

Netfpga Architecture And Hardware Description An Insight Of The Netfpga Platform By Diego Reforgiato

Computer Science, Technology And Application – Proceedings Of The 2016 International Conference (Csta 2016)Reconfigurable Architectures and Design Automation Tools for Application-Level Network SecurityData Privacy Management and Autonomous Spontaneous SecurityIntelligent InformaticsSecurity, Privacy, and Applied Cryptography EngineeringReconfigurable Computing: Architectures, Tools and ApplicationsEncyclopedia of Information Science and Technology, Third EditionTestbeds and Research Infrastructures for the Development of Networks and CommunitiesEuro-Par 2018: Parallel Processing WorkshopsHuman Centered ComputingReconfigurable Computing: Architectures, Tools and ApplicationsCommunication Technologies for VehiclesGreen Communications and NetworkingEuro-Par 2014: Parallel ProcessingPassive and Active MeasurementAdvances in Network-Embedded Management and ApplicationsMathematical and Engineering Methods in Computer ScienceHandbook of Research on Architectural Trends in Service-Driven ComputingMining and Control of Network Traffic by Computational IntelligenceNature of Computation and CommunicationTestbeds and Research Infrastructures, Development of Networks and CommunitiesAdvances in Computer Science and Information TechnologyInternet of Things, Smart Spaces, and Next Generation NetworkingTowards the Future InternetTestbeds and Research Infrastructure: Development of Networks and CommunitiesEuro-Par 2015: Parallel Processing WorkshopsComputer Information Systems and Industrial ManagementDetection of Intrusions and Malware, and Vulnerability AssessmentComputational Science and Its Applications – ICCSA 2023 WorkshopsTestbeds and Research Infrastructure: Development of Networks and CommunitiesMultimedia Communications, Services and SecurityThe GENI BookPath-policy Compliant Networking and a Platform for Heterogeneous IaaS ManagementGreen Communication and NetworkingData Processing on FPGAsArtificial intelligence and Machine LearningHandbook on Data CentersSecurity, Privacy, and Applied Cryptography EngineeringAdvanced Wireless NetworksProceedings of the Second International Conference on Computer and Communication Technologies Xing Zhang Sascha Mühlbach Joaquin Garcia-Alfaro Ajith Abraham Shivam Bhasin Phaophak Sirisuk Khosrow-Pour, Mehdi Song Guo Gabriele Mencagli Qiaohong Zu Andreas Koch Marion Berbineau F. Richard Yu Fernando Silva Nina Taft Alexander Clemm Petr Hlinný Ramanathan, Raja Federico Montesino Pouzols Phan Cong Vinh Thomas Magedanz Tai-hoon Kim Sergey Andreev Georgios Tselentis Victor C.M. Leung Sascha Hunold Khalid Saeed Roberto

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Suresh Chandra Satapathy

Computer Science, Technology And Application – Proceedings Of The 2016 International Conference (Csta 2016) Reconfigurable Architectures and Design Automation Tools for
Application–Level Network Security Data Privacy Management and Autonomous Spontaneous Security Intelligent Informatics Security, Privacy, and Applied Cryptography
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The GENI Book Path–policy Compliant Networking and a Platform for Heterogeneous IaaS Management Green Communication and Networking Data Processing on FPGAs Artificial
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the 2016 international conference on computer science technology and application csta2016 were held in changsha china on march 18 20 2016 the main objective of the joint conference is to provide a platform for researchers academics and industrial professionals to present their research findings in the fields of computer science and technology the csta2016 received more than 150 submissions but only 67 articles were selected to be included in this proceedings which are organized into 6 chapters covering image and signal processing computer network algorithm and simulation data mining and cloud computing computer systems and application mathematics and management

