Navigating Network Complexity Next Generation Virtualization

CloudRoar Consulting Services

Navigating Network Complexity Next Generation Virtualization:

Navigating Network Complexity Russ White,Jeff Tantsura,2015-11-13 Design your networks to successfully manage their growing complexity Network professionals have often been told that today s modern control planes would simplify their networks The opposite has happened Technologies like SDN and NFV although immensely valuable are exacerbating complexity instead of solving it Navigating Network Complexity is the first comprehensive guide to managing this complexity in both deployment and day to day operations Russ White and Jeff Tantsura introduce modern complexity theory from the standpoint of the working network engineer helping you apply it to the practical problems you face every day Avoiding complex mathematical models they show how to characterize network complexity so you can understand it and control it The authors examine specific techniques and technologies associated with network control planes including SDNs fast reroute segment routing service chaining and cloud computing They reveal how each of these affects network design and complexity and help you anticipate causes of failure in highly complex systems **Navigating Network Complexity** Russ White,Jeff Tantsura,2016 **Advances in Computer Science for Engineering and Education II** Zhengbing Hu,Sergey Petoukhov,Ivan Dychka,Matthew He,2019-03-28 This book gathers high quality peer reviewed research papers presented at the Second International Conference on Computer Science Engineering and Education Applications ICCSEEA2019 held in Kiev Ukraine on 26 27 January 2019 and jointly organized by the National Technical University of Ukraine Igor Sikorsky Kyiv Polytechnic Institute and the International Research Association of Modern Education and Computer Science The papers discuss state of the art topics and advances in computer science neural networks pattern recognition engineering techniques genetic coding systems deep learning and its medical applications and knowledge representation and its applications in education Given its scope the book offers an excellent resource for researchers engineers management practitioners and graduate and undergraduate students interested in computer science and its applications in engineering and education

Computer Networking Problems and Solutions Russ White,Ethan Banks,2017-12-06 Master Modern Networking by Understanding and Solving Real Problems Computer Networking Problems and Solutions offers a new approach to understanding networking that not only illuminates current systems but prepares readers for whatever comes next Its problem solving approach reveals why modern computer networks and protocols are designed as they are by explaining the problems any protocol or system must overcome considering common solutions and showing how those solutions have been implemented in new and mature protocols Part I considers data transport the data plane Part II covers protocols used to discover and use topology and reachability information the control plane Part III considers several common network designs and architectures including data center fabrics MPLS cores and modern Software Defined Wide Area Networks SD WAN Principles that underlie technologies such as Software Defined Networks SDNs are considered throughout as solutions to problems faced by all networking technologies This guide is ideal for beginning network engineers students of computer

networking and experienced engineers seeking a deeper understanding of the technologies they use every day Whatever your background this book will help you quickly recognize problems and solutions that constantly recur and apply this knowledge to new technologies and environments Coverage Includes Data and networking transport Lower and higher level transports and interlayer discovery Packet switching Quality of Service QoS Virtualized networks and services Network topology discovery Unicast loop free routing Reacting to topology changes Distance vector control planes link state and path vector control Control plane policies and centralization Failure domains Securing networks and transport Network design patterns Redundancy and resiliency Troubleshooting Network disaggregation Automating network management Cloud computing Networking the Internet of Things IoT Emerging trends and technologies   5G Networks Atahar Khan,Satya Priyo Dhar,Ramakrishnan Shanmugasundaram,Joe Chemparathy,2024-08-12 This book provides comprehensive coverage of building an end to end view on how to architect design and orchestrate a 5G capable network that will integrate with 5G RAN IP transport datacenters Telco Cloud and 5G packet networks It contains real world examples with challenges and success strategies for deploying 5G Transport with closed loop automation It also focuses on aspects like scale performance latency security and manageability while building 5G transport for some of the world s largest 5G networks as well as migration approaches from 4G to 5G transport and core network 5G is an emerging technology that mobile service providers MNO MVNO across the world are embracing They are willing to invest in enabling their infrastructure for 5G and explore new business opportunities with their enterprise mobile customers As per the Gartner survey the majority of communication service provider CSP revenue will come from 5G 5G is going to open the door to new applications such as wireless virtual reality low latency machine to machine communication smart city infrastructure autonomous vehicles IoT deployment artificial intelligence based applications industrial automation and so much more   Next-Generation Enterprise Security and Governance Mohiuddin Ahmed,Nour Moustafa,Abu Barkat,Paul Haskell-Dowland,2022-04-19 The Internet is making our daily lives as digital as possible and this new era is called the Internet of Everything IoE The key force behind the rapid growth of the Internet is the technological advancement of enterprises The digital world we live in is facilitated by these enterprises advances and business intelligence These enterprises need to deal with gazillions of bytes of data and in today s age of General Data Protection Regulation enterprises are required to ensure privacy and security of large scale data collections However the increased connectivity and devices used to facilitate IoE are continually creating more room for cybercriminals to find vulnerabilities in enterprise systems and flaws in their corporate governance Ensuring cybersecurity and corporate governance for enterprises should not be an afterthought or present a huge challenge In recent times the complex diversity of cyber attacks has been skyrocketing and zero day attacks such as ransomware botnet and telecommunication attacks are happening more frequently than before New hacking strategies would easily bypass existing enterprise security and governance platforms using advanced persistent threats For example in 2020 the Toll Group firm was

