INFORMATION SECURITY

Volume 1

UNDERSTANDING OPERATING SYSTEMS PRINCIPLES and PRACTICES

MUHAMMAD ADEEL JAVAID

Nexus Academic Publishers (NAP) Lahore, Pakistan

Understanding Operating Systems Principles and Practices

Volume–1

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Volume

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Nexus Academic Publishers (NAP) Lahore, Pakistan
http://nexusacademicpublishers.com/

First Published in Pakistan in 2013

The first edition published in 2013 by

Nexus Academic Publishers (NAP)

1–B Opposite School –4, Gate # 2, Old Officer Colony Zarar Shaheed Road, Sadar Lahore Cantt. Lahore, Pakistan Phone: 0092 322 4742353

email: info@nexusacademicpublishers.com

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Nexus Academic Publishers (NAP)

1–B Opposite School –4, Gate # 2, Old Officer Colony Zarar Shaheed Road, Sadar Lahore Cantt. Lahore, Pakistan Phone: 0092 322 4742353

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Nexus Academic Library Cataloguing in Publication Data
A catalogue record for this book is available for the Nexus Academic Publishers

Price:	Inland	**PKRs. 1500**
	Foreign	**USD: 30**

Proof read and edited by Mr. Khalid Nazir Wattoo
Typeset in 8.5 Californian FB by Nexus Academic Publishers, Punjab, Lahore Cantt (Pakistan)
Online Printed in Pakistan

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"I think computer viruses should count as life. I think it says something about human nature that the only form of life we have created so far is purely destructive. We've created life in our own image."

– *Stephen Hawking*

Acknowledgements

"This book is dedicated to my mother who has been my biggest supporter and to all my family members and friends who have stood by me through thick and thin. I am indebted to my dear friend Mr. Khalid Nazir Wattoo who spared some moments of his precious time to finalize the manuscript".

Muhammad Adeel Javaid

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PREFACE

The operating System's (OS) function is to manage the main components of a computer and act as a user interface for the computer's hardware. The OS plays an important role for the entire computer system. The operating system is responsible for performing the following activities, provides a user interface, performs common hardware functions, manages system memory, manages processing tasks, provides network capability, controls access to system resources and manages files.

Providing a system interface, which allows users the ability to access the computer system, is a principle function of any operating system. There exist many different types of system interfaces, which include command–based user interfaces and graphical user interfaces.

The first computer system interfaces were command based. A command–based user interface requires users to memorize commands and type them in order to run programs and accomplish tasks. Such user interfaces were predominately in personal computers used until Windows 3.1 became standard issue in 1992.

The main difference between the graphical user interface and the command–based user interface is that the prior uses icons, menus and button–bars, which are activated by mouse to operate software. In his writings, Cardinali explains that graphical user interfaces are linked to an increase in productivity amongst users. Studies shown that the graphical user interface significantly reduces the learning curve opposed to it's command driven counterpart. Cardinali attributes the graphical interface's preference among users to the elimination of having to memorize commands. The most commonly used graphical user interface, today, is Windows by Microsoft.

The performance of a computer depends on the Operating system's management of hardware, which includes extrapolating data from input devices or retrieving data from disks, storing the data and displaying the information via output devices such as a monitor. The OS converts simple instructions for the tasks above into detailed instructions that the computer is able to interpret. In addition the OS communicates errors and attention needs required by input/output devices.

Memory is an important resource that must be carefully managed. The memory management feature is responsible for directing user requests for date to the data's physical storage location (Stair and Reynolds, 2006). Other functions of the memory management feature include space multiplexing and multitasking. Space multiplexing means that more than one user can be operating the OS at the same time, under this assumption, the OS schedules every process in such a way that users get the impression that their processes reside directly on the RAM. Multitasking allows users to run more than one application simultaneously. In short the job of the memory manager is to keep track of which parts of memory are in use and which parts are not in use, to allocate memory to processes when they need it and de–allocate it when they are done, and to manage swapping between main memory and disc when main memory is not big enough to hold all the processes.

Some operating systems provide features that allow users to connect to computer networks and the capability to link users to the Internet. The networking capability of the OS makes a user more vulnerable to security issues. Therefore, the OS is equipped with protection features such as password protected log–on features, the recording of user information pertaining to the log–on, and the reporting of security breaches. Furthermore, users may require that more than one person have access to the same computer. The OS protects multiple users on the same computer by keeping track of where each file is stored and who is authorized to access it.

The Operating system is responsible for providing users with an interface that allow them to communicate directions in order to perform specified tasks on a computer. The OS facilitates the above process by managing common hardware functions, where it converts simple directions into detailed instructions the computer can interpret. Furthermore, the OS manages memory and processing tasks, which allow users to store, and request data, to run more than one application at a time and even allow multiple users access to the same system. Finally, the OS secures the users files by managing its resource allocation and files, which allow users to comfortably share their computer and networking capabilities with others.

This book explains the operating system and various processes that the operating system is responsible for. This includes explaining the different types of system interfaces, describing common hardware functions, memory management and processing tasks, networking capabilities, system resources and file management

Muhammad Adeel Javaid
Dated: 5–10–2013