the relevance of the internet has dramatically grown in the past decades however the enormous financial impact attracts many types of criminals setting up proper security mechanisms e g intrusion detection systems ids has therefore never been more important than today to further compete with today s data transfer rates 10 to 100 gbit s dedicated hardware accelerators have been proposed to offload compute intensive tasks from general purpose processors as one key technology reconfigurable hardware architectures e g the field programmable gate array fpga are of particular interest to this end this work addresses the use of such fpgas in the context of interactive communication applications which goes beyond the regular packet level operations often seen in this area to support rapid prototyping a novel fpga platform netstage has been designed and developed which provides a communication core for internet communication and a flexible connection bus for attaching custom applications modules a hardware honeypot the malcobox has been set up as a proof of concept application furthermore to address the ongoing issue of hardware programming complexity the domain specific malacoda language for abstractly formulating honeypot packet communication dialogs is presented and discussed an associated compiler translates malacoda into high performance hardware modules for netstage together netstage and malacoda address some of the productivity deficiencies often recognized as major hindrances for the more widespread use of reconfigurable computing in communications applications finally the netstage platform has been evaluated in a real production environment

this book constitutes the thoroughly refereed joint post proceedings of two international workshops the 5th international workshop on data privacy management dpm 2010 and the 3rd international workshop on autonomous and spontaneous security setop 2010 collocated with the esorics 2010 symposium in athens greece in september 2010 the 9 revised full papers for dpm 2010 presented together with two keynote talks are accompanied by 7 revised full papers of setop 2010 all papers were carefully reviewed and

selected for inclusion in the book the dpm 2010 papers cover topics such as how to translate the high level business goals into system level privacy policies administration of privacy sensitive data privacy data integration and engineering privacy access control mechanisms information oriented security and query execution on privacy sensitive data for partial answers the setop 2010 papers address several specific aspects of the previously cited topics as for instance the autonomic administration of security policies secure p2p storage rfid authentication anonymity in reputation systems etc

this book constitutes the thoroughly refereed post conference proceedings of the first international symposium on intelligent informatics isi 12 held in chennai india during august 4 5 2012 the 54 revised papers presented were carefully reviewed and selected from 165 initial submissions the papers are organized in topical sections on data mining clustering and intelligent information systems multi agent systems pattern recognition signal and image processing and computer networks and distributed systems the book is directed to the researchers and scientists engaged in various fields of intelligent informatics

this book constitutes the refereed proceedings of the 9th international conference on security privacy and applied cryptography engineering space 2019 held in gandhinagar india in december 2019 the 12 full papers presented were carefully reviewed and selected from 24 submissions this annual event is devoted to various aspects of security privacy applied cryptography and cryptographic engineering this is a very challenging field requiring the expertise from diverse domains ranging from mathematics to solid state circuit design

recon gurable computing rc systems have generated considerable interest in the embedded and high performance computing communities over the past two decades with eld programmable gate arrays fpgas as the leading techn ogy at the helm of innovation in this discipline achieving orders of magnitude performance and power improvements using fpgas over traditional microp cessorsis not uncommon for well suitedapplications but even with two decades of research and technological advances fpga design still presents a subst ial challenge and often necessitates hardware design expertise to exploit its true potential although the challenges to address the design productivity sues are steep the promise and the potential of the rc technology in terms of performance power size and versatility continue to attract application design engineers and rc researchers alike the international symposium on applied recon gurable computing arc aims to bring together researchers and practitioners of rc systems with an emphasis on

practical applications and design methodologies of this promising technology this year's arc symposium the sixth arc symposium was held in bangkok thailand during march 17-19 2010 and attracted papers in three primary focus areas: rc applications, rc architectures and rc design methodologies.

this 10-volume compilation of authoritative research-based articles contributed by thousands of researchers and experts from all over the world emphasized modern issues and the presentation of potential opportunities, prospective solutions and future directions in the field of information science and technology provided by publisher.

this book constitutes the refereed proceedings of the 11th international conference on testbeds and research infrastructures for the development of networks and communities (tridentcom 2016) held in hangzhou china in june 2016. the 16 papers were carefully selected from 25 submissions and provide a forum about technologies of big data, cyber physical systems and computer communications. the papers cover future internet and software defined networks, network testbed design and implementation, testbed for network applications and qos/qoe in networks.

