

Unit 14B - Planning Report

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User Requirements

Introduction

The company I work for “The IT People” has been commissioned by a new client called “Blink Photography” to manage their IT systems. Blink Photography have 12 identical desktop PCs and 14 identical laptops, some of which have technical issues.

The client would like to know if it is worth having the systems upgraded or simply repaired, and they want advice about preventative procedures to ensure that the same problems do not persist or occur in the future.

Purpose

The client “Blink Photography”, has asked for help in fixing the technical issues with their computer systems and they would like advice on whether it’s worth upgrading or just repairing and maintaining their systems.

The client has specified that they need lots of storage on multiple hard drives in order to run and store their software and client/project files. It’s also essential for their systems to have between 16GB to 32GB on their desktop PCs and 8GB to 16GB on their laptop systems.

They also want high spec graphics cards and high spec monitors with large screens to enable them to view their work in high definition with high quality graphics. Graphics cards and hard drives will see a lot of heavy use throughout the working week so it is imperative that this is taken into account in order to fix any issues the systems have.

The client has also specified that backup storage must be reliable, quick and easy to use as the client has a lot of computer systems containing lots of data which will need to be backed up regularly without slowing down the systems for hours at a time as the client needs to keep downtime to a minimum so that it doesn’t impact on their business.

Test Plan

Test No.	Component Description	Test	Data	Expected Result	Actual Result
1	CPU	Benchmarking (this compares how the CPU currently operates against the model's standard recorded test, which tells you how your device is operating compared to how it should be operating)	Maths	I expect that the CPU will be operating as close to the standard for the model, as possible.	N/A
2	PSU	Multi-meter test to check the PSU is operating at the correct voltage	Voltage	I expect that the PSU will be operating at the correct voltage standard for the model.	N/A
3	Graphics Card	Benchmarking (this compares how the graphics card currently operates against the model's standard recorded test, which tells you how your device is operating compared to how it should be operating)	Graphics/Maths	I expect that the graphics card will be operating as close to the standard for the model as possible.	N/A
4	Motherboard	POST (Power On Self-Test) test is performed when the computer is first turned on once the main components have	Electricity/power.	I expect the POST test to be successful, if an error is detected it will display in the BIOS screen and if no errors are detected the	N/A

		<p>been connected to the motherboard.</p> <p>This allows the built-in diagnostic program to check the hardware connected to the motherboard to make sure everything is present and functioning properly.</p>		computer will continue with the next stage of the boot and no errors will be displayed.	
5	RAM	Memory diagnostic test will detect any problems with the RAM.	Memory Data	I expect the test to run smoothly and that no issues will be detected.	N/A
6	Hard Drive	Disk Defragmentation	Memory allocation and data stored on disk.	I expect to see the data has been re-located	N/A
7	Monitor	Does it turn on? picture	Pixels/graphics	I expect to see the monitor turn on and a start-up screen appears and that the picture is clear without dead pixels or colour distortion.	N/A
8	Hard Drive	Chkdsk utility check, which can check the hard disk for system issues and it can also fix them.	Hard disk	I expect that the check disk utility program will run and that no errors will be reported/found.	N/A
9	Motherboard	Benchmarking (this compares how the motherboard currently operates against the model's standard recorded test, which tells you how your device is operating compared to how it should be operating)	Binary Data	I expect that the graphics card will be operating as close to the standard for the model as possible.	N/A
10	PSU	Does it switch on?	Power	I expect that the PSU will switch on and power up the other hardware components.	N/A

Hardware Components, Devices and Software Resources Required to Upgrade

The current system specifications:

The client is currently using the following desktop system for 12 identical PCs:

Operating System: Windows 7 (32 bit)

Processor: Intel Core i7-6700 Quad-Core Processor, 3.4 GHz/4.0 GHz with Turbo Boost, 8MB Cache

Memory (RAM): 8GB DDR3 (16GB maximum installable RAM)

Graphics Card: NVIDIA GeForce GTX 745 (4GB)

Storage: 1TB HDD, 5400RPM

Ethernet: 10/100 Ethernet

Bluetooth: Bluetooth 4.0

Video Interface: HDMI x 1, DVI x 1

Audio Interface: 3.5mm jack

Optical Disk Drive: DVD/RW with double layer support

Memory Card Reader: SD Memory Card Reader

Expansion Card Slot: No

Power Supply Unit: 220W

Looking at the system currently in place, there are a few issues that need to be addressed. The client operates a photography business, they require a lot of storage across multiple drives, high-specification monitors with large screens, high-specification graphics cards, plenty of RAM and speedy yet reliable back up storage.

