Programme: Computing & Web Development

Module: CPU4002

Module Title: Information Systems & Databases

Assignment Title: M.J.G Sales

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Word Count: 2451

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Date of Submission – 17/03/16

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Introduction

M.J.G Sales

M.J.G Sales are a SME (Small to Medium Enterprise) who supply mannequins to small retail outlets. They have decided that their current system does not meet the demand of their current workflow, and would like to upgrade. This is to ensure that their system can meet their current demands, add new features and futureproof the company. The CEO, Mark Granger, has decided that M.J.G Sales' current turnover of £350,000 is causing the business to lose sales. Therefore, a new and improved system will improve work flow, efficiency and ultimately, profit. (Walters, 2015)

The System Development Life Cycle

The System Development Life Cycle (SDLC) is an important process which must be taken into consideration when designing and implementing a new system. The SDLC covers the feasibility study, analysis, design, implementation, testing, evaluation and maintenance of the new proposed system. (TutorialsPoint, n.d.)

The Current System

Problems

There are several problems with M.J.G Sales concerning their database systems' software, hardware and their current method of data input. Due to these problems

the business is slowly losing sales, causing a decrease in annual profit. As it stands, the following problems needs to be addressed;

- **Hardware** – The company does not currently have a server hosting a database via a network. Therefore, a dedicated server will be installed in order to provide support for the new features that Mark Granger (CEO) would like to have implemented. Also, the computer hardware at the staff workstations is outdated and needs upgrading to meet the demands of the employee's in all departments.

- **Software** – The current software installed on the staff workstation computers needs to be updated and refined, in order to work as efficiently as possible with the hardware configuration.

- **Record System** – The current paper based system means staff need to temporarily write client details on paper, before adding them to the database upon arrival at the office. This leaves records susceptible to transcription and trans-positioning errors when being read from paper records as there is no form of electronic spell-checker.

- **Data Entry** – Currently, a large volume of simultaneous sales will cause all staff to be utilised. This is not efficient and allows for mistakes to be made if staff are stressed due to being rushed and flustered. The new system needs to include validation and verification methods in order to reduce the probability of such errors occurring.

- **Database Type** – The current flat file database is obsolete as it allows for great quantities of data redundancy and does not work very efficiently with

large quantities of records. A new relational database will need to be implemented for the new system.

- **Data Structure** – The current database does not allow Sales Managers to track the location and sales data for their representatives. The new database should be structured in such a way to allow this.

- **Access Levels** – A hierarchy of data access needs to be implemented into the new system. Allowing the CEO (Chief Executive Officer) and his assistant to view an overview of the entire system. However, lower ranking staff will only need access to data invoicing and inputting. Therefore, staff should be restricted respective of their roles.

- **Back-Up** – The current system does not have any back-up procedures put into place. This means that in the event of a hard-drive failure, natural disaster or theft, data will be lost. Therefore, procedures need to be put into place in order to decrease the probability of such a disaster occurring.

The New System

The new system will be designed in order to eliminate all of the problems mentioned above. They can be rectified by implementing a new system of hardware, software and procedures. These changes will be applied to the headquarters in Shrewsbury; and the two regional Sales Offices in Manchester and Glasgow. (Walters, 2015)

Network

Network Infrastructure

A high end, secure network will be implemented in order to allow several members of staff to add, delete and append records in the database simultaneously where-ever they are. It will allow fast synchronicity across all the machines on the network and also allow peer-to-peer interaction for the sharing of documents and peripherals such as printers. A central router will be installed alongside the server at the Shrewsbury Headquarters. This will be connected to switches via copper Ethernet cabling, which will connect each desktop computer to the company network. This will allow for central auditing, remote management, central software installation and updates, and ease of manageability. A user account system will be implemented in order to increase security and provide staff access rights. Each member of staff will be provided with a unique User ID and Password which will grant access to the system and allow access to specific parts of the system respectively. This will also adhere to the Data Protection Act (1998) as client data is kept secure and will be encrypted. (Young, 2014)

Extranet

Also, an extranet will be put into place in order for members of staff to privately communicate with the business' supplier. An extranet allows for the business to monitor sales orders and place automatic ordering with a specific supplier when inventory stock levels drops below a certain value. It also increases flexibility as information is available to partners, clients, and customers. This means that everyone can access information quickly and securely, wherever they are. (AllBusinessEditors, n.d.)

Hardware

Computer hardware quickly becomes obsolete due to the increasing demand of software and usage on a large business scale. It is important that M.J.G Sales upgrade their computer hardware in order to cope with their current demand, while futureproofing themselves for expansion. It is also important to have hardware which can process and perform actions as fast as possible to maximise productivity and efficiency. The new system will bring brand new hardware to the headquarters' server and the employee workstation computers in the two regional sales offices for all departments.