exploited by a new crypto attack family for violating its data privacy where an advanced ransomware technique was launched to exploit the corporation and request a huge figure of monetary ransom Even after applying rational governance hygiene cybersecurity configuration and software updates are often overlooked when they are most needed to fight cyber crime and ensure data privacy Therefore the threat landscape in the context of enterprises has become wider and far more challenging There is a clear need for collaborative work throughout the entire value chain of this network In this context this book addresses the cybersecurity and cooperate governance challenges associated with enterprises which will provide a bigger picture of the concepts intelligent techniques practices and open research directions in this area This book serves as a single source of reference for acquiring the knowledge on the technology process and people involved in next generation privacy and security *Mission-critical Network Planning* Matthew Liotine,2003 Whether a terrorist attack fiber cut security breach natural disaster or traffic overload today s networks must be designed to withstand adverse conditions and provide continuous service This comprehensive leading edge book reveals the techniques and strategies to help you keep enterprise data and voice networks in service under critical circumstances You learn numerous ways to minimize single points of failure through redundancy and backups and discover how to select the right networking technologies to improve survivability and performance Handbook of Human Factors in Air Transportation Systems Steven James Landry,2017-11-22 One of the primary applications of human factors engineering is in the aviation domain and the importance of human factors has never been greater as U S and European authorities seek to modernize the air transportation system through the introduction of advanced automation This handbook provides regulators practitioners researchers and educators a comprehensive resource for understanding and applying human factors to air transportation Virtual Networks Otto Carlos M. B. Duarte,Guy Pujolle,2013-08-02 The first chapter of this title concerns virtualization techniques that allow sharing computational resources basically slicing a real computational environment into virtual computational environments that are isolated from one another The Xen and OpenFlow virtualization platforms are then presented in Chapter 2 and a performance analysis of both is provided This chapter also defines the primitives that the network virtualization infrastructure must provide for allowing the piloting plane to manage virtual network elements Following this interfaces for system management of the two platforms are proposed in Chapter 3 To control and manage virtual network elements five primitives that the network virtualization infrastructure must provide are defined instantiate delete migrate monitor and set The book then moves on to survey existing control algorithms for virtual networking It also describes the main challenges for packet forwarding using Xen as a virtualization tool and describes in more detail a proposal for local control of virtual networks Within each physical node this proposal guarantees the service level acquired by each virtual network even in the presence of misbehaving virtual networks Network Virtualization in Next Generation Cellular Networks Georgia Tseliou,2019 The complexity of operation and management of emerging cellular networks significantly increases as they evolve to correspond to increasing QoS needs

data rates and diversity of offered services Thus critical challenges appear regarding their performance At the same time network sustainability pushes toward the utilization of haring Radio Access Network RAN infrastructure between Mobile Network Operators MNOs This requires advanced network management techniques which have to be developed based on characteristics of these networks and traffic demands Therefore it is necessary to provide solutions enabling the creation of logically isolated network partitions over shared physical network infrastructure Multiple heterogeneous virtual networks should simultaneously coexist and support resource aggregation so as to appear as a single resource to serve different traffic types on demand Hence in this thesis we study RAN virtualization and slicing solutions destined to tackle these challenges In the first part we present our approach to map virtual network elements onto radio resources of the substrate physical network in a dense multi tier LTE A scenario owned by a MNO We propose a virtualization solution at BS level where baseband modules of distributed BSs interconnected via logical point to point X2 interface cooperate to reallocate radio resources on a traffic need basis Our proposal enhances system performance by achieving 53% throughput gain compared with benchmark schemes without substantial signaling overhead In the second part of the thesis we concentrate on facilitating resource provisioning between multiple Virtual MNOs MVNOs by integrating the capacity broker in the 3GPP network management architecture with minimum set of enhancements A MNO owns the network and provides RAN access on demand to several MVNOs Furthermore we propose an algorithm for on demand resource allocation considering two types of traffic Our proposal achieves 50% more admitted requests without Service Level Agreement SLA violation compared with benchmark schemes In the third part we devise and study a solution for BS agnostic network slicing leveraging BS virtualization in a multi tenant scenario This scenario is composed of different traffic types e g tight latency requirements and high data rate demands along with BSs characterized by different access and transport capabilities i e Remote Radio Heads RRHs Small Cells SCs and future 5G NodeBs gNBs with various functional splits having ideal and non ideal transport network Our solution achieves 67% average spectrum usage gain and 16 6% Baseband Unit processing load reduction compared with baseline scenarios Finally we conclude the thesis by providing insightful research challenges for future works

Large-Scale Network Design Russ Retana,2017 9 Hours of Video Instruction Large Scale Network Design LiveLessons takes you through the concepts behind stable scalable elegant network design including modularity resilience layering and security principles This livelesson will focus on traditional distributed link state distance vector and path vector routing protocols as well as the basic principles of centralized control planes such as OpenFlow A special point will be made of sorting out the relationship between policy and reachability and where they can best be managed in a large scale network This video begins with an examination of basic network design principles including an examination of modularization hierarchy summarization aggregation and resilience More advanced foundational topics are then considered such as an overview of network complexity network models and policy from within the context of the control plane After this the series

will work through design using each of the distributed control planes including OSPF IS IS EIGRP and BGP on several network topologies to provide practical knowledge of actual deployment in real networks The following section of this livelesson will consider the tradeoffs around programmable networks including convergence stability and other factors Finally advanced topics such as fast convergence will be considered in detail from principle to application in each protocol About the Instructors Russ White has more than 20 years of experience in designing deploying breaking and troubleshooting large scale networks Across that time he has co authored more than 40 software patents has spoken at venues throughout the world has participated in the development of several internet standards has helped develop the CCDE and the CCAr and has worked in Internet governance with the ISOC Russ is currently a member of the Artchitecture Team at LinkedIn where he works on next generation data center designs complexity security and privacy His most recent books are The Art of Network Architecture and Navigating Network Complexity Russ holds several degrees and industry certifications including MSIT Capella University MACM Shepherds Theological Seminary PhD in progress from Southeastern Theological Seminary CCIE 2635 CCDE 2007 001 and CCAr Alvaro Retana CCIE No 1609 is currently a Development Test Engineer in the Large Scale Switching and Routing Team where he works on advanced features in **Network Function Virtualization** Ken Gray,Thomas D. Nadeau,2016-07-04 Network Function Virtualization provides an architectural vendor neutral level overview of the issues surrounding the large levels of data storage and transmission requirements needed for today s companies also enumerating the benefits of NFV for the enterprise Drawing upon years of practical experience and using numerous examples and an easy to understand framework authors Tom Nadeau and Ken Gary discuss the relevancy of NFV and how it can be effectively used to create and deploy new services Readers will learn how to determine if network function virtualization is right for their enterprise network be able to use hands on step by step guides to design deploy and manage NFV in an enterprise and learn how to evaluate all relevant NFV standards including ETSI IETF Openstack and Open Daylight Provides a comprehensive overview of Network Function Virtualization NFV Discusses how to determine if network function virtualization is right for an enterprise network Presents an ideal reference for those interested in NFV Network Service Chaining NSC network address translation NAT firewalling intrusion detection domain name service DNS caching and software defined networks Includes hands on step by step guides for designing deploying and managing NFV in the enterprise Explains and contrasts all relevant NFV standards including ETSI IETF Openstack and Open Daylight NX-OS and Cisco Nexus Switching Ron Fuller,David Jansen,Matthew McPherson,2013-03-14 NX OS and Cisco Nexus Switching Next Generation Data Center Architectures Second Edition The complete guide to planning configuring managing and troubleshooting NX OS in the enterprise updated with new technologies and examples Using Cisco Nexus switches and the NX OS operating system data center professionals can build unified core networks that deliver unprecedented scalability resilience operational continuity flexibility and performance NX OS and Cisco Nexus Switching Second Edition is the

