UNIVERSITI TEKNOLOGI MARA

A FRAMEWORK OF GREEN END-USER COMPUTING THROUGH VIRTUALIZATION APPROACH

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Thesis submitted in fulfilment
of the requirements for the degree of
Doctor of Philosophy
(Information Technology)

Faculty of Computer and Mathematical Sciences

February 2023

ABSTRACT

Information Technology (IT) usage from IT services provided by the IT sector is changing the ways IT personnel interact in the different work processes. IT personnel use multiple devices in the workplace which led to the increasing number of devices in organizations. However, it is impossible to control the multiple devices brought by the IT personnel, leading to a waste of IT resources, increasing carbon emissions and electricity consumption in the environment. This situation has become more concerning because of the redundancy of the IT work process and the difficulty of getting IT technical support. Many researchers proposed a virtualization approach to reduce and optimize the use of IT devices in the organization. However, the guidelines are limited and practices proposed were underutilized in IT organizations. IT business process is also in-silos that causing it incomprehensible to strategize virtualization. Therefore, to reduce a negative impact on the environment, the organization must understand the IT work process to support green initiatives. There is an urgent need for a better understanding of the current work processes, the role of the IT personnel, and the trends in the usage of IT devices that access the data center using virtualization. Thus, the end-user computing framework is needed for planning and managing the work process that highlights the virtualization approach performed by IT personnel in the Malaysian public sector. It explicitly studies the IT department of KeTTHA that implements the green data center. The qualitative approach was adopted; to analyse the work activities and the component in end-user computing that utilize virtualization, to propose suitable virtualization technologies and to evaluate the end-user computing framework through the virtualization approach for IT personnel. The data was collected using a case study strategy with single units of analysis (organization) which consists of interviews, observation, and document analysis. The data was analyzed using content analysis using a pattern matching approach to evaluate and determine four dimensions that consist of the IT work processes (process), end-user component (people), virtualization (technology), and green computing benefit. The results reveal the uniqueness of the IT personnel, which are IT functional support, IT core focus support, IT support services, and data IT support. The framework also highlights the virtualization technology used by IT personnel to perform different work tasks. This framework helps IT organizations utilize the IT resources that can help enhance the work process and support the environment in the future.

ACKNOWLEDGEMENT

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CHAPTER 1

INTRODUCTION

1.1   Introduction

Green computing has emerged and reshaped how information and communication technology (ICT) is implemented. Information technology (IT) has radically impacted our way of working and living while also enhancing our productivity, economic well-being, and social well-being as it has developed. As a result, governments, industry, and society face a new and critical task: addressing environmental concerns and putting environmentally sound practices in place.

Most people are unaware that IT is contributing to environmental problems. Computers and other IT infrastructure consume a large amount of electricity, increasing daily, putting a strain on our power grids. As a result, we contribute to greenhouse gas (GHG) emissions. In addition, hundreds of thousands of servers were infested in data centres and virtualization, all of which were performing activities for businesses and end-users to facilitate and achieve crucial business goals. As a result, these servers are nearly 90% idle the majority of the time, consuming massive amounts of energy and emitting massive amounts of carbon dioxide (CO_2) that are hazardous to environmental sustainability.

Virtualization is the initial aspect in data centers; this is followed by the physical server in data centers. Although there have been many green practices related to the data center, due to the problem mentioned in Section 1.3, this research focuses on the end-user, the IT personnel. This research aims to propose a framework that will assist the organization in using virtualization at work and ensure the appropriate IT personnel in the organization support green computing (GC). The proposed framework introduces the three most important components to support green computing; IT work process, virtualization technologies, and type of IT personnel. Under the IT work process component, the level of access is applied to choose the needed job roles to proceed with the responsibilities that use virtualization during the work process. Next, results from the IT work process component are then used as input for our virtualization technologies to segment usage patterns and describe green