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Formal Specification and Verification of a Communication Protocol

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Communication Protocol Specification And Verification

AW Rasmussen

Communication Protocol Specification And Verification:

Communication Protocol Specification and Verification Richard Lai,Ajin Jirachiefpattana,2012-12-06 Communication protocols are rules whereby meaningful communication can be exchanged between different communicating entities In general they are complex and difficult to design and implement Specifications of communication protocols written in a natural language e g English can be unclear or ambiguous and may be subject to different interpretations As a result independent implementations of the same protocol may be incompatible In addition the complexity of protocols make them very hard to analyze in an informal way There is therefore a need for precise and unambiguous specification using some formal languages Many protocol implementations used in the field have almost suffered from failures such as deadlocks When the conditions in which the protocols work correctly have been changed there has been no general method available for determining how they will work under the new conditions It is necessary for protocol designers to have techniques and tools to detect errors in the early phase of design because the later in the process that a fault is discovered the greater the cost of rectifying it Protocol verification is a process of checking whether the interactions of protocol entities according to the protocol specification do indeed satisfy certain properties or conditions which may be either general e g absence of deadlock or specific to the particular protocol system directly derived from the specification In the 80s an ISO International Organization for Standardization working group began a programme of work to develop formal languages which were suitable for Open Systems Interconnection OSI This group called such languages Formal Description Techniques FDTs Some of the objectives of ISO in developing FDTs were enabling unambiguous clear and precise descriptions of OSI protocol standards to be written and allowing such specifications to be verified for correctness There aretwo FDTs standardized by ISO LOTOS and Estelle Communication Protocol Specification and Verification is written to address the two issues discussed above the needs to specify a protocol using an FDT and to verify its correctness in order to uncover specification errors in the early stage of a protocol development process The readership primarily consists of advanced undergraduate students postgraduate students communication software developers telecommunication engineers EDP managers researchers and software engineers It is intended as an advanced undergraduate or postgraduate textbook and a reference for communication protocol professionals *Formal Methods for Communication Protocol Specification and Verification* Carl A. Sunshine,Rand Corporation,1979 Increasingly numerous and complex communication protocols are being employed in distributed systems and computer networks of all types This Note describes some of the more formal techniques that are being developed to facilitate design of correct protocols Our major conclusion is that it is vital to specify the services provided by a protocol layer in addition to specifying the cooperating protocol entities which make up the layer We develop service specifications of several representative protocols by using formal techniques from software engineering such as abstract machines and buffer histories A survey of protocol verification methods and a bibliography indexed by key phrases

are also provided Author Communication Protocol Specification and Verification Richard Lai,1998 **Protocol Specification, Testing and Verification, XII** R.J. Linn,M.Ü. Uyar,2016-09-20 For more than a decade researchers and engineers have been addressing the problem of the application of formal description techniques to protocol specification implementation testing and verification This book identifies the many successes that have been achieved within the industrial framework and the difficulties encountered in applying theoretical methods to practical situations Issues discussed include testing and certification verification validation environments and automated tools formal specifications protocol conversion implementation specification languages and models Consideration is also given to the concerns surrounding education available to students and the need to upgrade and develop this through sponsorship of a study of an appropriate curriculum at both undergraduate and graduate levels It is hoped this publication will stimulate such support and inspire further research in this important arena **Protocol Specification, Testing, and Verification, IV** Yechiam Yemini,Robert Strom,Shaula Yemini,1985 Hardbound This book covers research in protocol theory and analysis specification and formal models of protocols protocol validation and verification performance analysis of protocols and protocol design implementation and testing Main Features 1 Broad coverage of the research in the area of computer communication protocols 2 A combination of theoretical and experimental research on protocol modelling design analysis synthesis verification and testing 3 A description of international research activities conducted by leading researchers in the field from over 13 countries *Protocol Specification, Testing, and Verification, VIII* Sudhir Aggarwal,Krishan Sabnani,1988 Protocol Specification, Testing, and Verification, VII IFIP Working Group 6.1,1987 *On the Specification and Verification of Communication Protocols* A. Petrenko,1980 **Protocol Specification, Testing, and Verification, III** Harry Rudin,Colin H. West,1983 **Protocol Specification, Testing, and Verification, VI** Concordia University,Université de Montréal,1987 **Protocol Specification, Testing and Verification, X** Luigi Logrippo,Robert L. Probert,Hasan Ural,1990 The contributions to this book are from researchers and practitioners concerned with the theory and application of formal methods to the specification testing and verification of protocols for open systems Being the tenth in a successful series of symposia a special feature of the book is a number of invited papers on the same theme The First Ten Years The Next Ten Years *Protocol Specification, Testing, and Verification, IX* Ed Brinksma,Giuseppe Scollo,Chris A. Vissers,1990 Researchers and practitioners concerned with the application of formal methods to the design description analysis implementation and testing of open systems contributed to this book It is the ninth in a successful series of annual volumes *Protocol Specification, Testing, and Verification, VI* Concordia University,Université de Montréal,1987 *Protocol Specification, Testing and Verification XV* Piotr Dembinski,Marek Sredniawa,1995-11-30 This volume presents the latest research worldwide on communications protocols emphasizing specification and compliance testing It presents the complete proceedings of the fifteenth meeting on Protocol Specification Testing and Verification arranged by the