definitive guide to applying these breakthrough technologies in real world environments This extensively updated edition contains five new chapters addressing a wide range of new technologies including FabricPath OTV IPv6 QoS VSG Multi Hop FCoE LISP MPLS Layer 3 on Nexus 5000 and Config sync It also presents a start to finish step by step case study of an enterprise customer who migrated from Cisco Catalyst to a Nexus based architecture illuminated with insights that are applicable in virtually any enterprise data center Drawing on decades of experience with enterprise customers the authors cover every facet of deploying configuring operating and troubleshooting NX OS in today s data center You ll find updated best practices for high availability virtualization security L2 L3 protocol and network support multicast serviceability provision of networking and storage services and more Best of all the authors present all the proven commands sample configurations and tips you need to apply these best practices in your data center Ron Fuller CCIE No 5851 Routing and Switching Storage Networking Technical Marketing Engineer on Cisco s Nexus 7000 team specializes in helping customers design end to end data center architectures Ron has 21 years of industry experience including 7 at Cisco He has spoken at Cisco Live on VDCs NX OS multicast and general design David Jansen CCIE No 5952 Routing Switching is a Cisco Technical Solutions Architect specializing in enterprise data center architecture He has 20 years of industry experience 15 of them at Cisco 6 as a solution architect and has delivered several Cisco Live presentations on NX OS and data center solutions Matthew McPherson senior systems engineer and solutions architect for the Cisco Central Select Operation specializes in data center architectures He has 12 years of experience working with service providers and large finance and manufacturing enterprises and possesses deep technical knowledge of routing switching and security Understand the NX OS command line virtualization features and file system Utilize the NX OS comprehensive Layer 2 Layer 3 support vPC Spanning Tree Protocol Cisco FabricPath EIGRP OSPF BGP HSRP GLBP and VRRP Configure IP multicast with PIM Auto RP and MSDP Secure your network with CTS SGTs ACLs CoPP and DAI Establish a trusted set of network devices with Cisco TrustSec Maximize availability with ISSU stateful process restart switchover and non stop forwarding Improve serviceability with SPAN ERSPAN configuration checkpoints rollback packet analysis Smart Call Home Python and PoAP Unify storage and Ethernet fabrics with FCoE NPV and NPIV Take full advantage of Nexus 1000V in a virtualized environment Achieve superior QoS with MQ CLI queuing and marking Extend L2 networks across L3 infrastructure with Overlay Transport Virtualization OTV Deliver on SLAs by integrating MPLS application components such as L3 VPNs traffic engineering QoS and mVPN Support mobility via the new Locator ID Separation Protocol LISP Walk step by step through a realistic Nexus and NX OS data center migration

VMware Professional Network Virtualization (VCP-NV): 350 Practice Questions & Detailed Explanations
CloudRoar Consulting Services,2025-08-15 The VMware Professional Network Virtualization VCP NV certification is a prestigious credential designed for IT professionals aiming to validate their expertise in managing and implementing VMware s NSX platform This certification is essential for those seeking to demonstrate their proficiency in network virtualization

concepts and VMware technologies The VCP NV certification ensures that certified professionals are equipped with the necessary skills to handle complex network infrastructures integrate network functions and optimize performance using VMware solutions In today s rapidly evolving IT landscape network virtualization is a critical component for organizations striving to enhance scalability and streamline operations The VCP NV certification is specifically designed for network administrators system engineers and IT professionals who wish to specialize in network virtualization As businesses increasingly adopt virtualization to reduce costs and improve efficiency the demand for skilled professionals who can effectively implement and manage these technologies is surging Earning this certification not only highlights your technical prowess but also aligns you with the growing industry trend of virtualization making you an invaluable asset to any organization This comprehensive guide VMware Professional Network Virtualization VCP NV 350 Practice Questions Detailed Explanations is crafted to mirror the complexity and scope of the actual certification exam Inside you ll find 350 meticulously curated practice questions that cover all exam domains from fundamental concepts to advanced networking scenarios Each question is accompanied by detailed explanations ensuring you understand the rationale behind the correct answers The scenarios presented are designed to reflect real world challenges providing you with an opportunity to apply problem solving skills rather than relying on memorization This approach builds a solid foundation of knowledge boosting your confidence and readiness for the exam Achieving the VCP NV certification can significantly enhance your career prospects leading to roles that demand higher responsibilities and offer increased professional recognition This resource not only prepares you for the certification exam but also equips you with practical skills that translate into day to day tasks making you more effective in your current role Whether you re looking to advance in your career validate your expertise or gain a competitive edge in the job market this guide is your essential companion on the path to success in network virtualization   <u>Using TRILL, FabricPath, and VXLAN</u> Sanjay Hooda,Shyam Kapadia,Padmanabhan Krishnan,2014-01-30 Using TRILL FabricPath and VXLAN Designing Massively Scalable Data Centers with Overlays TRILL FabricPath and VXLAN overlays help you distribute data traffic far more effectively dramatically improving utilization in even the largest data center networks Using TRILL FabricPath and VXLAN is the first practical and comprehensive guide to planning and establishing these high efficiency overlay networks The authors begin by reviewing today s fast growing data center requirements and making a strong case for overlays in the Massive Scale Data Center MSDC Next they introduce each leading technology option including FabricPath TRILL LISP VXLAN NVGRE OTV and Shortest Path Bridging SPB They also present a chapter length introduction to IS IS focusing on details relevant to the control of FabricPath and TRILL networks Building on this foundation they offer in depth coverage of FabricPath its advantages architecture forwarding configuration verification and benefits in Layer 2 networks Through examples they explain TRILL s architecture functionality and forwarding behavior focusing especially on data flow They also fully address VXLAN as a solution for realizing IP based data center fabrics including multi tenant cloud

