development processes. Coauthored by Peter H. Feiler, the standard's author and technical lead, this introductory

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Architecture and tutorial Design Language is ideal for self-directed learning or classroom instruction, and is an excellent reference for practitioners, including architects, developers, integrators, validators, certifiers, first-level technical leaders, and project managers. Packed with real-world examples, it introduces all aspects of the AADL notation as part of an architecture-centric, model-based engineering approach to discovering embedded software systems problems earlier, when they cost less to solve. Throughout, the authors compare AADL to other modeling notations and approaches,

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Architecture & Design Language while presenting the language via a complete case study: the development and analysis of a realistic example system through repeated refinement and analysis. Part One introduces both the AADL language and core Model-Based Engineering (MBE) practices, explaining basic software systems modeling and analysis in the context of an example system, and offering practical guidelines for effectively applying AADL. Part Two describes the characteristics of each AADL element, including their representations, applicability, and constraints. The Appendix includes comprehensive listings of AADL language

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Architecture, properties Design Language elements, properties incorporated in the AADL standard, and a description of the book's example system.

The first complete guide to SAE AADL: written by the standard's author, completely authoritative, and promoted by both SAE and SEI * *Thoroughly explains the new SAE AADL architecture notation for model-based analysis and validation of mission/safety-critical software-reliant systems. *Presents many real-world examples: ideal for self-learning, instruction, and as a working reference. *Addresses a key standard

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pioneered by Boeing, Lockheed Martin, Rockwell Collins, DOD, FAA, NASA, ESA, JAXA, and many top universities. Embedded, software-reliant systems are increasingly critical in many industries. In response, 30+ organizations have joined SAE (formerly, the Society of Automobile Engineers) to define the Architecture Analysis and Design Language (AADL). This international industry standard will help streamline and improve systems development through state-of-the-art architecture modeling, analysis, and validation. Ideal for both self-learning and classroom instruction, and an excellent

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reference for implementers, Model-Based Engineering with AADL is the first book on this crucial new standard. It introduces the reader to all aspects of AADL notation as part of an architecture-centric, model-based engineering approach to discover embedded software systems problems earlier in the lifecycle, and thereby solve them more cost-effectively. Co-authored by Peter Feiler, the standard's author and technical lead, this introductory reference and tutorial is packed with real-world examples. Throughout, the authors compare AADL to other modeling notations and approaches, while presenting

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the language via a complete case study: the development and analysis of a realistic example system through repeated refinement and analysis.

Conventional build-then-test practices are making today's embedded, software-reliant systems unaffordable to build. In response, more than thirty leading industrial organizations have joined SAE (formerly, the Society of Automotive Engineers) to define the SAE Architecture Analysis & Design Language (AADL) AS-5506 Standard, a rigorous and extensible foundation for model-based

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Architecture Analysis Design Language engineering analysis practices that encompass software system design, integration, and assurance. Using AADL, you can conduct lightweight and rigorous analyses of critical real-time factors such as performance, dependability, security, and data integrity. You can integrate additional established and custom analysis/specification techniques into your engineering environment, developing a fully unified architecture model that makes it easier to build reliable systems that meet customer expectations. Model-Based Engineering with AADL is the first guide to using this new international standard to

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Architecture And Design Languages.

Coauthored by Peter H. Feiler, the standard's author and technical lead, this introductory reference and tutorial is ideal for self-directed learning or classroom instruction, and is an excellent reference for practitioners, including architects, developers, integrators, validators, certifiers, first-level technical leaders, and project managers. Packed with real-world examples, it introduces all aspects of the AADL notation as part of an architecture-centric, model-based engineering approach to discovering embedded software systems

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problems earlier, when they cost less to solve. Throughout, the authors compare AADL to other modeling notations and approaches, while presenting the language via a complete case study: the development and analysis of a realistic example system through repeated refinement and analysis. Part One introduces both the AADL language and core Model-Based Engineering (MBE) practices, explaining basic software systems modeling and analysis in the context of an example system, and offering practical guidelines for effectively applying AADL. Part Two describes the characteristics of each AADL element, including their

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representations, applicability, and constraints. The Appendix includes comprehensive listings of AADL language elements, properties incorporated in the AADL standard, and a description of the book's example system.

