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**DIGITALIZATION OF A WORKPLACE**

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Bachelor's Thesis  
Spring 2019  
Degree Programme in Information Technol-  
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Oulu University of Applied Sciences

## ABSTRACT

Oulu University of Applied Sciences  
Degree Programme in Information Technology

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Title of the bachelor's thesis: Digitalization of a Workplace

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Term and year of completion: Spring 2019

Number of pages: 21

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The aim of the thesis was to improve the hardware and working methods of a local accounting company, Koontia Oy. Current computer hardware was insufficient and error-prone, therefore new, custom-built hardware was needed.

An improved VPN connectivity was desired, along with upgrades to Koontia Oy's file server. The file server was updated from Ubuntu to Windows Server, and the VPN connectivity was updated to use Remote Desktop Protocol from OpenVPN.

Excel spreadsheets were used for customer details and billing tracking, and an improved solution was wanted. A database for customer data and billing tracking were implemented but ended up not being used due to difficulties in finding suitable client software for access and editing, and issues in data migration.

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Keywords: Databases, File organisation, Office management

## **PREFACE**

The practical part of the work was done for an accounting firm, Koontia Oy, which is based in Utajärvi, during the summer break of 2017, from the months of June to September. Koontia Oy's CEO, Sirpa Komminaho, facilitated my work from the company's side, providing me the resources needed to achieve my tasks.

The tutoring teacher was Eino Niemi, who gave me invaluable advice in the practical steps I would have to take to complete my work, and who pointed me in the right direction and gave me suggestions on topics I should focus on in my work.

Thank you to everyone who has helped me work with my thesis and who have given me their support.

Oulu, 12.12.2018  
Jere Komminaho

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# 1 INTRODUCTION

As time goes on and technologies develop, our working methods and tools must evolve alongside. The company that ordered the work, Koontia Oy, an accounting firm based in Utajärvi, saw the need to develop their workplace to take advantage of current trends and developments in the form of new computer hardware, and lessening their dependency on paper.

Koontia Oy employs four people, two CEOs and two accountants. Both CEOs do accounting-related tasks, and different people handle the accounting of different customer companies. One accountant handles the company's own accounting needs, while the other is in charge of billing customers for the work done, in addition to their typical tasks.

In a preliminary interview and from research on the devices I discovered that the current computers that the company had were underperforming, necessitating an upgrade of the existing hardware. The computers were slow, prone to errors, and had varying degrees of performance

Existing customer and billing records did not have a central location, updating and editing the records was unnecessarily difficult and tedious, so centralizing the records and easing the update process was crucial. This also had the effect on reducing the need for paper since when customer and billing data is accessible from all locations and can be tracked digitally, the need for taking paper copies is greatly reduced.

There were issues with using different programs on different workstations, and compatibility issues with their current file server, which meant migrating their existing files to a new file server, and creating a unified environment for the machines to communicate in. The previous file server was leveraged Ubuntu as its operating system, which was changed to Windows Server.

## 1.1 Hardware upgrades

Previously Koontia Oy's workstations were used machines bought from a local IT retailer who specialises in refurbishing and reselling used workstations from

companies. These machines had differing levels of performance and reliability and due to this they could not easily be serviced. Also, they would not be designed with maintainability in mind, due to their age.

Maintainability, a unified performance, and affordable cost were important factors in designing the new workstations

## **1.2 Databases**

Every company has some information that is vital to their day-to-day operations: a list of their customers, employee records, status of different tasks, and what has been billed and when and from whom. The amount of data is overwhelming for an individual to track in their head, which means digital or physical data storage methods are almost necessary for a business to operate.

Storage, access and retrieval become larger concerns the more data there is. If such documents only exist physically, these concerns are difficult to address. A physical storage is hard to expand on demand, finding what you want quickly can be difficult, and accessing the data can be difficult depending on how the documents are laid out and stored. Digital databases address these concerns well. Adding more storage capacity is simpler than building new physical storage areas. Accessing the data can be done on the workstation that is used to do daily work tasks, and searching and filtering results as needed is simpler than going through the archives.

## **1.3 Windows Server 2016**

Windows Server 2016 is a server operating system developed by Microsoft. The version of Windows Server that was used to replace the previous Ubuntu operating system for the company's file server. Since all workstations use Windows 10, Windows Server would fit the greater IT ecosystem better than Ubuntu. Moving workstations to Ubuntu was not feasible since some programs used by the company rely on the Windows operating system.