Headquarters Server

The company headquarters in Shrewsbury will house a new server. This server will host the company's database across its network so it can be access from the sales offices in Manchester and Glasgow. It will also allow members of staff to access the database wherever they are using handheld tablets that are connected to the network via a radio connection (4G) or Wi-Fi. The following hardware will be installed into the server;

- **Central Processing Unit (CPU):** High-End CPU's will be installed with a great number of cores and a high clock frequency. This will provide fast processing speeds and allow program multi-tasking. Multiple CPU's will allow parallel processing for improved performance and can be used for back-up purposes in case one of the processers fail.

- **Motherboard:** A motherboard will be installed with the correct socket for the new CPU and the correct DIMM (Dual-Inline Memory Modules) slots for the

RAM. It will also need SATAIII (Serial Advanced Technology Attachment 3) support and enough ports for the various hard disk drives.

- **Random Access Memory (RAM):** A large quantity of memory with fast clock speeds and low latency will be installed in order to deal with the greater demand from the software being used on the new system. This will provide the ability to have lots of programs running simultaneously and decrease the processing time between the RAM and the CPU.

- **Graphics Processing Unit (GPU):** A high-end business orientated graphics card is not required for the purpose of the server. Therefore, the on-board graphics chipset on the Motherboard will suffice. This chipset will still perform well as it has a sufficient number of cores and high enough clock speed and data transfer rate.

- **Network Interface Card (NIC):** A BASE1000 Network Interface Card will be installed in the Motherboard in the event of the on-board controller failing. This NIC will take over and allow the network to continue running without any interruption or network downtime.

- **Cooling:** In order to preserve hardware longevity, reduce load temperatures and improve system performance. Sufficient cooling will be installed into the server's chassis. Fans with a high CFM (Cubic Feet per Minute) Rating and RPM (Revolutions per Minute) Speeds will be installed, along with a closed-loop liquid CPU Cooler. High static-pressure fans wills be used on the liquid coolers radiator in order to reap the benefits of its cooling by pushing as much air as possible through the radiator to cool the water in the loop.

- **Hard Disk Drive (HDD):** New HDD's will be installed in order to store the vast quantity of database records that are held on the system. They should be of a larger capacity (~4TB [Terabyte]) and have sufficient speed (7200 RPM). There will be separate drives installed specifically for back-up purposes, should a drive fail, become corrupt, or succumb to the accidental deletion of data. There will be mirrored drives in a RAID (Redundant Array of Independent Disks) Level 1 configuration. This will duplicate data in the event that a drive should lose its data.

- **Solid State Drive (SSD):** A new SSD will be installed as the servers boot disk. This is the disk that the server operating system will be installed on. This will significantly improve boot speeds, operating system navigation speeds and both read/write speeds. This drive does not need to be of a great storage capacity (<500GB [Gigabyte]), but of high speed (>90K IOPS [Input Output Operations per Second]).

- **Power Supply Unit (PSU):** A new PSU Should will be installed in order to meet the power demand of the new hardware. A greater wattage and efficiency rating (I.e. Gold/Diamond/Platinum) will be chosen in order to provide the necessary power to the components when under full load and drawing max TDP (Thermal Design Power). There will be a second, backup power supply of similar wattage that will automatically take over the system load in the event of a PSU Failure.

- **Case/Chassis:** The server case will be of the correct form factor (I.e. ATX/E-ATX) for the Motherboard. There will be enough 3.5" HDD Bays and 2.5" SSD Bays for the various disks. The case will have enough room for the

liquid cooler radiator, and enough room for the fans and sufficient air flow. The server chassis will also allow multiple power supplies. (Anon., n.d.)

Staff Workstations

The two regional sales offices in Manchester and Glasgow will house the staff workstations. These workstations will be in all the departments. Including; Finance; Administration; Sales; and Supplies & Marketing. The desktop computers at these workstations do not need to be as capable as the server's hardware. Therefore, a 'Novatech Pro NUI19' will be purchased for each member of staff. These desktop computers are cheap to purchase and run due to a low wattage 250W PSU. They have a sufficient CPU, RAM and the Operating System comes installed on a Solid State Drive in order to improve overall performance, and provide fast read/write speeds for database related work. (Novatech, n.d.)

Members of staff will also need a method of adding records to the company database without being at the office. Therefore, a cost effective mid-end tablet will be purchased for each employee in order to input records directly to the database. The tablet will be password protected along with a unique Staff ID Number. Once logged in, the tablet will have spreadsheet software installed and pre-set forms that allow fast data input. The tablet will be 4G enabled and have Wi-Fi capabilities. This will allow employees to connect remotely to the server, where data can be securely transferred over the network and saved to the database.

CEO & Management Department

The CEO, Mark Granger, needs to be able to view the system as a whole, whether he is in office or on the move. Therefore, he will have his own personal laptop

which is of slightly higher specification than the staff workstation computers. The laptop will be a ‘HP Envy 17-n104na’. It has a large hard-drive for all the data he will be dealing with, and a faster processor to handle the workload. Furthermore, he has a unique login that has full access rights and control. This allows him to remotely access staff computers, view the central audit trail in order to view who has been logging on and when and access any of the administrative tools. (Packard, n.d.)

Software

Headquarters Server

The following tables show the required software that will be installed onto the new computers. Each heading shows which department the software will be installed in, along with the type of software and a description.