International Federation for Information Processing *Specification and Verification of Communication Protocols in AFFIRM Using State Transition Models* David H. Thompson,Carl A. Sunshine,Roddy W. Erickson,Susan L. Gerhart,Daniel Schwabe,UNIVERSITY OF SOUTHERN CALIFORNIA MARINA DEL REY INFORMATION SCIENCES INST.,1981 It is becoming increasingly important that communication protocols be formally specified and verified This report describes a particular approach the state transition model using a collection of mechanically supported specification nd verification tools incorporated in a running system called Affirm Although developed for the specification of abstract data types and the verification of their properties the formalism embodied in Affirm can also express the concepts underlying state transition machines Such models easily express most of the events occurring in protocol systems including those of the users their agent processes and the communication channels The report reviews the basic concepts of state transition models and the Affirm formalism and methodology and describes their union A detailed example the Alternating Bit Protocol illustrates various properties of interest for specification and verification Other examples explored using this formalism are briefly described and the accumulated experience is discussed Author *Protocol Specification, Testing and Verification XV* Piotr Dembinski,Marek Sredniawa,2016-01-09 This volume presents the latest research worldwide on communications protocols emphasizing specification and compliance testing It presents the complete proceedings of the fifteenth meeting on Protocol Specification Testing and Verification arranged by the International Federation for Information Processing **Formal Description Techniques and Protocol Specification, Testing and Verification** Atsushi Togashi,Tadanori Mizuno,Norio Shiratori,Teruo Higashino,2013-06-05 FORTE PSTV 97 addresses Formal Description Techniques FDTs applicable to Distributed Systems and Communication Protocols such as Estelle LOTOS SDL ASN 1 TTCN Z Automata Process Algebra Logic The conference is a forum for presentation of the state of the art in theory application tools and industrialization of FDTs and provides an excellent orientation for newcomers *Protocol Specification, Testing, and Verification, XI* Bengt Jonsson,Joachim Parrow,Björn Pehrson,1991 This book contains original contributions on theory applications and experiences from the use of advanced techniques applied to distributed systems The emphasis is on services and protocols Specific areas addressed include Specification languages and models Formal specification Testing and certification Implementation and Environments and automated tools In addition to these more traditional topics contributions are included on bull Specification testing and verification of real time properties bull Novel methods for formal specification of realistic services bull Automated and semi automated analysis of non finite state systems bull Design and implementation by stepwise refinement and bull Applications of the above to new generations of high speed networks multi media services and distributed environments for computer supported cooperative work *Protocol Specification, Testing, and Verification* Carl A. Sunshine,1982 **COMMUNICATION PROTOCOL ENGINEERING** PALLAPA VENKATARAM,SUNILKUMAR S. MANVI,B. SATHISH BABU,2014-02-11 This well accepted book now in its second edition is a time honoured revision and

extension of the previous edition With improved organization and enriched contents the book primarily focuses on the concepts of design development of communication protocols or communication software Beginning with an overview of protocol engineering the text analyzes important topics such as TCP IP suite protocol structure Protocol specification Protocol specification languages like SDL SPIN Estelle E LOTOS CPN UML etc Protocol verification and validation techniques like semantic models and reachability analysis Generating conformance test suite and its application to a running protocol implementation Audience Communication Protocol Engineering is purely a text dedicated to the undergraduate students of electronics and communication engineering and computer engineering The text is also of immense use to the postgraduate students of communication systems Highlights of Second Edition Incorporates latest and up to date information on the topics covered Includes a large number of figures and examples for easy understanding of concepts Presents some new sections like wireless protocol challenges TCP protocol verification of TCP test execution test case derivation etc Involves extension of protocol specification languages like SPIN Estelle Uppaal etc

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