Since the construction of the first embedded system in the 1960s, embedded systems have continued to spread. They provide a continually increasing number of services and are part of our daily life. The development of these systems is a difficult problem which does not yet have a global solution. Another

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difficulty is that systems are plunged into the real world, which is not discrete (as is generally understood in computing), but has a richness of behaviors which sometimes hinders the formulation of simplifying assumptions due to their generally autonomous nature and they must face possibly unforeseen situations (incidents, for example), or even situations that lie outside the initial design assumptions. Embedded Systems presents the state of the art of the development of embedded systems and, in particular, concentrates on the modeling and analysis of these systems by looking at "model-driven

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engineering", (MDE2): SysML, UML/MARTE and AADL. A case study (based on a pacemaker) is presented which enables the reader to observe how the different aspects of a system are addressed using the different approaches. All three systems are important in that they provide the reader with a global view of their possibilities and demonstrate the contributions of each approach in the different stages of the software lifecycle. Chapters dedicated to analyzing the specification and code generation are also presented. Contents Foreword, Brian R. Larson. Foreword, Dominique Potier.

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Introduction, Fabrice Kordon, Jérôme Hugues, Agusti Canals and Alain Dohet. Part 1.

General Concepts 1. Elements for the Design of Embedded Computer Systems, Fabrice Kordon, Jérôme Hugues, Agusti Canals and Alain Dohet.

2. Case Study: Pacemaker, Fabrice Kordon, Jérôme Hugues, Agusti Canals and Alain Dohet.

Part 2. SysML 3. Presentation of SysML

Concepts, Jean-Michel Bruel and Pascal Roques. 4. Modeling of the Case Study Using

SysML, Loïc Fejoz, Philippe Leblanc and

Agusti Canals. 5. Requirements Analysis, Ludovic Apvrille and Pierre De Saqui-Sannes.

Part 3. MARTE 6. An Introduction to MARTE

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Concepts, Sébastien Gérard and François Terrier. 7. Case Study Modeling Using MARTE, Jérôme Delatour and Joël Champeau. 8. Model-Based Analysis, Frederic Boniol, Philippe Dhaussy, Luka Le Roux and Jean-Charles Roger. 9. Model-Based Deployment and Code Generation, Chokri Mraidha, Ansgar Radermacher and Sébastien Gérard. Part 4. AADL 10. Presentation of the AADL Concepts, Jérôme Hugues and Xavier Renault. 11. Case Study Modeling Using AADL, Etienne Borde. 12. Model-Based Analysis, Thomas Robert and Jérôme Hugues. 13. Model-Based Code Generation, Laurent Pautet and Béchir Zalila.

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Architecture Description Languages is an essential reference for both academic and professional researchers in the field of system engineering and design. The papers presented in this volume were selected from the workshop of the same name that was held as part of the World Computer Congress 2004 Conference, held in Toulouse, France in August 2004. This collection presents significant research and innovative developments and applications from both academic researchers and industry practitioners on topics ranging from

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Semantics to Tool and Development
Environments. The aim of an ADL is to formally describe software and hardware architectures. Usually, an ADL describes components, their interfaces, their structures, their interactions (structure of data flow and control flow) and the mappings to hardware systems. A major goal of such description is to allow analysis with respect to several aspects like timing, safety, reliability. The papers in this state-of-the-art volume cover such topics of interest as components, connectors, composition; semantics and formalization; verification,

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simulation and test; tools and development environments; standardization; industrial projects. To encourage closer interaction between academic and industrial networking research communities, the workshop welcomed academic research papers as well as industrial contributions, and both are included here. Which makes this collection important not only for ADL experts and researchers, but also for all teachers and administrators interested in ADL.

This open access book coherently gathers well-founded information on the fundamentals of

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Architecture and formalisms for modelling cyber-physical systems (CPS). Highlighting the cross-disciplinary nature of CPS modelling, it also serves as a bridge for anyone entering CPS from related areas of computer science or engineering. Truly complex, engineered systems—known as cyber-physical systems—that integrate physical, software, and network aspects are now on the rise. However, there is no unifying theory nor systematic design methods, techniques or tools for these systems. Individual (mechanical, electrical, network or software) engineering disciplines only offer partial solutions. A technique

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known as Multi-Paradigm Modelling has recently emerged suggesting to model every part and aspect of a system explicitly, at the most appropriate level(s) of abstraction, using the most appropriate modelling formalism(s), and then weaving the results together to form a representation of the system. If properly applied, it enables, among other global aspects, performance analysis, exhaustive simulation, and verification. This book is the first systematic attempt to bring together these formalisms for anyone starting in the field of CPS who seeks solid modelling foundations

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and a comprehensive introduction to the distinct existing techniques that are multi-paradigmatic. Though chiefly intended for master and post-graduate level students in computer science and engineering, it can also be used as a reference text for practitioners.