Windows Server provides the ability to use Active Directory for the better and improved user and program management. <sup>[1]</sup> Updates to software could be

pushed out to all workstations far more conveniently, and all necessary programs could be installed on all workstations at once, ensuring parity. Switching between desks would be simplified if need be, since user data would not be bound to a single workstation. All user data would carry over by simply logging into their Active Directory account on a different workstation. Using Windows Server also enabled Koontia Oy to use the file server as a workstation if needed since all the necessary programs were installed on it as part of the server installation process.

#### **1.4 Remote connectivity**

Using Windows Server helped to establish remote working better than the existing Ubuntu server would have. Windows Server, by virtue of being in the Windows operating system family, comes enabled with Remote Desktop Services, the remote connectivity suite that consists of client software to use to establish and receive connections from other computers, and the protocol that the client software use to communicate the Remote Desktop Protocol.

Since this suite is native to Windows, connecting remotely to the office was straightforward: by opening necessary ports, enabling and configuring RDP on the Server remote access could be initiated without installing additional programs, since RDP is a proprietary protocol developed by Microsoft.



## 2 HARDWARE UPGRADES

### 2.1 Background

Accounting in the 21<sup>st</sup> century requires the usage of computers since the amount of transactions and other financial details a company must keep track of are overwhelming without using some tools that run on said computers to help accountants do their job more efficiently and more easily. Koontia Oy is no exception, having used a wide array of different tools during their time of operation, switching from time to time according to their business needs.

Different programs have different requirements for the machine they are running on, and as Microsoft's Windows is the most common operating system <sup>[3]</sup>, Koontia Oy has been using Windows ever since the company was founded. The current stock of computers they had were underperforming, and were prone to errors, necessitating upgrades to the computers.

Due to the computers being refurbished or used machines acquired from a local IT retailer that specialises in refurbishing and reselling old corporate hardware, the computers were not really designed to be upgradeable and maintainable. Most were small form factor computers that were not designed to be easily serviceable, which made finding replacement parts in the event of a component failure too costly and time-consuming. Figure has an example of a small form factor computer. Some performance and reliability issues were also present: more than one computer had to be replaced way before the expected end of life for a computer.



*Figure 1. Three HP EliteDesk workstations. The middle workstation is an example of a small form factor computer.*

## **2.2 Requirements for new hardware**

Buying used computers had not been working for Koontia Oy, so the computers should be brand new. Replacing entire workstations in the event of component failures was also not desired. The computers had to be performant enough. The primary concerns were that slowdowns would not occur, and all the necessary programs would run smoothly when it came to selecting replacement computers.

In addition to replacing existing computers, new peripherals, such as keyboards and mice, were purchased due to age and ergonomics issues with existing peripherals.

The solution was to assemble computers from new parts. This meant that the requirements for the hardware were able to be satisfied more accurately, e.g. a large storage space was not a requirement since the file server contained the majority of the company's files, and that the machines could be easily serviceable if some hardware issue arose. The computer parts at the time were relatively new, so getting replacement parts would not be very difficult. The hardware was selected based on how affordable it was, without neglecting a good performance.

The operating system had to be Windows since some of the tools they still use require Windows to run and switching away from those tools was not feasible nor cost-effective. It would have required an extensive manual data migration from one software to another, and that was not deemed worthwhile, especially since the tools still worked fine for the company's purpose. Before the upgrade, not all workstations used Windows 10, so during the upgrade, operating systems were updated.

### **2.3 Implementation**

The new machines were assembled, and data was migrated from the old computers without any issues. The workstations are now more reliable, perform better, and are more pleasant to use due to the upgraded peripherals. All operating systems were successfully updated, and the personnel at Koontia Oy were very happy with the new machines.

## 3 DATABASE

### 3.1 Background

A database is “a collection of data organized especially for rapid search and retrieval”. [2] This can either refer to an electronic one or a physical one, but for the purposes of this document the word refers to an electronic database. There are two types of databases, relational and non-relational.

Relational databases suit applications where the necessary data structures are well-defined and simple, and where relations between different datapoints should be reflected. A library’s data needs are served by a relational database very well. A library keeps track of the books they have and information, such as author, ISBNs, publishing year, that every published book is expected to have. They also track what books are loaned to whom, and when they are expected to return. Without defined relations between different data entities (books and customers), keeping track of all the necessary data a library needs to function would be almost impossible, or at least extremely inconvenient.

