



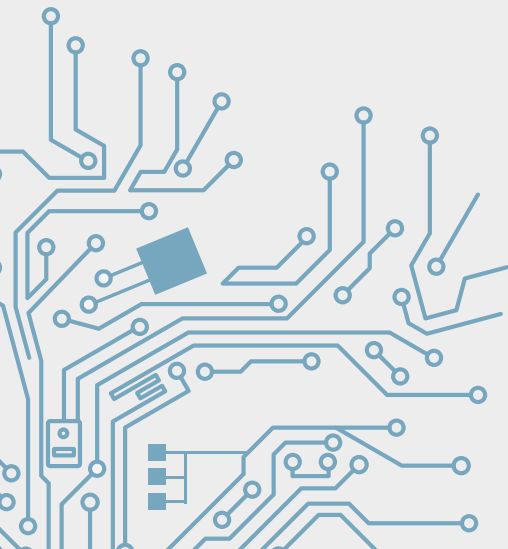
Modern Operating Systems : Design and Implementation

Mr. Sankait Gupta

Dr. Parveen Sadotra

Dr. Pradeep Chouksey

Mr. Mayank Chopra



Modern Operating Systems: Design and Implementation



**India | UAE | Nigeria | Uzbekistan | Montenegro | Iraq |
Egypt | Thailand | Uganda | Philippines | Indonesia**
www.nexgenpublication.com

Modern Operating Systems: Design and Implementation

Authored By:

Mr. Sankait Gupta

Assistant Professor, Department of Computer Application
Govt. Degree College R.S.Pura Higher Education Department, UT of
JK

Dr. Parveen Sadotra

Assistant Professor, Department of Computer Science and Informatics
Central University of Himachal Pradesh, Shahpur Parisar, Shahpur

Dr. Pradeep Chouksey

Associate Professor and Head of Department
Computer Science and Informatics at Central University Himachal
Pradesh (H.P.)

Mr. Mayank Chopra

Assistant Professor, Department of Computer Science & informatics
Central University of Himachal Pradesh, India

Copyright 2024 by Mr. Sankait Gupta, Dr. Parveen Sadotra,
Dr. Pradeep Chouksey and Mr. Mayank Chopra

First Impression: May 2024

Modern Operating Systems: Design and Implementation

ISBN: 978-81-19477-62-3

Rs. 1000/- (\$80)

No part of the book may be printed, copied, stored, retrieved, duplicated and reproduced in any form without the written permission of the editor/publisher.

DISCLAIMER

Information contained in this book has been published by Nex Gen Publications and has been obtained by the authors from sources believed to be reliable and correct to the best of their knowledge. The authors are solely responsible for the contents of the articles compiled in this book. Responsibility of authenticity of the work or the concepts/views presented by the author through this book shall lie with the author and the publisher has no role or claim or any responsibility in this regard. Errors, if any, are purely unintentional and readers are requested to communicate such error to the author to avoid discrepancies in future.

Published by:
Nex Gen Publications

Preface

Welcome to Design and Implementation of Modern Operating Systems. This book is designed to make the complex yet intriguing world of operating systems (OS) understandable and interesting to all readers, whether they are seasoned professionals wishing to brush up on their expertise or first-year computer science students.

Whether it's the laptop on your desk, the smartphone in your pocket, or the enormous servers running the internet, operating systems are the foundation of all computer activities. However, their magic frequently goes unrecognised. This book seeks to reveal that magic by simplifying difficult ideas into language that is easy to grasp.

We begin by investigating the basic components of operating systems and learning about how hardware and software are managed. You'll discover how important parts such as file systems, memory management, and the kernel interact to provide a smooth user experience.

We'll explore increasingly complex subjects as we go along, such as virtualization, security, and process synchronisation. With a focus on providing a thorough understanding of both the theoretical and practical aspects of OS design and implementation, each chapter builds upon the one before it.

