



CAPERS JONES

Forewords by Walker Royce
and Tony Salvaggio



THE
TECHNICAL AND
SOCIAL HISTORY OF
SOFTWARE ENGINEERING

The Technical And Social History Of Software Engineering

Andrzej Yatsko, Walery Suslow



The Technical And Social History Of Software Engineering:

The Technical and Social History of Software Engineering Capers Jones, 2014 Pioneering software engineer Capers Jones has written the first and only definitive history of the entire software engineering industry Drawing on his extraordinary vantage point as a leading practitioner for several decades Jones reviews the entire history of IT and software engineering assesses its impact on society and previews its future One decade at a time Jones assesses emerging trends and companies winners and losers new technologies methods tools languages productivity quality benchmarks challenges risks professional societies and more He quantifies both beneficial and harmful software inventions accurately estimates the size of both the US and global software industries and takes on unexplained mysteries such as why and how programming languages gain and lose popularity

Formal Methods for Software Engineering Markus Roggenbach, Antonio Cerone, Bernd-Holger Schlingloff, Gerardo Schneider, Siraj Ahmed Shaikh, 2022-06-22 Software programs are formal entities with precise meanings independent of their programmers so the transition from ideas to programs necessarily involves a formalisation at some point The first part of this graduate level introduction to formal methods develops an understanding of what constitutes formal methods and what their place is in Software Engineering It also introduces logics as languages to describe reasoning and the process algebra CSP as a language to represent behaviours The second part offers specification and testing methods for formal development of software based on the modelling languages CASL and UML The third part takes the reader into the application domains of normative documents human machine interfaces and security Use of notations and formalisms is uniform throughout the book Topics and features Explains foundations and introduces specification verification and testing methods Explores various application domains Presents realistic and practical examples illustrating concepts Brings together contributions from highly experienced educators and researchers Offers modelling and analysis methods for formal development of software Suitable for graduate and undergraduate courses in software engineering this uniquely practical textbook will also be of value to students in informatics as well as to scientists and practical engineers who want to learn about or work more effectively with formal theories and methods Markus Roggenbach is a Professor in the Dept of Computer Science of Swansea University Antonio Cerone is an Associate Professor in the Dept of Computer Science of Nazarbayev University Nur Sultan Bernd Holger Schlingloff is a Professor in the Institut für Informatik of Humboldt Universität zu Berlin Gerardo Schneider is a Professor in the Dept of Computer Science and Engineering of University of Gothenburg Siraj Ahmed Shaikh is a Professor in the Institute for Future Transport and Cities of Coventry University The companion site for the book offers additional resources including further material for selected chapters prepared lab classes a list of errata slides and teaching material and virtual machines with preinstalled tools and resources for hands on experience with examples from the book The URL is <https://sefm-book.github.io>

Quantifying Software Capers Jones, 2017-10-24 Software is one of the most important products in human history and is widely used by all industries and all countries It is also one of the most expensive

and labor intensive products in human history Software also has very poor quality that has caused many major disasters and wasted many millions of dollars Software is also the target of frequent and increasingly serious cyber attacks Among the reasons for these software problems is a chronic lack of reliable quantified data This reference provides quantified data from many countries and many industries based on about 26 000 projects developed using a variety of methodologies and team experience levels The data has been gathered between 1970 and 2017 so interesting historical trends are available Since current average software productivity and quality results are suboptimal this book focuses on best in class results and shows not only quantified quality and productivity data from best in class organizations but also the technology stacks used to achieve best in class results The overall goal of this book is to encourage the adoption of best in class software metrics and best in class technology stacks It does so by providing current data on average software schedules effort costs and quality for several industries and countries Because productivity and quality vary by technology and size the book presents quantitative results for applications between 100 function points and 100 000 function points It shows quality results using defect potential and DRE metrics because the number one cost driver for software is finding and fixing bugs The book presents data on cost of quality for software projects and discusses technical debt but that metric is not standardized Finally the book includes some data on three years of software maintenance and enhancements as well as some data on total cost of ownership