Non-relational databases serve applications where the structure of the data is not needed to be very strict, and relational management on the database level is not needed or desired. Where a library deals with entities that are strictly defined and have static properties, a software business that keeps user data might not gain any benefit from trying to strictly define the data it expects from its users, which means a non-relational database with its looser requirements might be more beneficial.

A relational database was chosen because the requirements for input data were well defined and expected, and the relationality of the data was a requirement. There was also no need for an easy scalability. Microsoft SQL Server was chosen due to the operating system of the server being Windows Server 2016.

### **3.2 Current customer storage**

Koontia Oy has customer data which they must store to conduct business. They refer to clients internally with both names and an identification number, the identification number being the more widely used identifier. They store this client data in an Excel spreadsheet, located on their file server.

This spreadsheet is the master spreadsheet, yet it is not the single, authoritative source of client data. There are other spreadsheets with clients that are not in the master spreadsheet, and those clients have not been migrated to the master spreadsheet. Some of these spreadsheets were not located on the file server, but instead on client computers as local files.

They also store billing templates in Excel and create printouts of these templates when it comes time to track billing for each month.

Implementing a database to replace the Excel spreadsheets would have defined and enforced a single place for all client related data, and it would have cemented a single procedure for adding clients. The data would have been in the database, new customers would have been entered in a single place, and printouts would have always been up-to-date. All of these are highly preferable outcomes to the data remaining fragmented and separate in the different Excel spreadsheets.

### 3.3 Database design

lärpäke1	
Yritysnumero	
Ilmoitus	lärpäke1
Alv	
[Sotu+ vero]	

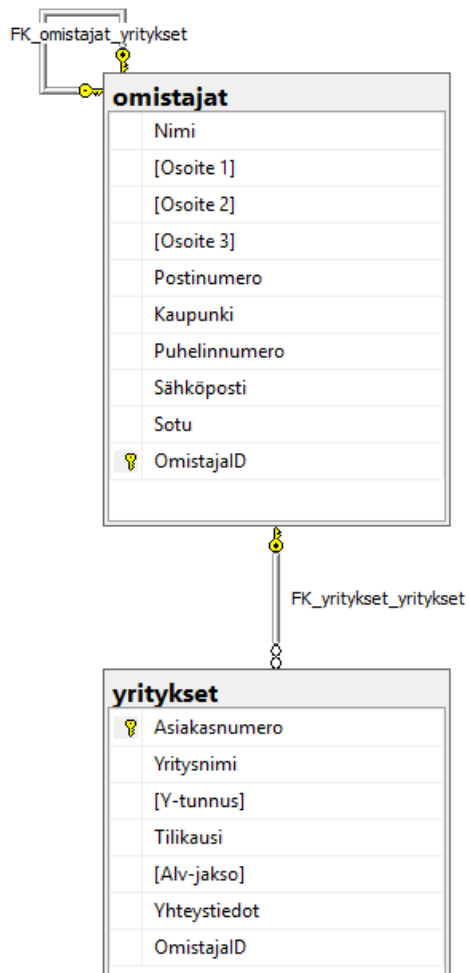


Fig. 2 Database diagrams from the implemented databases.

The table structures are as shown in the Figure 2.

The “Lärpäke” table is the company’s internal designation for the billing printouts. It uses the company ID, the company name, how different figures are reported to the Tax Administration, whether and when certain tax-related matters have been reported, and the reference number of the Tax Administration account for the client.

The “Omistajat” (Owners) table contains the information of the owner of the company, who would also be the contact person. It contains data, such as the name, SSN, address, phone number, email and owner ID. This data would be required for business purposes and could be used to contact the person if necessary.

The “Yritykset” (Businesses) table contains the information on a company: the name, internal reference ID for the company, registered business ID, ID for the contact person that references the “Omistajat” table, the contact details of the company, and the company’s fiscal year.

When billing starts, this sheet is used as a reference for which companies can be billed and for what work. The clients are grouped by how these reports are handled: some companies’ employees report these figures to the Tax Administration themselves, and Koontia Oy reports the rest. Somebody at Koontia Oy prints out the sheet and adds it into the billing binder to be filled in later.

This process works for Koontia Oy since they are a small business. They have few enough employees that entering records into the billing binder does not need to be done in parallel, and they serve few enough clients for Excel-based tracking to still work without being too cumbersome.

Had they more clients, a different solution for tracking the billing status for each client would be better for the company. For over a hundred companies, this Excel-based billing tracking would probably become inconvenient. It is not easily filterable or searchable since it is a physical document. Records of Koontia Oy’s

clients do not automatically get updated to the billing spreadsheet, which can cause outdated information to be on the spreadsheet.