this book constitutes revised selected papers from the workshops held at 24th international conference on parallel and distributed computing (euro par 2018) which took place in turin italy in august 2018. the 64 full papers presented in this volume were carefully reviewed and selected from 109 submissions. euro par is an annual international conference in europe covering all aspects of parallel and distributed processing. these range from theory to practice from small to the largest parallel and distributed systems and infrastructures from fundamental computational problems to full edged applications from architecture, compiler, language and interface design and implementation to tools support infrastructures and application performance aspects.

this book constitutes revised selected papers from the thoroughly refereed proceedings of the second international human centered computing conference (hcc 2016) that consolidated and further develops the successful icpca/sws conferences on pervasive computing and the networked world and which was held in colombo sri lanka in january 2016. the 58 full papers and 30 short papers presented in this volume together with one keynote talk were carefully reviewed and selected from 211 submissions. these proceedings present research papers investigating into a variety of aspects towards human centric intelligent societies. they cover the categories infrastructure and devices.

service and solution data and knowledge and community

this book constitutes the refereed proceedings of the 7th international symposium on reconfigurable computing architectures tools and applications arc 2011 held in belfast uk in march 2011 the 40 revised papers presented consisting of 24 full papers 14 poster papers and the abstracts of 2 plenary talks were carefully reviewed and selected from 88 submissions the topics covered are reconfigurable accelerators design tools reconfigurable processors applications device architecture methodology and simulation and system architecture

this book constitutes the joint refereed proceedings of the 5th international workshop on communication technologies for vehicles trains nets4cars 2013 and nets4trains 2013 held in vilnius lithuania in may 2013 the 12 full papers of the road track and 5 full papers of the rail track presented together with 3 invited talks were carefully reviewed and selected from 24 submissions they address topics such as intra vehicle inter vehicle and vehicle to infrastructure communications protocols and standards mobility and traffic models models methodologies and techniques testing and applications

green communications and networking introduces novel solutions that can bring about significant reductions in energy consumption in the information and communication technology ict industry as well as other industries including electric power containing the contributions of leading experts in the field it examines the latest research advances

this book constitutes the refereed proceedings of the 20th international conference on parallel and distributed computing euro par 2014 held in porto portugal in august 2014 the 68 revised full papers presented were carefully reviewed and selected from 267 submissions the papers are organized in 15 topical sections support tools environments performance prediction and evaluation scheduling and load balancing high performance architectures and compilers parallel and distributed data management grid cluster and cloud computing green high performance computing distributed systems and algorithms parallel and distributed programming parallel numerical algorithms multicore and manycore programming theory and algorithms for parallel computation high performance networks and communication high performance and scientific applications and gpu and accelerator computing

this book constitutes the refereed proceedings of the 13th international conference on passive and active measurement pam 2012 held in vienna austria in march 2012 the 25 revised full papers presented were carefully reviewed and selected from 83 submissions the papers were arranged into eight sessions traffic evolution and analysis large scale monitoring evaluation methodology malicious behavior new measurement initiatives reassessing tools and methods perspectives on internet structure and services and application protocols

the general trend of modern network devices towards greater intelligence and programmability is accelerating the development of systems that are increasingly autonomous and to a certain degree self managing examples range from router scripting environments to fully programmable server blades this has opened up a new field of computer science research reflected in this new volume this selection of contributions to the first ever international workshop on network embedded management applications nema features six papers selected from submissions to the workshop held in october 2010 at niagara falls canada they represent a wide cross section of the current work in this vital field of inquiry covering a diversity of perspectives the volume s dual structure first of all examines the enablers for nemas the platforms frameworks and development environments which facilitate the evolution of network embedded management and applications the second section of the book covers network embedded applications that might both empower and benefit from such enabling platforms these papers cover topics ranging from deciding where to best place management control functions inside a network to a discussion of how multi core hardware processors can be leveraged for traffic filtering applications the section concludes with an analysis of a delay tolerant network application in the context of the one laptop per child program there is a growing recognition that it is vital to make network operation and administration as easy as possible to contain operational expenses and cope with ever shorter control cycles this volume provides researchers in the field with the very latest in current thinking