Making operating system education approachable and pleasurable is our aim. By providing lucid explanations, practical examples, and interactive exercises, our aim is to deconstruct this crucial domain of computer science and encourage you to go further into it.

We are appreciative that you have decided to travel this path with us. We really hope you find this book to be inspirational and educational.

Regards,

Mr. Sankait Gupta
Dr. Parveen Sadotra
Dr. Pradeep Chouksey
Mr. Mayank Chopra

Acknowledgement

To everyone who helped make this book, "**Modern Operating Systems: Design and Implementation**," a reality, we would like to express our sincere gratitude. This project has been a journey full of experiences, obstacles, and priceless help from many people and organisations.

We would want to thank our families first and foremost for their continuous support and understanding. Throughout the writing process, we have been able to rely on your support and patience. We also thank our friends and colleagues whose thoughtful comments and debates have greatly enhanced this work.

We would especially like to thank the technical reviewers for their thorough reading of our drafts and insightful comments. We have been able to increase the clarity of our writing and refine our concepts thanks to your skill and perceptive eyes.

We owe a huge debt of gratitude to our instructors and mentors, whose lessons and counsel have helped us to grasp operating systems. We are motivated to delve extensively and passionately into this topic by your wisdom and inspiration.

We also thank the open-source community for its efforts. Our understanding and approach to modern operating systems have been greatly influenced by the abundance of resources and the collaborative spirit among users.

At last, we express our gratitude to the editorial staff and publisher for their hard work and professional support. Your production, editing, and management of this book have been greatly appreciated.

We are incredibly appreciative to everyone who has contributed to this book, which is the result of our combined efforts. We are grateful for your assistance in realising our dream.

Mr. Sankait Gupta

Dr. Parveen Sadotra

Dr. Pradeep Chouksey

Mr. Mayank Chopra

About the Authors



Sankait Gupta is an Assistant Professor in JK Higher Education Department and presently working in Government Degree College R.S.Pura (Jammu). He has a bachelor's Degree in Non-Medical and Masters in Computer Applications. He has done MCA from University of Jammu. After working as contractual Lecturer in SSVS Degree College Sunderbani for a period of 3 years, he joined Jammu And Kashmir Higher Education Department as Assistant Professor in 2012. He is an exceptionally qualified educator with over 15 years of experience working with students both at Undergraduate (B.Sc. and B.C.A.) and Post Graduate (M.C.A.) levels. He has adopted very creative teaching strategies that fully engage students in the learning process. He has developed and run many online courses for his students, both UG and PG, on the Moodle Platform. He has created the E-content of various courses. He was the Resource person in Online Workshop Cum Webinar on “E-Content Development” organized by JK Higher education Department in 2020. He is a life time member of Computer Society of India Mumbai.

His areas of interest in teaching are C, C++, Data Structures, Operating Systems, Networking etc. He has presented a number Research papers in various National and International Conferences. He has also published his Research Papers in National and International Journals in the field of Online Education, Library Automation and Cloud Computing.



Dr. Parveen Sadotra (MCA, Ph.D, CCSP, CEH, CCSP and CCA) is presently an Assistant Professor in Department of Computer Science and Informatics, Central University of Himachal Pradesh, Shahpur Parisar, Shahpur. He has definitive experience in the field of computers and Cyber Crime Investigation Training.

He specialize in Cyber Security, Ethical Hacking and Cyber Forensics, Furthermore, Dr. Sadotra presented and published various research papers on Cyber Laws, Investigation of cyber crime, Intrusion Detection System, Cyber Security, Web Security, E- Commerce and Cyber Education in the leading journals. He also published two books on Mobile Technologies and Cloud Computing. He also serves as reviewer of papers in conference. In addition to this he delivered various Lectures and Presentation in Workshop, Seminar and in capsule Trainings. He has got various Appreciations & Commendations certificates from J&K Police for Working on Cyber Crime.