A Guide to Selecting Software Measures and Metrics Capers Jones, 2017-03-03 Going where no book on software measurement and metrics has previously gone this critique thoroughly examines a number of bad measurement practices hazardous metrics and huge gaps and omissions in the software literature that neglect important topics in measurement The book covers the major gaps and omissions that need to be filled if data about software development is to be useful for comparisons or estimating future projects Among the more serious gaps are leaks in reporting about software development efforts that if not corrected can distort data and make benchmarks almost useless and possibly even harmful One of the most common leaks is that of unpaid overtime Software is a very labor intensive occupation and many practitioners work very long hours However few companies actually record unpaid overtime This means that software effort is underreported by around 15% which is too large a value to ignore Other sources of leaks include the work of part time specialists who come and go as needed There are dozens of these specialists and their combined effort can top 45% of total software effort on large projects The book helps software project managers and developers uncover errors in measurements so they can develop meaningful benchmarks to estimate software development efforts It examines variations in a number of areas that include Programming languages Development methodology Software reuse Functional and nonfunctional requirements Industry type Team size and experience Filled with tables and charts this book is a starting point for making measurements that reflect current software development practices and realities to arrive at meaningful benchmarks to guide successful software projects

Software Development Patterns and Antipatterns Capers Jones, 2021-08-27 Software

development has been a troubling since it first started There are seven chronic problems that have plagued it from the beginning Incomplete and ambiguous user requirements that grow by 2% per month Major cost and schedule overruns for large applications 35% higher than planned Low defect removal efficiency DRE Cancelled projects that are not completed 30% above 10 000 function points Poor quality and low reliability after the software is delivered 5 bugs per FP Breach of contract litigation against software outsource vendors Expensive maintenance and enhancement costs after delivery These are endemic problems for software executives software engineers and software customers but they are not insurmountable In *Software Development Patterns and Antipatterns* software engineering and metrics pioneer Capers Jones presents technical solutions for all seven The solutions involve moving from harmful patterns of software development to effective patterns of software development The first section of the book examines common software development problems that have been observed in many companies and government agencies The data on the problems comes from consulting studies breach of contract lawsuits and the literature on major software failures This section considers the factors involved with cost overruns schedule delays canceled projects poor quality and expensive maintenance after deployment The second section shows patterns that lead to software success The data comes from actual companies The section's first chapter on Corporate Software Risk Reduction in a Fortune 500 company was based on a major telecom company whose CEO was troubled by repeated software failures The other chapters in this section deal with methods of achieving excellence as well as measures that can prove excellence to C level executives and with continuing excellence through the maintenance cycle as well as for software development

Software Quality Daniel Galin, 2018-02-15 The book presents a comprehensive discussion on software quality issues and software quality assurance SQA principles and practices and lays special emphasis on implementing and managing SQA Primarily designed to serve three audiences universities and college students vocational training participants and software engineers and software development managers the book may be applicable to all personnel engaged in a software projects Features A broad view of SQA The book delves into SQA issues going beyond the classic boundaries of custom made software development to also cover in house software development subcontractors and readymade software An up to date wide range coverage of SQA and SQA related topics Providing comprehensive coverage on multifarious SQA subjects including topics hardly explored till in SQA texts A systematic presentation of the SQA function and its tasks establishing the SQA processes planning coordinating follow up review and evaluation of SQA processes Focus on SQA implementation issues Specialized chapter sections examples implementation tips and topics for discussion Pedagogical support Each chapter includes a real life mini case study examples a summary selected bibliography review questions and topics for discussion The book is also supported by an Instructor's Guide

Smart Maintenance for Human-Robot Interaction Bo Xing, Tshilidzi Marwala, 2017-09-08 This self contained book written by active researchers presents up to date information on smart maintenance strategies for human robot interaction HRI and the associated

applications of novel search algorithms in a single volume eliminating the need to consult scattered resources Unlike other books it addresses maintaining a smart HRI from three dimensions namely hardware cyberware and hybrid asset management covering problems encountered in each through a wide variety of representative examples and elaborated illustrations Further the diverse mathematical models and intelligent systems constructions make the book highly practical It enables readers interested in maintenance robotics and intelligent systems but perplexed by myriads of interrelated issues to grasp basic methodologies At the same time the referenced literature can be used as a roadmap for conducting deeper researches

Software Methodologies Capers Jones, 2017-07-06 This comprehensive reference uses a formal and standard evaluation technique to show the strengths and weakness of more than 60 software development methodologies such as agile DevOps RUP Waterfall TSP XP and many more Each methodology is applied to an application of 1000 function points using the Java language Each methodology produces a characteristic set of results for development schedules productivity costs and quality The intent of the book is to show readers the optimum kinds of methodologies for the projects they are concerned with and to warn them about counter indications and possible harm from unsuitable methodologies

Insight into Theoretical and Applied Informatics Andrzej Yatsko, Walery Suslow, 2015-01-01 The book is addressed to young people interested in computer technologies and computer science The objective of this book is to provide the reader with all the necessary elements to get him or her started in the modern field of informatics and to allow him or her to become aware of the relationship between key areas of computer science The book is addressed not only to future software developers but also to all who are interested in computing in a widely understood sense The authors also expect that some computer professionals will want to review this book to lift themselves above the daily grind and to embrace the excellence of the whole field of computer science Unlike existing books this one bypasses issues concerning the construction of computers and focuses only on information processing Recognizing the importance of the human factor in information processing the authors intend to present the theoretical foundations of computer science software development rules and some business aspects of informatics in non technocratic humanistic terms