applications Using TRILL FabricPath and VXLAN provides detailed strategies and methodologies for FabricPath TRILL and VXLAN deployment and migration as well as best practices for management and troubleshooting It also presents three detailed implementation scenarios each reflecting realistic data center challenges In particular the authors show how to integrate multiple overlay technologies into a single end to end solution that offers exceptional flexibility agility and availability Sanjay K Hooda is principal engineer in Catalyst switching software engineering at Cisco He has more than 15 years of network design and implementation experience in large enterprise environments and has participated in IETF standards activities His interests include wireless multicast TRILL FabricPath High Availability ISSU and IPv6 He is co author of IPv6 for Enterprise Networks Shyam Kapadia Technical Leader at Cisco s Data Center Group DCG was an integral part of the team that delivered the next generation Catalyst 6500 Sup 2T 2 Terabyte platform Since then he has focused on developing new solutions for data center environments He holds a Ph D in computer science from USC where his research encompassed wired wireless ad hoc vehicular and sensor networks Padmanabhan Krishnan has more than 12 years of experience in networking and telecommunications including 7 at Cisco His recent experience has included providing data path solutions for TRILL in the Catalyst 6500 Sup 2T Platform using FPGA as well as design and development of platform core infrastructure and L2 features n Discover how overlays can address data center network problems ranging from scalability to rapid provisioning n Examine popular data center overlay examples n Learn about extensions to IS IS for TRILL and FabricPath n Use FabricPath TRILL and VXLAN to simplify configuration improve performance and availability optimize efficiency and limit table size n Learn about FabricPath control and data plane architecture details n Review example FabricPath configurations on Cisco Nexus 7000 6000 5000 switches n Understand TRILL concepts and architecture including overlay header control and data plane and MAC address learning n Learn about VXLAN architecture details and packet forwarding n Review example VXLAN configurations on a Cisco Nexus 1000V distributed virtual switch n Implement TRILL FabricPath networks with VXLAN to virtualized servers in an intra data center environment n Connect multiple traditional data centers using an OTV overlay as a Layer 2 extension n Use OTV overlays to connect sites running FabricPath TRILL or both **Private Cloud Computing** Stephen R Smoot,Nam K Tan,2011-11-26 Private cloud computing enables you to consolidate diverse enterprise systems into one that is cloud based and can be accessed by end users seamlessly regardless of their location or changes in overall demand Expert authors Steve Smoot and Nam K Tan distill their years of networking experience to describe how to build enterprise networks to create a private cloud With their techniques you ll create cost saving designs and increase the flexibility of your enterprise while maintaining the security and control of an internal network Private Cloud Computing offers a complete cloud architecture for enterprise networking by synthesizing WAN optimization next generation data centers and virtualization in a network friendly way tying them together into a complete solution that can be progressively migrated to as time and resources permit Describes next generation data center

architectures such as the virtual access layer the unified data center fabric and the rack and roll deployment model Provides an overview of cloud security and cloud management from the server virtualization perspective Presents real world case studies configuration and examples that allow you to easily apply practical know how to your existing enterprise environment Offers effective private cloud computing solutions to simplify the costly and problematic challenge of enterprise networking and branch server consolidation **Network Function Virtualization A Complete Guide - 2019 Edition** Gerardus Blokdyk,2019-07-22 What steps can you take to lay the groundwork for new networking models in your enterprise How are nfv and sdn going to assist in the next generation of networks for your organization What is network security Disadvantages of ip multimedia subsystem What are the grand challenges Defining designing creating and implementing a process to solve a challenge or meet an objective is the most valuable role In EVERY group company organization and department Unless you are talking a one time single use project there should be a process Whether that process is managed and implemented by humans AI or a combination of the two it needs to be designed by someone with a complex enough perspective to ask the right questions Someone capable of asking the right questions and step back and say What are we really trying to accomplish here And is there a different way to look at it This Self Assessment empowers people to do just that whether their title is entrepreneur manager consultant Vice President CxO etc they are the people who rule the future They are the person who asks the right questions to make Network Function Virtualization investments work better This Network Function Virtualization All Inclusive Self Assessment enables You to be that person All the tools you need to an in depth Network Function Virtualization Self Assessment Featuring 965 new and updated case based questions organized into seven core areas of process design this Self Assessment will help you identify areas in which Network Function Virtualization improvements can be made In using the questions you will be better able to diagnose Network Function Virtualization projects initiatives organizations businesses and processes using accepted diagnostic standards and practices implement evidence based best practice strategies aligned with overall goals integrate recent advances in Network Function Virtualization and process design strategies into practice according to best practice guidelines Using a Self Assessment tool known as the Network Function Virtualization Scorecard you will develop a clear picture of which Network Function Virtualization areas need attention Your purchase includes access details to the Network Function Virtualization self assessment dashboard download which gives you your dynamically prioritized projects ready tool and shows your organization exactly what to do next You will receive the following contents with New and Updated specific criteria The latest quick edition of the book in PDF The latest complete edition of the book in PDF which criteria correspond to the criteria in The Self Assessment Excel Dashboard Example pre filled Self Assessment Excel Dashboard to get familiar with results generation In depth and specific Network Function Virtualization Checklists Project management checklists and templates to assist with implementation INCLUDES LIFETIME SELF ASSESSMENT UPDATES Every self assessment comes

with Lifetime Updates and Lifetime Free Updated Books Lifetime Updates is an industry first feature which allows you to receive verified self assessment updates ensuring you always have the most accurate information at your fingertips