this volume contains the post proceedings of the 9th doctoral workshop on mathematical and engineering methods in computer science memics 2014 held in tel czech republic in october 2014 the 13 thoroughly revised papers were carefully selected out of 28 submissions and are presented together with 4 invited papers the topics covered by the papers include algorithms logic and games high performance computing computer aided analysis verification and testing hardware design and diagnostics computer graphics and image processing and artificial intelligence and natural language processing

research into the next generation of service architecture techniques has enabled the design development and implementation of dynamic adaptive and autonomic services to enable enterprises to efficiently align information technology with their agile business requirements and foster smart services and seamless enterprise integration handbook of research on architectural trends in service driven computing explores delineates and discusses recent advances in architectural methodologies and development techniques in service driven computing this comprehensive publication is an inclusive reference source for organizations researchers students enterprise and integration architects practitioners software developers and software engineering professionals engaged in the research development and integration of the next generation of computing

as other complex systems in social and natural sciences as well as in engineering the internet is hard to understand from a technical point of view packet switched networks defy analytical modeling the internet is an outstanding and challenging case because of its fast development unparalleled heterogeneity and the inherent lack of measurement and monitoring mechanisms in its core conception this monograph deals with applications of computational intelligence methods with an emphasis on fuzzy techniques to a number of current issues in measurement analysis and control of traffic in the internet first the core building blocks of internet science and other related networking aspects are introduced then data mining and control problems are addressed in the first class two issues are considered predictive modeling of traffic load as well as summarization of traffic flow measurements the second class control includes active queue management schemes for internet routers as well as window based end to end rate and congestion control the practical hardware implementation of some of the fuzzy inference systems proposed here is also addressed while some theoretical developments are described we favor extensive evaluation of models using real world data by simulation and experiments

this book constitutes the thoroughly refereed post conference proceedings of the international conference on nature of computation and communication ictcc 2014 held in november 2014 in ho chi minh city vietnam the 34 revised full papers presented were carefully reviewed and selected from over 100 submissions the papers cover formal methods for self adaptive systems and discuss natural approaches and techniques for computation and communication

this book constitutes the proceedings of the 6th international icst conference tridentcom 2010 held in berlin germany in may 2010 out of more than 100 submitted contributions the program committee finally selected 15 full papers 26 practices papers and 22 posters they focus on topics as internet testbeds future internet research wireless sensors

media and mobility and monitoring in large scale testbeds

this book constitutes the refereed joint proceedings of four co located international conferences concertedly held in miyazaki japan in june 2010 the papers in this volume were selected based on their scores obtained from the independent reviewing processes at particular conferences and their relevance to the idea of constructing hybrid solution to address the real world challenges of it it provides a chance for academic and industry professionals to catch up on recent progress in the related areas the 49 revised full papers presented were carefully reviewed and selected during two rounds of reviewing and improvement from more than 1000 initial submissions the papers emanate from the four following international conferences information security and assurance isa 2010 advanced communication and networking acn 2010 advanced science and technology ast 2010 and ubiquitous computing and multimedia applications ucma 2010 this volume focuses on various aspects of advance

this book constitutes the joint refereed proceedings of the 12 international conference on next generation teletraffic and wired wireless advanced networking new2an and the 5th conference on internet of things and smart spaces rusmart 2012 held in st petersburg russia in august 2012 the total of 42 papers was carefully reviewed and selected for inclusion in this book the 14 papers selected from rusmart are organized in topical sections named defining an internet of things ecosystem future services and smart space governing through service mashups the 28 papers from new2an deal with the following topics wireless cellular networks ad hoc mesh and delay tolerant networks scalability cognition and self organization traffic and internet applications and wireless sensor networks they also contain 4 selected papers from the new2an 2012 winter session