Visual Experiences Carla Viviana Coleman, 2017-07-31 Visual Experiences A Concise Guide to Digital Interface Design provides step by step examples to enable readers to create an interface guiding them from sketching an idea to creating an interactive prototype This creation of a visual experience is achieved in three steps thought design and interaction This book focuses on the visual experience of digital interface design from the initial idea to end user prototype Key Features Shows how to design visual digital interface experiences a concise guide to creating successful prototypes without programming Teaches the whole process of how to sketch design and create interactions Unlike other books this book does not just give a list of terminologies but workable examples and methods Includes a wide range of basic to advanced exercises geared towards professionals and students alike Includes many illustrations throughout the book guiding the reader through the process

Milestones in Analog and Digital Computing

Herbert Bruderer, 2021-01-04 This Third Edition is the first English language edition of the award winning Meilensteine der Rechentechnik illustrated in full color throughout in two volumes The Third Edition is devoted to both analog and digital computing devices as well as the world's most magnificent historical automatons and select scientific instruments employed in astronomy surveying time measurement etc It also features detailed instructions for analog and digital mechanical calculating machines and instruments and is the only such historical book with comprehensive technical glossaries of terms not found in print or in online dictionaries The book also includes a very extensive bibliography based on the literature of numerous countries around the world Meticulously researched the author conducted a worldwide survey of science technology and art museums with their main holdings of analog and digital calculating and computing machines and devices historical automatons and selected scientific instruments in order to describe a broad range of masterful technical achievements Also covering the history of mathematics and computer science this work documents the cultural heritage of technology as well

Mad by the Millions Harry Yi-Jui Wu, 2021-04-13 The World Health Organization's post World War II work on the epidemiology and classification of mental disorders and its vision of a world psyche In 1946 the World Health Organization undertook a project in social psychiatry that aimed to discover the epidemiology and classification of mental disorders In Mad by the Millions Harry Y Jui Wu examines the WHO's ambitious project arguing that it was shaped by the postwar faith in technology and expertise and the universalizing vision of a world psyche Wu shows that the WHO's idealized scientific internationalism laid the foundations of today's highly highly metricalized global mental health system

Software Kim W. Tracy, 2021-09-20 Software history has a deep impact on current software designers computer scientists and technologists System constraints imposed in the past and the designs that responded to them are often unknown or poorly understood by students and practitioners yet modern software systems often include old software and historical programming techniques This work looks at software history through specific software areas to develop student consumable practices design principles lessons learned and trends useful in current and future software design It also exposes key areas that are widely used in modern software yet infrequently taught in computing programs Written as a textbook this book uses specific cases from the past and present to explore the impact of software trends and techniques Building on concepts from the history of science and technology software history examines such areas as fundamentals operating systems programming languages programming environments networking and databases These topics are covered from their earliest beginnings to their modern variants There are focused case studies on UNIX APL SAGE GNU Emacs Autoflow internet protocols System R and others Extensive problems and suggested projects enable readers to deeply delve into the history of software in areas that interest them most

History of Computing: Software Issues Ulf Hashagen, Reinhard Keil-Slawik, Arthur L. Norberg, 2013-06-29

Techno-Fixers Sean F. Johnston, 2020-03-26 This is the story of a seductive idea Over the past century the potential of new technology to solve social dilemmas has captivated modern culture From apps that encourage

physical activity to airport scanners meant to prevent terrorism the concept that clever innovation can improve society is irresistible but faith in such technological fixes is seldom questioned Where did this idea come from what makes it so appealing and how does it endanger our future Techno Fixers traces the source of modern confidence in technology to engineering hubris radical utopian movements science fiction fanzines policy makers soundbites corporate marketing and optimistic consumer culture from the turn of the twentieth century until today Sean Johnston demonstrates that through the promotion of prominent government scientists technocrats entrepreneurs and popular media modern invention became the favourite tool for addressing human problems and society's ills Nonetheless when it comes to assessing the success of cigarette filters as the solution to safe smoking or DDT as the answer for agricultural productivity the evidence is sobering Cautioning that the rhetoric of technological fixes seldom matches reality Johnston examines how employing innovation to bypass traditional methods can foster as many problems as it solves A critical examination of modern faith in technology Techno Fixers evaluates past mistakes present implications and future opportunities for innovating societies