Dr. Pradeep Chouksey is an Associate Professor and Head of Department of Computer Science and Informatics at Central University Himachal Pradesh (H.P.). He has teaching and research experience of more than 16 years. He is actively involved in research with more than 50 presentations, publications and articles in several reputed peer-reviewed international journals, National and international conferences, edited books, etc. He had served as session chair at several National and international conferences. He serves as external examiner for doctoral candidates, external member of doctoral committees, member of board of studies, and academic auditor for various institutions and universities. He also serves as reviewer of papers

for various international journals and subject expert for external committees.



Mr. Mayank Chopra has received BSc Physics (Hons.) degree from Himachal Pradesh University, India, and MSc Information Technology degree from Central University of Himachal Pradesh, India. Currently he is working as an Assistant Professor in the Department of Computer Science & informatics at Central University of Himachal Pradesh, India. His current research interest includes deep learning, UAV, web development, security and data science.

Table of Contents

Preface	IV - V
Acknowledgement	VI - VII
About the Authors	VIII - X
Table of Contents	XI - XII
Title of Chapters	Page No.
<i>Chapter - 1</i>	1 – 15
<i>System Software</i>	
<i>Chapter - 2</i>	16 – 29
<i>Fundamental of Operating System</i>	
<i>Chapter - 3</i>	30 – 44
<i>Process Management</i>	
<i>Chapter - 4</i>	45 – 60
<i>Thread Management</i>	
<i>Chapter - 5</i>	61 – 70
<i>Concurrency Control</i>	
<i>Chapter - 6</i>	71 – 82
<i>Deadlock</i>	
<i>Chapter - 7</i>	83 – 92
<i>Memory Management</i>	

<i>Chapter - 8</i>	93 – 102
<i>Virtual Memory</i>	
<i>Chapter - 9</i>	103 – 112
<i>I/O Hardware</i>	
<i>Chapter - 10</i>	113 – 128
<i>I/O Software</i>	
<i>Chapter - 11</i>	129 – 139
<i>Secondary Storage Management</i>	
<i>Chapter - 12</i>	140 – 149
<i>File Systems</i>	
<i>Chapter - 13</i>	150 – 158
<i>Protection</i>	
<i>Chapter - 14</i>	159 – 170
<i>Security</i>	
<i>Chapter - 15</i>	171 – 178
<i>Linux System</i>	
<i>Chapter - 16</i>	179 – 187
<i>Shell Programming</i>	
<i>REFERENCES</i>	188 – 217

ABOUT THE AUTHORS



Mr. Sankait Gupta

Assistant Professor, Department of Computer Application
Govt. Degree College R.S.Pura Higher Education Department, UT of JK



Dr. Parveen Sadotra

Assistant Professor, Department of Computer Science and Informatics
Central University of Himachal Pradesh, Shahpur Parisar, Shahpur



Dr. Pradeep Chouksey

Associate Professor and Head of Department
Computer Science and Informatics at Central University Himachal Pradesh
(H.P.)



Mr. Mayank Chopra

Assistant Professor, Department of Computer Science & informatics
Central University of Himachal Pradesh, India

ABOUT THE BOOK

A comprehensive manual, '**Modern Operating Systems: Design and Implementation,**' explores the inner workings of contemporary operating systems. Regardless of your level of knowledge, this book breaks down difficult ideas into easily understood chunks. You will learn how operating systems handle multitasking, maintain security and stability, and manage hardware and software resources. It deconstructs prominent systems like Windows, Linux, and macOS, explaining their design principles with useful examples and real-world applications. This book provides concise explanations and practical insights into creating and maintaining contemporary operating systems, making it ideal for students, developers, and anyone else intrigued by the technology that runs our gadgets.



India | UAE | Nigeria | Malaysia | Montenegro | Iraq | Egypt | Thailand | Uganda | Philippines | Indonesia

Nex Gen Publications || www.nexgenpublication.com || info@nexgenpublication.com