emerging trends from european research bthe way the book is structured and enhanced makes it an ideal reference book for managers academics researchers and system designers in the communications field b brbri harry skianis computing reviews about the 2009 edition of towards

this book constitutes the proceedings of the 9th international conference on testbeds and research infrastructures for the development of networks and communities tridentcom 2014 held in guangzhou china in may 2014 the 49 revised full papers presented were carefully selected out of 149 submissions the conference consisted of 6 symposia covering topics such as testbed virtualization internet of things vehicular networks sdn ndn large scale testbed federation mobile networks wireless networks

this book constitutes the thoroughly refereed post conference proceedings of 12 workshops held at the 21st international conference on parallel and distributed computing euro par 2015 in vienna austria in august 2015 the 67 revised full papers presented were carefully reviewed and selected from 121 submissions the volume includes papers from the following workshops bigdatacloud 4th workshop on big data management in clouds euro edupar first european workshop on parallel and distributed computing education for undergraduate students hetero par 13th international workshop on algorithms models and tools for parallel computing on heterogeneous platforms lsdve third workshop on large scale distributed virtual environments omhi 4th international workshop on on chip memory hierarchies and interconnects padaps third workshop on parallel and distributed agent based simulations pelga workshop on performance engineering for large scale graph analytics reppar second international workshop on reproducibility in parallel computing resilience 8th workshop on resiliency in high performance computing in clusters clouds and grids rome third workshop on runtime and operating systems for the many core era uchpc 8th workshop on unconventional high performance computing and vhpc 10th workshop on virtualization in high performance cloud computing

this book constitutes the proceedings of the 17th international conference on computer information systems and industrial management applications cisim 2018 held in olomouc czech republic in september 2018 the 42 full papers presented together with 4 keynotes were carefully reviewed and selected from 69 submissions the main topics covered by the chapters in this book are biometrics security systems multimedia classification and clustering and industrial management besides these the reader will find interesting papers on computer information systems as applied to wireless networks computer graphics and intelligent systems the papers are organized in the following topical sections biometrics and pattern recognition applications computer information systems industrial management and other applications machine learning and high performance computing modelling and optimization and various aspects of computer security

this book constitutes the proceedings of the 16th international conference on detection of intrusions and malware and vulnerability assessment dimva 2019 held in gothenburg sweden in june 2019 the 23 full papers presented in this volume were carefully reviewed and selected from 80 submissions the contributions were organized in topical sections named wild wild web cyber physical systems malware software security and binary analysis network security and attack mitigation

this nine volume set Incs 14104 14112 constitutes the refereed workshop proceedings of the 23rd international conference on computational science and its applications iccsa

2023 held at athens greece during july 3 6 2023 the 350 full papers and 29 short papers and 2 phd showcase papers included in this volume were carefully reviewed and selected from a total of 876 submissions these nine volumes includes the proceedings of the following workshops advances in artificial intelligence learning technologies blended learning stem computational thinking and coding aailt 2023 advanced processes of mathematics and computing models in complex computational systems acmc 2023 artificial intelligence supported medical data examination aim 2023 advanced and innovative web apps aiwa 2023 assessing urban sustainability asus 2023 advanced data science techniques with applications in industry and environmental sustainability ateliers 2023 advances in based learning awbl 2023 blockchain and distributed ledgers technologies and applications bdlt 2023 bio and neuro inspired computing and applications bionca 2023 choices and actions for human scale cities decision support systems cahsc dss 2023 and computational and applied mathematics cam 2023

this book constitutes the proceedings of the 7th international icst conference tridentcom 2011 held in shanghai china in april 2011 out of numerous submissions the program committee finally selected 26 full papers and 2 invited papers they focus on topics as future internet testbeds future wireless testbeds federated and large scale testbeds network and resource virtualization overlay network testbeds management provisioning and tools for networking research and experimentally driven research and user experience evaluation