This book constitutes the proceedings of the 7th International Symposium on Model-Based Safety and Assessment, IMBSA 2020, held in Lisbon, Portugal, in September 2020. The conference was held virtually due to the COVID-19 pandemic. The 15 revised full papers

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Architecture Year's Design Language and 4 short papers presented were carefully reviewed and selected from 30 initial submissions. The papers are organized in topical sections on safety models and languages; state-space modeling; dependability analysis process; safety assessment in automotive domain; AI and safety assurance.

This book presents ARCADIA—a tooled method devoted to systems and architecture engineering, especially for those dealing with strong constraints to be reconciled (cost, performance, safety, security, reuse,

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consumption, weight). The book describes the detailed reasoning necessary to: understand the real customer need; define and share the product architecture among all engineering stakeholders; early validate its design and justify it; and ease and master integration, validation, verification and qualification (IVVQ). Offers a comprehensive examination of systems engineering, including the use of models to support it Not only yet another book on modeling, but rather a journey in systems engineering, enlightening the use of models to support it. Focuses on solitary modeling tasks while also covering prime

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collaborations between engineering stakeholders Examines modeling techniques to capture and share architecture and to early verify it against need and non-functional constraints Addresses subjects not usually covered by model-based system engineering (MBSE) methods, such as co-engineering with specialties, system/sub-system co-engineering, integration verification and validation Features a powerful, dedicated tool (Capella) Covers a range of topics, including an introduction to system engineering issues, an introduction to MBSE, a presentation of the method for beginners

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Architecture For Design Language
and a handy reference manual for advanced users

A foundational text that offers a rigorous introduction to the principles of design, specification, modeling, and analysis of cyber-physical systems. A cyber-physical system consists of a collection of computing devices communicating with one another and interacting with the physical world via sensors and actuators in a feedback loop. Increasingly, such systems are everywhere, from smart buildings to medical devices to automobiles. This textbook offers a rigorous

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and comprehensive introduction to the principles of design, specification, modeling, and analysis of cyber-physical systems. The book draws on a diverse set of subdisciplines, including model-based design, concurrency theory, distributed algorithms, formal methods of specification and verification, control theory, real-time systems, and hybrid systems, explaining the core ideas from each that are relevant to system design and analysis. The book explains how formal models provide mathematical abstractions to manage the complexity of a system design. It covers both synchronous and

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asynchronous models for concurrent computation, continuous-time models for dynamical systems, and hybrid systems for integrating discrete and continuous evolution. The role of correctness requirements in the design of reliable systems is illustrated with a range of specification formalisms and the associated techniques for formal verification. The topics include safety and liveness requirements, temporal logic, model checking, deductive verification, stability analysis of linear systems, and real-time scheduling algorithms. Principles of modeling,

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Architecture, Verification, and analysis are illustrated by constructing solutions to representative design problems from distributed algorithms, network protocols, control design, and robotics. This book provides the rapidly expanding field of cyber-physical systems with a long-needed foundational text by an established authority. It is suitable for classroom use or as a reference for professionals.

Software architecture—the conceptual glue that holds every phase of a project together for its many stakeholders—is widely

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recognized as a critical element in modern software development. Practitioners have increasingly discovered that close attention to a software system's architecture pays valuable dividends. Without an architecture that is appropriate for the problem being solved, a project will stumble along or, most likely, fail. Even with a superb architecture, if that architecture is not well understood or well communicated the project is unlikely to succeed. Documenting Software Architectures, Second Edition, provides the most complete and current guidance, independent of language or

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Architecture, on how to capture an architecture in a commonly understandable form. Drawing on their extensive experience, the authors first help you decide what information to document, and then, with guidelines and examples (in various notations, including UML), show you how to express an architecture so that others can successfully build, use, and maintain a system from it. The book features rules for sound documentation, the goals and strategies of documentation, architectural views and styles, documentation for software interfaces and software behavior, and templates for capturing and organizing information to

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Architecture Model Design Language
generate a coherent package. New and improved in this second edition: Coverage of architectural styles such as service-oriented architectures, multi-tier architectures, and data models Guidance for documentation in an Agile development environment Deeper treatment of documentation of rationale, reflecting best industrial practices Improved templates, reflecting years of use and feedback, and more documentation layout options A new, comprehensive example (available online), featuring documentation of a Web-based service-oriented system Reference guides for three important

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Architecture documentation languages: UML,
AADL, and SysML

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