Software Process Improvement for Small and Medium Enterprises: Techniques and Case Studies Oktaba, Hanna, Piattini, Mario, 2008-04-30 Software engineering is of major importance to all enterprises however the key areas of software quality and software process improvement standards and models are currently geared toward large organizations where most software organizations are small and medium enterprises Software Process Improvement for Small and Medium Enterprises Techniques and Case Studies offers practical and useful guidelines models and techniques for improving software processes and products for small and medium enterprises utilizing the authoritative demonstrative tools of case studies and lessons learned to provide academics scholars and practitioners with an invaluable research source

Collaborative Software Engineering Ivan Mistrik, John Grundy, André van der Hoek, Jim Whitehead, 2010-03-10 Collaboration among individuals from users to developers is central to modern software engineering It takes many forms joint activity to solve common problems negotiation to resolve conflicts creation of shared definitions and both social and technical perspectives impacting all software development activity The difficulties of collaboration are also well documented The grand challenge is not only to ensure that developers in a team deliver effectively as individuals but that the whole team delivers more than just the sum of its parts The editors of this book have assembled an impressive selection of authors who have contributed to an authoritative body of work tackling a wide range of issues in the field of collaborative software engineering The resulting volume is divided into four parts preceded by a general editorial chapter providing a more detailed review of the domain of collaborative software engineering Part 1 is on Characterizing Collaborative Software Engineering Part 2 examines various Tools and Techniques Part 3 addresses organizational issues and finally Part 4 contains four examples of Emerging Issues in Collaborative Software Engineering As a result this book delivers a comprehensive state of the art overview and empirical results for researchers in academia and industry in areas like software process management empirical software engineering

and global software development Practitioners working in this area will also appreciate the detailed descriptions and reports which can often be used as guidelines to improve their daily work A Companion to American Technology Carroll Pursell,2008-04-30 A Companion to American Technology is a groundbreaking collection of original essays that analyze the hard to define phenomenon of technology in America 22 original essays by expert scholars cover the most important features of American technology including developments in automobiles television and computing Analyzes the ways in which technologies are organized such as in the engineering profession government medicine and agriculture Includes discussions of how technologies interact with race gender class and other organizing structures in American society **Encyclopedia of Software Engineering Three-Volume Set (Print)** Phillip A. Laplante,2010-11-22 Software engineering requires specialized knowledge of a broad spectrum of topics including the construction of software and the platforms applications and environments in which the software operates as well as an understanding of the people who build and use the software Offering an authoritative perspective the two volumes of the Encyclopedia of Software Engineering cover the entire multidisciplinary scope of this important field More than 200 expert contributors and reviewers from industry and academia across 21 countries provide easy to read entries that cover software requirements design construction testing maintenance configuration management quality control and software engineering management tools and methods Editor Phillip A Laplante uses the most universally recognized definition of the areas of relevance to software engineering the Software Engineering Body of Knowledge SWEBOK as a template for organizing the material Also available in an electronic format this encyclopedia supplies software engineering students IT professionals researchers managers and scholars with unrivaled coverage of the topics that encompass this ever changing field Also Available Online This Taylor E mail e reference taylorandfrancis com International Tel 44 0 20 7017 6062 E mail online sales tandf co uk Builders of the Vision Daniel Cardoso Llach,2015-06-05 Builders of the Vision traces the intellectual history and contemporary practices of Computer Aided Design CAD and Numerical Control since the years following World War II until today Drawing from primary archival and ethnographic sources it identifies and documents the crucial ideas shaping digital design technologies since the first numerical control and CAD systems were developed under US Air Force research contracts at MIT between 1949 and 1970 the cybernetic theorization of design as a human machine endeavor the vision of computers as perfect slaves taking care of the drudgery of physical labor the techno social utopias of computers as vehicles of democracy and social change the entrepreneurial urge towards design and construction integration and the managerial ideologies enabling today s transnational geographies of practice Examining the contrasting and often conflicting sensibilities that converge into CAD and BIM discourses globalism utopianism entrepreneurialism and architects desires for aesthetic liberation Builders of the Vision shows that software systems and numerically controlled machines are not merely instruments or tools but rather versatile metaphors reconfiguring conceptions of design materiality work and what it means to be creative Crucially by

revealing software systems as socio technical infrastructures that mediate the production of our built environments author Daniel Cardoso Llach builds a strong case for the fields of architecture media and science and technology studies to critically engage with both the politics and the poetics of technology in design Builders of the Vision will be essential reading for scholars and practitioners across disciplines interested in the increasingly complex socio technical systems that go into imagining and building of our artifacts buildings and cities

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