this volume constitutes the refereed proceedings of the 7th international conference on multimedia communications services and security mcss 2014 held in krakow poland in june 2014 the 21 full papers included in the volume were selected from numerous submissions the papers cover ongoing research activities in the following topics audiovisual systems novel multimedia architectures multimedia data fusion acquisition of multimedia content quality of experience management watermarking technology and applications content searching methods interactive multimedia applications cybercrime countermeasures cryptography biometry as well as privacy protection solutions

this book edited by four of the leaders of the national science foundation s global environment and network innovations geni project gives the reader a tour of the history architecture future and applications of geni built over the past decade by hundreds of leading computer scientists and engineers geni is a nationwide network used daily by thousands of computer scientists to explore the next cloud and internet and the applications and services they enable which will transform our communities and our lives

since by design it runs on existing computing and networking equipment and over the standard commodity internet it is poised for explosive growth and transformational impact over the next five years over 70 of the builders of geni have contributed to present its development architecture and implementation both as a standalone us project and as a federated peer with similar projects worldwide forming the core of a worldwide network applications and services enabled by geni from smarter cities to intensive collaboration to immersive education are discussed the book also explores the concepts and technologies that transform the internet from a shared transport network to a collection of slices private on the fly application specific nationwide networks with guarantees of privacy and responsiveness the reader will learn the motivation for building geni and the experience of its precursor infrastructures the architecture and implementation of the geni infrastructure its deployment across the united states and worldwide the new network applications and services enabled by and running on the geni infrastructure and its international collaborations and extensions this book is useful for academics in the networking and distributed systems areas chief information officers in the academic private and government sectors and network and information architects

the dissertation is divided into two parts each of which can stand independently of the other icing and expedient the icing project aims to build a network architecture that empowers the end points of a communication by giving them control over the path used for the communication the challenge is providing this control without violating the policies of the providers carrying the communication s traffic and ensuring that the path is followed icing consists of a number of sub projects icing pvm icing on and icing I3 expedient is an answer to the following question how can users manage resources across a federated set of infrastructure as a service iaas providers these resources may be heterogeneous consisting of different types of network compute or other resources they may be sliced virtualized or fully delegated and they may cross trust boundaries expedient provides a platform that gives users access to all resources using one set of credentials does not require infrastructure developers to change their systems and allows infrastructure providers to enforce their policies concerning the use of their resources this dissertation discusses expedient in the context of geni a federated set of iaas providers with the goal of providing resources for experimental network research

this book constitutes the thoroughly refereed proceedings of the second international conference greenets 2012 held in gaudia spain in october 2012 the 11 revised full papers presented were carefully selected and reviewed these papers represent 23 68 of the submissions and cover topics such as communications and networking energy efficient

network architecture and protocols systems and technologies and energy efficient management

roughly a decade ago power consumption and heat dissipation concerns forced the semiconductor industry to radically change its course shifting from sequential to parallel computing unfortunately improving performance of applications has now become much more difficult than in the good old days of frequency scaling this is also affecting databases and data processing applications in general and has led to the popularity of so called data appliances specialized data processing engines where software and hardware are sold together in a closed box field programmable gate arrays fpgas increasingly play an important role in such systems fpgas are attractive because the performance gains of specialized hardware can be significant while power consumption is much less than that of commodity processors on the other hand fpgas are way more flexible than hard wired circuits asics and can be integrated into complex systems in many different ways e g directly in the network for a high frequency trading application this book gives an introduction to fpga technology targeted at a database audience in the first few chapters we explain in detail the inner workings of fpgas then we discuss techniques and design patterns that help mapping algorithms to fpga hardware so that the inherent parallelism of these devices can be leveraged in an optimal way finally the book will illustrate a number of concrete examples that exploit different advantages of fpgas for data processing table of contents preface introduction a primer in hardware design fpgas fpga programming models data stream processing accelerated db operators secure data processing conclusions bibliography authors biographies index