   Vmware Certified Professional - Network Virtualization Certification Prep Guide : 350 Questions & Answers CloudRoar Consulting Services,2025-08-15 Get ready for the VCP NV exam with 350 questions and answers covering NSX architecture virtual networks security administration troubleshooting and best practices Each question provides practical examples and detailed explanations to ensure exam readiness Ideal for VMware network engineers and virtualization professionals VMware VCPNV NetworkVirtualization NSX VirtualNetworks Security Administration Troubleshooting BestPractices ExamPreparation CareerGrowth ProfessionalDevelopment Virtualization ITSkills Networking   *Virtual Routing in the Cloud* Arvind Durai,Stephen Lynn,Amit Srivastava,2016-04-25 The Cisco expert guide to planning deploying and operating virtual routing with the CSR 1000V Cloud Services Router Virtual routing and the Cisco Cloud Services Router CSR 1000V are key enablers of today s revolutionary shift to elastic cloud applications and low cost virtualized networking Now there s an authoritative complete guide to building real solutions with the Cisco CSR 1000V platform Three leading experts cover every essential building block present key use cases and configuration examples illuminate design and deployment scenarios and show how the CSR 1000V platform and APIs can enable state of the art software defined networks SDN Drawing on extensive early adopter experience they illuminate crucial OS and hypervisor details help you overcome migration challenges and offer practical guidance for monitoring and operations This guide is an essential resource for all technical professionals planning or deploying data center and enterprise cloud services and for all cloud network operators utilizing the Cisco CSR 1000V or future Cisco virtual routing platforms Review the fundamentals of cloud virtualization multitenant data center design and software defined networking Understand the Cisco CSR 1000V s role features and infrastructure requirements Compare server hypervisor technologies for managing VM hardware with CSR 1000V deployments Understand CSR 1000V software architecture control and data plane design licensing requirements and packet flow Walk through common virtual router scenarios and configurations including multiple cloud and data center examples Integrate CSR 1000V into the OpenStack SDN framework and use its APIs to solve specific problems Master a best practice workflow for deploying the CSR 1000V Use the Cisco management tools to automate orchestrate and troubleshoot virtualized routing Category Networking Cloud Computing Covers Cloud Services Router This book is part of the Networking Technology Series from Cisco Press which offers networking professionals valuable information for constructing efficient networks understanding new technologies and building successful careers   Networking for VMware Administrators Christopher Wahl,Steven Pantol,2014-03-19 The one stop guide to modern networking for every VMware administrator engineer and architect Now that virtualization has blurred the lines between networking and servers many VMware specialists need a stronger understanding of networks than they may have gained in earlier IT roles Networking for VMware Administrators fills this crucial knowledge gap Writing for

VMware professionals Christopher Wahl and Steve Pantol illuminate the core concepts of modern networking and show how to apply them in designing configuring and troubleshooting any virtualized network environment Drawing on their extensive experience with a wide range of virtual network environments the authors address physical networking switching storage networking and several leading virtualization scenarios including converged infrastructure Teaching through relevant examples they focus on foundational concepts and features that will be valuable for years to come To support rapid learning and mastery they present clear learning objectives questions problems a complete glossary and extensive up to date references Coverage includes The absolute basics network models layers and interfaces and why they matter Building networks that are less complex more modular and fully interoperable Improving your virtual network stack tips tricks and techniques for avoiding common pitfalls Collaborating more effectively with network and storage professionals Understanding Ethernet Advanced Layer 2 Layer 3 and modern converged infrastructure Mastering virtual switching and understanding how it differs from physical switching Designing and operating vSphere standard and distributed switching Working with third party switches including Cisco Nexus 1000V Creating powerful resilient virtual networks to handle critical storage network traffic Deploying rackmount servers with 1 Gb and 10 Gb Ethernet Virtualizing blade servers with converged traffic and virtual NICs Christopher Wahl has acquired well over a decade of IT experience in enterprise infrastructure design implementation and administration He has provided architectural and engineering expertise in a variety of virtualization data center and private cloud based engagements while working with high performance technical teams in tiered data center environments He currently holds the title of Senior Technical Architect at Ahead a consulting firm based out of Chicago Steve Pantol has spent the last 14 years wearing various technical hats with the last seven or so focused on assorted VMware technologies He is a Senior Technical Architect at Ahead working to build better datacenters and drive adoption of cloud technologies

Uncover the mysteries within is enigmatic creation, **Navigating Network Complexity Next Generation Virtualization** . This downloadable ebook, shrouded in suspense, is available in a PDF format (*). Dive into a world of uncertainty and anticipation. Download now to unravel the secrets hidden within the pages.

https://crm.allthingsbusiness.co.uk/public/browse/fetch.php/Lowes%20Irs%20Refund%20Status%20Top.pdf

Table of Contents Navigating Network Complexity Next Generation Virtualization

1. Understanding the eBook Navigating Network Complexity Next Generation Virtualization
    - The Rise of Digital Reading Navigating Network Complexity Next Generation Virtualization
    - Advantages of eBooks Over Traditional Books
2. Identifying Navigating Network Complexity Next Generation Virtualization
    - Exploring Different Genres
    - Considering Fiction vs. Non-Fiction
    - Determining Your Reading Goals
3. Choosing the Right eBook Platform
    - Popular eBook Platforms
    - Features to Look for in an Navigating Network Complexity Next Generation Virtualization
    - User-Friendly Interface
4. Exploring eBook Recommendations from Navigating Network Complexity Next Generation Virtualization
    - Personalized Recommendations
    - Navigating Network Complexity Next Generation Virtualization User Reviews and Ratings
    - Navigating Network Complexity Next Generation Virtualization and Bestseller Lists
5. Accessing Navigating Network Complexity Next Generation Virtualization Free and Paid eBooks
    - Navigating Network Complexity Next Generation Virtualization Public Domain eBooks
    - Navigating Network Complexity Next Generation Virtualization eBook Subscription Services
    - Navigating Network Complexity Next Generation Virtualization Budget-Friendly Options
6. Navigating Navigating Network Complexity Next Generation Virtualization eBook Formats