The billing information database was suggested to replace the billing spreadsheet. It would have provided an easily searchable interface, where data on all companies would have come from the database, thereby ensuring that the data were accurate and up-to-date all the time. Companies could have been filtered according to different criteria, and printouts could have still been made, were they necessary. The database could have been accessed by all the employees at the same time, from all workstations, without having to worry about where the printed spreadsheet is at any given time.

### **3.4 Implementation**

Both the company and the contact person databases were implemented but they were not used by the company. No freely available database entry and access tools that were suitable for the employees were found, and the data migration from the previous Excel scheme was not finished successfully due to timing constraints.

The billing database had its own share of issues. Implementation proved more difficult than estimated, mainly due to the complexity of creating the combined data sets for each month. A suitable solution to this issue was not found, leaving an initial version of the database structure created, data not imported and the database unused.

Despite some of the desired outcomes being left unimplemented, the foundation in the form of server architecture has been created, and the databases can later be finished if needed when there is more time.



## **4 REMOTE CONNECTIVITY**

### **4.1 Background**

In accounting there is a lot of physical documents that gets handled on a day-to-day basis: receipts, bank statements, and pay stubs, to name a few. Even though most of this data is generated from electronic sources, material versions are delivered to Koontia Oy. This is because some clients have opted into receiving physical versions of the data by their provider, and because legal requirements necessitate physical backups.

Despite the physical nature of the documents, a remote connection to the office was desired. Accessing the files in the office was necessary on occasion, and while many files that are integral to the daily operations of Koontia Oy cannot be taken away from the office, there are still some tasks that can be done. With remote connectivity in place, employees could choose to spend a day doing those kinds of tasks, without having to commute.

### **4.2 Current setup**

Before the Windows Server implementation, Koontia Oy had an OpenVPN setup that enabled remote connectivity to their file server.

Koontia Oy wanted to be able to use all their programs remotely, which meant their previous, file server only remote access was insufficient. The lack of a static public IP made connecting difficult at times: sometimes the IP changed, and finding the new one and updating it to all remote clients that were not up-to-date was a cumbersome task.

The employees were not tech-savvy enough to update the file themselves. In addition, keeping track of the files that had to be updated was difficult since there was no way to push updated configurations to clients. A more user-friendly way to update connectivity information was requested, and a remote connection that would provide more functionality alongside file server access.

### **4.3 New remote connectivity solution**

The server hosting the OpenVPN solution was replaced with a server running Windows Server 2016. Choosing Windows Server over Linux enabled the use of Remote Desktop Protocol, RDP, which enabled the remote usage of the server computer over a secure connection. Using RDP enables the transmission of graphics and audio from the receiving computer to the connecting computer and the transfer of keyboard and mouse input to the receiving computer from the connecting computer, enabling using the receiving computer as if the user was in front of the computer themselves. This way programs installed on the server computer could be used, file server could be accessed, and connecting was handled using a protocol and software that are native to Windows<sup>[4]</sup>.

Figure 3 shows the Remote Desktop Connection window to demonstrate the nature of the remote access.

The Windows Server machine also doubles as a workstation locally. It runs the limited license version of a legacy accounting software that is still used to handle some clients. Before this software was on a low-performance laptop, which made using it quite difficult, but after transferring the software to the server it can be used via Remote Desktop Protocol from each individual workstation as needed.



*Figure 3. Remote Desktop Connection window after remote connection has been established.*

## 5 CONCLUSION

The purpose of the work was to update the methods and customs used by Koontia Oy, to update the company's IT equipment, and to lessen their dependency on paper documents. The ways to achieve these purposes were to migrate the existing server to Windows Server, replace the existing computers, create a database for their clients, and establish the remote connectivity to the workplace.

The server migration was successful. Moving the server to Windows helped with file synchronization and permission problems and made accessing the files simpler since the client computers are Windows hosts.

The computer replacement went smoothly. Files were transferred to the new computers successfully and the computers were unified to have the same kind of performance across the board. Since the hardware was unified, troubleshooting issues became easier, and maintenance, such as replacing parts is easier since the computers were built with maintenance in mind.

The database was partially implemented. Data was not migrated, and Koontia Oy continued using the Excel-based approach.

Even though not everything was finished, the company was satisfied with what was implemented, and work that was not completed can be carried out later.

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