this book constitutes the revised selected papers of the 41st ibima international conference on artificial intelligence and computer science ibima ai 2023 which took place in granada spain during june 26 27 2023 the 30 full papers and 8 short papers included in this volume were carefully reviewed and selected from 58 submissions the book showcases a diverse array of research papers spanning various disciplines within the realm of artificial intelligence machine learning information systems communications technologies software engineering and security and privacy

this handbook offers a comprehensive review of the state of the art research achievements in the field of data centers contributions from international leading researchers and scholars offer topics in cloud computing virtualization in data centers energy efficient data centers and next generation data center architecture it also comprises current research trends in emerging areas such as data security data protection management and network resource management in data centers specific attention is devoted to

industry needs associated with the challenges faced by data centers such as various power cooling floor space and associated environmental health and safety issues while still working to support growth without disrupting quality of service the contributions cut across various it data technology domains as a single source to discuss the interdependencies that need to be supported to enable a virtualized next generation energy efficient economical and environmentally friendly data center this book appeals to a broad spectrum of readers including server storage networking database and applications analysts administrators and architects it is intended for those seeking to gain a stronger grasp on data center networks the fundamental protocol used by the applications and the network the typical network technologies and their design aspects the handbook of data centers is a leading reference on design and implementation for planning implementing and operating data center networks

this book constitutes the refereed proceedings of the 11th international conference on security privacy and applied cryptography engineering space 2021 held in kolkata india in december 2021 the 13 full papers presented were carefully reviewed and selected from 42 submissions this annual event is devoted to various aspects of security privacy applied cryptography and cryptographic engineering this is a very challenging field requiring the expertise from diverse domains ranging from mathematics to solid state circuit design

the third edition of this popular reference covers enabling technologies for building up 5g wireless networks due to extensive research and complexity of the incoming solutions for the next generation of wireless networks it is anticipated that the industry will select a subset of these results and leave some advanced technologies to be implemented later this new edition presents a carefully chosen combination of the candidate network architectures and the required tools for their analysis due to the complexity of the technology the discussion on 5g will be extensive and it will be difficult to reach consensus on the new global standard the discussion will have to include the vendors operators regulators as well as the research and academic community in the field having a comprehensive book will help many participants to join actively the discussion and make meaningful contribution to shaping the new standard

the book is about all aspects of computing communication general sciences and educational research covered at the second international conference on computer communication technologies held during 24 26 july 2015 at hyderabad it hosted by cmr technical campus in association with division v education research csi india after a

rigorous review only quality papers are selected and included in this book the entire book is divided into three volumes three volumes cover a variety of topics which include medical imaging networks data mining intelligent computing software design image processing mobile computing digital signals and speech processing video surveillance and processing web mining wireless sensor networks circuit analysis fuzzy systems antenna and communication systems biomedical signal processing and applications cloud computing embedded systems applications and cyber security and digital forensic the readers of these volumes will be highly benefited from the technical contents of the topics

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The FCC Crystal Structure: A Comprehensive Q&A

Introduction: Q: What is an FCC crystal structure, and why is it important? A: The face-centered cubic (FCC) crystal structure is one of the most common ways atoms arrange themselves in solid materials. It's characterized by a cubic unit cell with atoms located at each of the eight corners and at the center of each of the six faces. Understanding FCC structures is crucial because the arrangement of atoms directly influences a material's properties, including its density, ductility, malleability, and electrical conductivity. Many technologically important metals, like aluminum, copper, gold, silver, nickel, and lead, adopt this structure. This means that comprehending FCC helps us understand and engineer the behavior of countless materials in various applications.