Navigating Network Complexity Next Generation Virtualization Introduction

In the digital age, access to information has become easier than ever before. The ability to download Navigating Network Complexity Next Generation Virtualization has revolutionized the way we consume written content. Whether you are a student looking for course material, an avid reader searching for your next favorite book, or a professional seeking research papers, the option to download Navigating Network Complexity Next Generation Virtualization has opened up a world of possibilities. Downloading Navigating Network Complexity Next Generation Virtualization provides numerous advantages over physical copies of books and documents. Firstly, it is incredibly convenient. Gone are the days of carrying around heavy textbooks or bulky folders filled with papers. With the click of a button, you can gain immediate access to valuable resources on any device. This convenience allows for efficient studying, researching, and reading on the go. Moreover, the cost-effective nature of downloading Navigating Network Complexity Next Generation Virtualization has democratized knowledge. Traditional books and academic journals can be expensive, making it difficult for individuals with limited financial resources to access information. By offering free PDF downloads, publishers and authors are enabling a wider audience to benefit from their work. This inclusivity promotes equal opportunities for learning and personal growth. There are numerous websites and platforms where individuals can download Navigating Network Complexity Next Generation Virtualization. These websites range from academic databases offering research papers and journals to online libraries with an expansive collection of books from various genres. Many authors and publishers also upload their work to specific websites, granting readers access to their content without any charge. These platforms not only provide access to existing literature but also serve as an excellent platform for undiscovered authors to share their work with the world. However, it is essential to be cautious while downloading Navigating Network Complexity Next Generation Virtualization. Some websites may offer pirated or illegally obtained copies of copyrighted material. Engaging in such activities not only violates copyright laws but also undermines the efforts of authors, publishers, and researchers. To ensure ethical downloading, it is advisable to utilize reputable websites that prioritize the legal distribution of content. When downloading Navigating Network Complexity Next Generation Virtualization, users should also consider the potential security risks associated with online platforms. Malicious actors may exploit vulnerabilities in unprotected websites to distribute malware or steal personal information. To protect themselves, individuals should ensure their devices have reliable antivirus software installed and validate the legitimacy of the websites they are downloading from. In conclusion, the ability to download Navigating Network Complexity Next Generation Virtualization has transformed the way we access information. With the convenience, cost-effectiveness, and accessibility it offers, free PDF downloads have become a popular choice for students, researchers, and book lovers worldwide. However, it is crucial to engage in ethical downloading practices and prioritize personal security when utilizing online platforms. By doing so, individuals can make the most of the vast array of free PDF resources available and embark on

a journey of continuous learning and intellectual growth.

FAQs About Navigating Network Complexity Next Generation Virtualization Books

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer web-based readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Navigating Network Complexity Next Generation Virtualization is one of the best book in our library for free trial. We provide copy of Navigating Network Complexity Next Generation Virtualization in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Navigating Network Complexity Next Generation Virtualization. Where to download Navigating Network Complexity Next Generation Virtualization online for free? Are you looking for Navigating Network Complexity Next Generation Virtualization PDF? This is definitely going to save you time and cash in something you should think about.

Find Navigating Network Complexity Next Generation Virtualization :

lowes irs refund status top
nfl standings usa
stem kits top
act practice last 90 days
productivity planner tricks promo
mortgage rates update download
anxiety relief ai image generator price
pilates at home last 90 days coupon
openai tips

temu price store hours
ai image generator in the us
cyber week this week store hours
facebook review promo
promo code review download
broadway tickets how to free shipping

Navigating Network Complexity Next Generation Virtualization :

ce 425 soil and water engineering pdf uniport edu - Jun 22 2022
web mar 26 2023   ce 425 soil and water engineering 2 5 downloaded from uniport edu ng on march 26 2023 by guest in order to prevent soil from permanent irreversible damage
ce 425 soil and water engineering secure4 khronos - Jan 30 2023
web mechanical analysis of soil civil engineering ce 425 soil and water engineering elusya de civil and environmental engineering mit opencourseware what is soil definition
ce 425 soil and water engineering cyberlab sutd edu sg - Sep 06 2023
web ce 425 soil and water engineering water engineering apr 10 2023 details the design and process of water supply systems tracing the progression from source to sink
ce 425 soil and water engineering accounts ceu social - Jul 24 2022
web ce 425 soil and water engineering whispering the strategies of language an psychological journey through ce 425 soil and water engineering in a digitally driven
ce 425 soil and water engineering share docseducation - Aug 25 2022
web may 23 2023   browse and read ce 425 soil and water engineering ce 425 soil and water engineering want to get experience want to get any ideas to create new things
standard detayı - Nov 27 2022
web kapsam İng this standard specifies flanges ready for use made form non alloyed steel stell for elevated temperatures steel for low temperatures and stainless steel for
ce 425 soil and water engineering pdf uniport edu - Aug 05 2023
web engineering including topics such as soil compaction soil density increases soil disturbance and soil fragmentation soil tillage machineries and optimization of tillage
ce 425 soil and water engineering pdf uniport edu - Feb 16 2022

web jul 12 2023 and install the ce 425 soil and water engineering it is very simple then previously currently we extend the belong to to purchase and make bargains to

senior elective guide civil and environmental engineering - Apr 01 2023

web 17 rows ce 425 soil and site improvement you will learn the need for soil and site improvement and principle analysis and design procedures of the common and state of

ce 425 soil and water engineering pdf uniport edu - Mar 20 2022

web engineering geoenvironmental engineering and transportation engineering this volume entitled multi physics processes in soil mechanics and advances in geotechnical

ce 425 water supply and pollution control arthur d kney - Feb 28 2023

web ce 361 geotechnical engineering ce 361 laboratories ce 322 environmental site assessment ce 425 water supply and pollution control class resources ce 425

ce 425 soil and water engineering copy uniport edu - May 22 2022

web apr 17 2023 ce 425 soil and water engineering 2 7 downloaded from uniport edu ng on april 17 2023 by guest i e to model the effect of initial void ratio on the soil water

ce 425 soil and water engineering book skillience com - Jan 18 2022

web of state variables soil water characteristic curves for unsaturated soils ground surface moisture flux boundary conditions theory of water flow through unsaturated soils

ce 425 soil and water engineering download only - May 02 2023

web advances in soil and water conservation provides an in depth scholarly treatment of the most important developments and influences shaping soil and water conservation in

ce 425 soil and water engineering uniport edu - Apr 20 2022

web apr 24 2023 engineering including topics such as soil compaction soil density increases soil disturbance and soil fragmentation soil tillage machineries and

ce 425 soil and water engineering full pdf canvas edusynch - Jul 04 2023

web ce 425 soil and water engineering 3 3 about it ce 425 soil and water engineering engr colostate edu cive 425 soil and water engineering class

ce 425 soil and water engineering csu walter scott - Oct 07 2023

web the course is designed for students in civil and environmental engineering majors and for students interested in getting introduction to the theory and practice of irrigated

ce 425 soil and water engineering full pdf old thekitroom co - Nov 15 2021

web ce 425 soil and water engineering 1 ce 425 soil and water engineering surface and ground water weathering and soils soil erosion and conservation in the united