Department: Server Management Room (DMZ)	
Software Type	**Description**
Server Operating System (OS)	The server will need an appropriate operating system installed. It should be an OS that is designed in order to make it easy to manage and manipulate large scale database systems. An example would be ‘Microsoft Windows Server R2 2012’. (Stroud, n.d.)
Encryption Software	An encryption program will be installed in order to encrypt stored client data and employee passwords. Personal information needs to be kept safe and secure in order to comply with The Data Protection Act (1998). (ComputerWeekly, 2011)

Staff Workstations

Departments: Supplies & Marketing, Administration and Finance	
Software Type	**Description**
Suited Software Package	A software package suite such as 'Microsoft Office Business' will be installed onto the employee workstation machines. This package will contain a Word Processer, Presentation Designer, Spreadsheet Program, Publisher, Database Manager, Email Client & Note Recorder. These programs are conveniently bundled as to reduce costs. A word processer can be utilised for the production of reports and letters. A publisher can be used for any design work by the supplies and marketing department. An email client can be used by staff for contact between themselves and clients. A spreadsheet software can be used for spreadsheets and tables for calculating profit and sales figures. A Note Recorder can be utilised by staff in order to quickly make notes and organise them. (Meehan, n.d.)
VoIP (Voice over Internet Protocol)	A VoIP program such as Skype for Business will be installed to allow easy communication between employees and customers. It will also allow for video conferencing for meetings when employees are away or at home. This will ultimately safe costs for travel and accommodation as employee's will not have to travel and stay overnight. (ShoreTel, n.d.)
Call Monitoring Software	A piece of software will be installed that records calls for both training and security purposes. The calls will be stored locally on one of the servers' hard drives and will be deleted after 6 months. (Talkdesk, n.d.)
Anti-Virus Software	An anti-virus program will remotely

	installed onto all of the employee computers. This program will filter pop-ups from web browsers and prevent users from access phishing sites. It will filter spam from the installed email client. It will also automatically scan from malware, bloatware, adware etc. on start-up and quarantine files when necessary. (Gorodyansky, 2012)
Department: Chief Executive Officer (CEO) & Management	
Operating System Management Software	Mark Granger, the CEO, would like to be able to overview the entire system. Therefore, his login will have the highest access rights in the hierarchy, granting him fill access and control. This software will be installed on his personal laptop in order to manage and survey his company wherever he is. This software will make use of central auditing in order to see who is logged in and what they are accessing at any time.
Department: Finance	
Payroll Management Software	A payroll management software will be installed specifically for the finance department. This software will be able to manage staff salaries, generate invoices, and apply bonuses and promotions. An example of this software would be ‘intuit’. (Intuit.co.uk, n.d.)

Implementation

Changeover

M.J.G Sales will be making use of the ‘Phased’ transitioning between the old and the new system. This involves splitting the system into separate modules, then removing one of the old and replacing it with the new. This process is repeated until the old system has been entirely replaced with the new one. In the event that

a problem occurs with one of these modules, the whole system does not need to be reversed to correct the error. (Anon., n.d.)

Security

An independent room, or a ‘De-Militarised Zone (DMZ)’, will be allocated to the servers. This room will be secure and only accessible by the network/server administrators and managers. It will have secure windows and a key combination lock on the door. This room will be well air conditioned and ventilated to ensure that the server hardware is kept at a low temperature. There will be a separate computer in the server room dedicated to monitoring the servers’ performance, resources and temperatures. It will also have the ability to remote access and monitors staff computers in order to diagnose problems and access admin level features. (Rouse, 2015)

Furthermore, as mentioned above, each member of staff will have a unique User ID and Password that will grant access to the system. This logical security system will be applied to all computers in all departments to prevent un-authorised access.

Back-Up

In order to ensure data is kept safe and secure, should there be a disaster scenario, certain procedures will be put into place. Firstly, a second server will be installed at the Shrewsbury Headquarters of similar hardware specification to the primary. Furthermore, the hard-disk drives installed in the main server at the headquarters will have a RAID (Redundant Array of Independent Disks) Level 1 Configuration which means each hard-drive will be mirrored identically onto another drive. This will ensure that if one of the drive should become physically damaged or corrupt, there is a back-up of all the data. An electronic schedule will

be configured within the server settings so that it automatically backs up the hard-drives every week.

Conclusion

The new system will vastly improve sales productivity and efficiency over the old, obsolete one. It will allow for the new features that CEO Mark Granger wanted to be implemented such as remote access to the network via a mobile device. The new system introduces greater security to protect on-site hardware and data from theft and damage. It also includes greater logical security and hierarchal access rights to the system to prevent unauthorised access. It futureproofs the business as the hardware and software is all high-end and up-to-date, meaning it will not become obsolete for many years. Furthermore, hardware such as the Hard-Disk Drives are of a large capacity in order to ensure that as database records accumulate, the server will still be able to store them without the need to purchase new hardware. The new system also provides back-ups by using RAID Configurations, multiple processors and power supplies and a back-up server if the primary one should fail.

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