I. Unit Cell and Atomic Arrangement: Q: Can you describe the FCC unit cell in detail? A: The FCC unit cell is a cube. Each corner of the cube contains one-eighth of an atom, and each face center contains one-half of an atom. Adding these contributions together ($8 \text{ corner atoms} \times 1/8 \text{ atom/corner} + 6 \text{ face atoms} \times 1/2 \text{ atom/face} = 4 \text{ atoms}$), we find that a single FCC unit cell contains a total of four atoms. These atoms are arranged in a highly symmetrical and efficient manner, maximizing the packing density.

Q: What is the atomic packing factor (APF) of an FCC structure? A: The APF represents the fraction of the unit cell volume that is actually occupied by atoms. In an FCC structure, the APF is 0.74, which is the highest possible APF for any crystal structure. This high APF contributes to the relatively high density often seen in FCC metals. This efficient packing makes FCC metals relatively strong and resistant to deformation under compression.

II. Coordination Number and Nearest Neighbors: Q: What is the coordination number in an FCC structure, and what does it signify? A: The coordination number represents the number of nearest neighbors surrounding a given atom. In an FCC structure, the coordination number is 12. Each atom is in contact with twelve other atoms; this high coordination contributes to its strong bonding and relatively high melting points.

Q: How are the atoms arranged around a central atom in an FCC structure? A: Imagine an atom at the center of the unit cell. It's surrounded by 12 nearest neighbors: 4 on the same plane, 4 above, and 4 below. This arrangement results in a very stable and closely packed structure.

III. Slip Systems and Mechanical Properties: Q: How does the FCC structure affect the mechanical properties of materials? A: The high symmetry and close packing of the FCC structure lead to its excellent ductility and malleability. Ductility is the ability of a material to deform plastically under tensile stress (pulled), while malleability is its ability to deform plastically under compressive stress (pushed). This is because FCC metals have many slip systems (planes along which atoms can easily slide past each other), allowing for significant plastic

deformation before fracture. This is a key reason why FCC metals are often preferred for applications requiring formability, like sheet metal in automotive bodies. Q: What are slip systems, and how do they relate to the FCC structure? A: Slip systems are combinations of specific crystallographic planes and directions along which dislocation movement occurs, leading to plastic deformation. FCC structures possess many slip systems (twelve {111} planes, each with $\langle 110 \rangle$ directions), contributing to their high ductility. The presence of numerous slip systems allows for easy dislocation movement and thus facilitates plastic deformation under stress. IV. Real-World Examples and Applications: Q: Can you provide some real-world examples of materials with an FCC structure and their applications? A: Aluminum (used in aircraft, beverage cans), copper (electrical wiring, plumbing), gold (jewelry, electronics), silver (jewelry, photography), nickel (alloys in aerospace and chemical industries), and lead (batteries, radiation shielding) are all examples of metals that crystallize in the FCC structure. Their unique properties, stemming from their atomic arrangement, allow them to be used in diverse applications. V. Conclusion: The FCC crystal structure is a fundamental concept in materials science. Its high atomic packing factor, high coordination number, and numerous slip systems all contribute to the characteristic mechanical and physical properties of many technologically important metals. Understanding the structure and its relationship to these properties is key to selecting and designing materials for specific applications. FAQs: 1. Q: How does temperature affect the FCC structure? A: High temperatures can lead to thermal vibrations that may affect the stability of the FCC structure, potentially leading to phase transformations to other crystal structures. 2. Q: Can alloys retain the FCC structure? A: Yes, many alloys retain the FCC structure, often with slight lattice parameter changes depending on the alloying elements. 3. Q: How does the FCC structure influence electrical conductivity? A: The close packing and the delocalized nature of valence electrons in FCC metals generally contribute to high electrical conductivity. 4. Q: Are there any limitations to the use of FCC metals? A: While ductile, FCC metals can be relatively soft compared to BCC or HCP metals, requiring strengthening mechanisms (alloying, work hardening) for applications needing higher strength. 5. Q: How is the FCC structure determined experimentally? A: Techniques like X-ray diffraction are routinely used to determine the crystal structure of materials. The diffraction pattern obtained is characteristic of the FCC structure and allows for accurate lattice parameter determination.

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