ce 425 soil and water engineering pdf uniport edu - Jun 03 2023

web mar 4 2023   ce 425 soil and water engineering 1 5 downloaded from uniport edu ng on march 4 2023 by guest ce 425 soil and water engineering as recognized adventure

ce 425 soil and water engineering orientation sutd edu sg - Sep 25 2022

web ce 425 soil and water engineering gameex de june 10th 2018 browse and read ce 425 soil and water engineering ce 425 soil and water engineering want to get

ce 425 soil and water engineering full pdf - Oct 27 2022

web we present ce 425 soil and water engineering and numerous book collections from fictions to scientific research in any way in the midst of them is this ce 425 soil and

standard detayı tse - Dec 29 2022

web standard detayı 1 1 bu standard yapılarda kullanılan borular ve içi boş profiller hariç yapı çeliğinden sıcak haddelenmiş yassı ve uzun mamullerin özelliklerini bk madde 13 ve

ce 425 soil and water engineering htaccess guide - Dec 17 2021

web ce 425 soil and water engineering that can be your partner bibliography on soil erosion and soil and water conservation 1938 this bibliography is a list of references to

propedeutica al latino universitario docsity - Sep 03 2022

web alfonso traina giorgio bernardi perini propedeutica al latino universitario pdf free ebook download as pdf file pdf or read book online for free

andrea bramanti catalogo dei corsi di studio uniroma1 it - May 31 2022

web università sapienza università di roma propedeutica al latino univesitario segui questo corso documenti 72 domande 1 studenti 28 documenti relativi al libro

propedeutica al latino univesitario 10589427 studocu - Apr 29 2022

web propedeutica al latino universitario nozioni essenziali per lo studio del latino università università degli studi di macerata corso storia della lingua latina l fil let 04 gli

propedeutica al latino universitario propedeutica al - Mar 29 2022

web propedeutica al latino universitario riassunto testo propedeutica al latino universitario capitolo studocu riassunto esaustivo del libro di traina sulla

alfonso traina giorgio bernardi perini propedeutica al latino - Sep 22 2021

propedeutica al latino universitario docsity - Oct 24 2021

web maggio 1972 vedizione in due volumi non pid disponibile prefazione alla seconda edizione oifws song tig imoyias toxe ud fmorv evrrerve fr 910 n che

propedeutica al latino universitario studocu - Dec 26 2021

web propedeutica al latino universitario sintesi del corso di lingua latina 4 4 97 anteprima parziale del testo scarica propedeutica al latino universitario e più sintesi

propedeutica al latino universitario di alfonso traina giorgio - Apr 10 2023

web propedeutica al latino universitario di alfonso traina giorgio bernardi perini bestseller in studi di linguistica con spedizione gratuita 9788855524544 libreria universitaria

lezioni propedeutica al latino universitario - Mar 09 2023

web propedeutica al latino universitario l insegnamento è previsto sue due livelli a seconda delle conoscenze pregresse degli studenti il livello 0 è dedicato a quanti non abbiano

propedeutica al latino universitario by alfonso traina z library - Jul 13 2023

web propedeutica al latino universitario alfonso traina giorgio bernardi perini 5 0 5 0 0 comments categories language learning education and reference latin language

propedeutica al latino universitario sintesi del corso di lingua - Nov 24 2021

web jan 5 2022 riassunto del testo di traina propedeutica al latino universitario

propedeutica al latino universitario vi edizione - Jun 12 2023

web propedeutica al latino universitario il manuale più adottato nelle università italiane per il suo equilibrio fra esigenze scientifiche e didattiche

propedeutica al latino universitario catalogo dei corsi di studio - Oct 04 2022

web jun 8 2020 vi sono tre specie di aspirazione aspirazione vocalica iniziale che si conservò nel latino urbano aspirazione vocalica interna per lo più intervocalica che

propedeutica al latino universitario alfonso traina giorgio - Nov 05 2022

web propedeutica al latino universitario livello 0 per gli studenti che non abbiano mai fatto latino 1 una buona grammatica normativa latina p es m fucecchi l graverini la

amazon it propedeutica al latino universitario traina alfonso - Dec 06 2022

web 8855523074 numero bni bn 96 11055 altri autori bernardi perini giorgio autori secondari marangoni claudio legame alla serie testi e manuali per l insegnamento

propedeutica al latino universitario docsity - Feb 08 2023

web preso per l esame di lingua latina all università nonostante non avessi mai fatto latino prima d ora manuale fondamentale di traina grande esponente di questa materia

propedeutica al latino universitario paperback amazon com - Jan 07 2023

web preso per l esame di lingua latina all università nonostante non avessi mai fatto latino prima d ora manuale fondamentale di traina grande esponente di questa materia

1propedeutica al latino universitario pdf scribd - May 11 2023

web se prendiamo uno stato qualunque del latino in qualunque fase tranne in parte quella preletteraria e ne consi deriamo lo spaccato lo vedremo composto di diversi strati o li

propedeutica al latino universitario alfonso traina giorgio - Aug 14 2023

web propedeutica al latino universitario è un libro di alfonso traina giorgio bernardi perini pubblicato da pàtron nella collana testi insegnamento univers del latino acquista su

pdf propedeutica al latino universitario - Jan 27 2022

web questo è un documento premium propedeutica al latino universitario testo imprescindibile per quanti desiderino acquisire una conoscenza d università

propedeutica al latino universitario propedeutica al - Jul 01 2022

web 2 a traina g bernardi perini propedeutica al latino universitario patron dal cap 1 al cap 7 compreso 3 cesare la guerra gallica introduzione e note di e barelli

alfonso traina giorgio bernardi perini propedeutica al latino - Aug 02 2022

web propedeutica al latino universitario di alfonso traina e giorgio bernardi perini sintesi a cura di riccardo d ascenzi i la storia del latino

propedeutica al latino universitario riassunto testo studocu - Feb 25 2022

web feb 7 2020   propedeutica al latino universitario a a 2019 2020 a l 6 cfu docente beatrice larosa lista dei principali argomenti di morfosintassi per l esame

modeling chemistry u4 ws 3 answer jetpack theaoi - Jun 08 2022

web modeling chemistry u4 ws 3 answer interestingly modeling chemistry u4 ws 3 answer that you really wait for now is coming modeling chemistry 1 u4 ws3 v1 name date pd chemistry unit 4 worksheet 3 use the following information about the masses of elements in each pair of

modeling chemistry u4 ws 3 answer housing gov - Feb 04 2022

web modeling chemistry u4 ws 3 answer modeling chemistry u4 ws 3 answer in this site is not the thesame as a answer reference book you read and download modeling chemistry u4 ws 3 answer free ebooks in pdf format naming drawing

organic compounds worksheet with answers most commonly read and

modeling chemistry u4 ws 3 answer pdf full pdf support ortax - Oct 12 2022

web practice you can find that s why the test prep books practice questions are as close as you can get to the actual acs general chemistry test answer explanations every single problem is followed by an answer explanation we know it s frustrating to miss a question and not understand why the answer explanations will help you learn from your

4b u4 ws3 key name date pd chemistryunit4worksheet3 use - Jul 21 2023

web name date pd chemistry unit 4 worksheet 3 use the following information about the masses of elements in each pair of compounds to help you suggest formulas that account for these ratios 1 compounds of carbon and oxygen compound a 57 1 g o 42 9 g c compound b 72 7 g o and 27 3 c a

doral academy preparatory school - Nov 13 2022

web jan 27 2015   we would like to show you a description here but the site won t allow us

date pd chemistry unit 4 worksheet 4 literature and science - Mar 17 2023

web chemistry unit 4 worksheet 4 answer the following questions on your own piece of paper be sure to show all modeling instruction amta 2013 2 u4 ws4 v1 0 6 two compounds of hydrogen and oxygen are tested compound i contains 15 0 g of hydrogen and 120 0 g of oxygen compound ii contains 2 0 g of hydrogen and 32 0 g

date pd chemistry unit 4 worksheet 2 chandler unified school district - Jan 03 2022

web based on your analysis what is the formula for ammonia unit 4 worksheet 2 part 2 chemists occasionally found that one volume of gas a reacted with one volume of gas b to produce two volumes of gaseous product early chemists like gay lussac were unable to account for this behavior of gases

modeling chemistry u4 ws 3 answer uniport edu - Apr 06 2022

web aug 22 2023   chemistry u4 ws 3 answer can be one of the options to accompany you behind having extra time it will not waste your time agree to me the e book will utterly declare you extra thing to read just invest

10 u4 ws3 key doc name date pd free particle model worksheet 3 - Apr 18 2023

web name date pd free particle model worksheet 3 quantitative force analysis vector components up and to the right will be positive for all problems 1 determine the tension in each cable below draw a force diagram for the system before solving the problem

modeling chemistry u4 ws 3 answer pdf - Aug 10 2022

web modeling chemistry u4 ws 3 answer getting the books modeling chemistry u4 ws 3 answer now is not type of inspiring means you could not and no one else going gone book collection or library or borrowing from your connections to entrance them this is an no question easy means to specifically get guide by on line this online message modeling

u4 ws1 key 12 9 13 pdf solubility mixture scribd - May 19 2023
web dec 9 2013   1 identify the separation techniques pictured below which technique would be useful to separate a mixture of sand and salt of salt and water distillation dissolve in water and filter out insoluble component 2 explain why the technique at left would not be effective in separating a mixture of salt and sugar

modeling chemistry u4 ws 3 answer - Jul 09 2022
web could enjoy now is modeling chemistry u4 ws 3 answer below chemistry in the community american chemical society 2002 this volume has relevance to a wide number of courses giving a hands on introduction to chemistry in relation to community issues rather than around specific chemical concepts phreeqe david l parkhurst

modeling chemistry u4 ws 3 answer liululu - Jan 15 2023
web browse and read modeling chemistry u4 ws 3 answer modeling chemistry u4 ws 3 answer where you can find the modeling chemistry u4 ws 3 answer easily modeling chemistry 1 u4 ws3 v1 name

modeling chemistry u4 ws 3 answer bespoke cityam - May 07 2022
web modeling chemistry u4 ws 3 answer free ebooks in pdf format excel section 3 knowledge check answers when i look to the sky rock and roll read and download modeling chemistry u4 ws 3 answer free ebooks in pdf format mathematical modeling in systems biology mathematical modeling

molecular modeling worksheet answers teachengineering - Dec 14 2022
web molecules the movement of atoms activity molecular modeling worksheet answers 3 12 draw the newman projection of ethanol in the eclipsed conformation 13 in the energy diagram below how does energy relate to staggered and eclipsed please explain in the diagram above the eclipsed conformations are when the potential energy is the highest

modeling instruction amta 2013 answers chemistry unit 3 - Mar 05 2022
web modeling chemistry unit 3 worksheet 4 answers tricia joy modeling instruction amta 2013 1 u1 ws3 v2 0 name date pd chemistry unit 1 worksheet modeling instruction amta 2014 1 u7 review v2 0 describe key characteristics of all chemical reactions including the role of energy 1 files related to

u4 ws3 buckeye valley studylib net - Jun 20 2023
web modeling chemistry 1 u4 ws3 v1 3 compounds of copper and chlorine atoms of cu are heavier than cl atoms by the ratio in compound a a compound a 35 9 g of cl 64 1 g of cu compound b 52 8 g of cl 47 2 g cu a

unit 3 worksheet 3 quantitative energy problems part 1 - Feb 16 2023
web modeling chemistry 1 u3 ws3 v2 0 unit 3 worksheet 3 quantitative energy problems part 1 energy constants h2o 334 j g heat of fusion melting or freezing hf 2260 j g heat of vaporization evaporating or condensing hv 2 1 j g c heat capacity c of solid water 4 18 j g c heat capacity c of liquid water

modeling chemistry u4 ws 3 answer pdf wef tamu - Sep 11 2022
web modeling chemistry u4 ws 3 answer 3 3 designed to allow each student to progress at his or her own pace which may vary from subject to subject students find the instruction embedded in the material so that the teachers voice is heard within the text both objective and subjective assessment methods are used to ensure mastery of the material

date pd chemistry unit 4 worksheet 3 literature and science - Aug 22 2023
web chemistry unit 4 worksheet 3 use the following information about the masses of elements in each pair of compounds to help you suggest formulas that account for these ratios 1 compounds of carbon and oxygen compound a 57 1 g o 42 9 g c compound b 72 7 g o and 27 3 c a determine the value of the ratio mass o mass c in each