Therefore, the first issue that is clearly visible is the RAM, 8GB is standard for any computer system these days and for a system that will see a lot of heavy use everyday 8GB is not going to allow the user to multi-task while the system is operating several heavy-duty programs (such as photo-editing software) all at once, it will be slow and frustrating for the user.

The problem is, the current systems only allow a maximum of 16GB of RAM, this does not leave the client with any room for upgrades in the future should they need to increase the RAM. To combat this, we plan to implement new motherboards into the PC systems that will allow the system to be upgraded to 64GB yet are compatible with the other components.

The next problem is the graphics card which is only 4GB, this just won't be compatible with the type of system the client requires. The client will be using a lot of demanding software and they will need to be able to view the images they edit in high definition.

The 4GB graphics card will not be able to handle this amount of heavy use on its own and will therefore be putting strain on the central processing unit which will shorten the lifespan of the central processing unit, so the best option to maintain the overall lifespan of the systems and increase the productivity of the systems, is to upgrade the graphics card. We plan to upgrade the 4GB graphics card to a 6GB graphics card to fix this issue.

Next, we have the storage, the client has requested multiple storage drives for each system, so it stands to reason that the business will need separate drives for active projects, the computers main system and for the editing software as each of these will demand a lot of storage space. Therefore, we advise the client to upgrade their storage to two 2TB (7200 RPM) hard drives to run the operating system and store the client's projects, files and editing software.

The final component that we plan to upgrade is the power supply unit, the current power supply unit is just not compatible with the system in place, it will struggle to even power the components. We plan to upgrade this component to a 1050w power supply unit.

The upgraded system specifications:

Operating System: Windows 10 Pro (64 bit)

Processor: Intel Core i7-6700 Quad-Core Processor, 3.4 GHz/4.0 GHz with Turbo Boost, 8MB Cache

Memory (RAM): 32GB DDR3 Crucial (4x (2x 8GB), alongside existing RAM)

Motherboard: ASUS Z170-P D3 ATX LGA1151 (64GB maximum installable RAM)

Graphics Card: ASUS GeForce GTX 1060 6GB Dual Video Card

Storage: 2 x Seagate Barracuda 3.5" 2TB HDD, 7200RPM

Ethernet: 10/100 Ethernet

Bluetooth: Bluetooth 4.0

Video Interface: HDMI x 2, DVI-D x 2, Display Ports x 2

Audio Interface: 3.5mm jack

Optical Disk Drive: DVD/RW with double layer support

Memory Card Reader: SD Memory Card Reader

Expansion Card Slot: Yes

Power Supply Unit: Corsair Professional 1050W 80+ Gold Certified ATX Power Supply

Description of Hardware Components and Software Resources Required for Upgrade

Description of Hardware Components

Memory (RAM): 32GB DDR3 Crucial (4x (2x 8GB), alongside existing RAM)

Description: Random Access Memory is used for temporarily storing volatile data to allow the system to access the data much faster.

The RAM that we will be installing will be 32GB of DDR3 RAM, using both the existing 8GB sticks of RAM and the 16GB (2x 8GB) of the Crucial DDR3 RAM. We have chosen DDR3 as it will help to keep the costs down for the build by utilizing the existing 8GB sticks of RAM already used in the PC systems. So instead of buying 24 sticks of 16GB RAM, we shall only be buying 18 sticks of 16GB RAM because we will be using the 12 sticks of 8GB RAM that are already in the PC systems. Not only does it help to keep the costs down by doing so, but the existing CPU and the motherboard we have chosen to upgrade is compatible with DDR3 RAM (as it uses a 240-pin connector, whereas DDR4 uses 288-pin connector, so you cannot physically put DDR4 RAM in a DDR3 motherboard).

Motherboard: ASUS Z170-P D3 ATX LGA1151 (64GB maximum installable RAM)

Description: The motherboard is used to connect all the hardware components in the system.

We decided to upgrade the motherboard as the existing motherboards could only be upgraded to 16GB of RAM and we wanted to speed this up to at least 32GB of RAM. The beauty of upgrading the motherboard

is that it allows room for future expansion, as the board we have chosen has a maximum of 64GB of installable RAM which we feel will give the client flexible room for expansion. As stated above, we have chosen to stick with a DDR3 compatible motherboard to re-use the existing RAM, which will enhance the usability and functionality of the PC systems, help re-use existing components and keep costs down. The motherboard also supports the existing Intel LGA 1151 CPU to cut the cost of buying new processors.

Graphics Card: ASUS GeForce GTX 1060 6GB Dual Video Card

Description: The graphics card is used to perform math calculations and process the graphics data for programs and applications on the system, this reduces strain on the central processing unit and increases the productivity for the system.

We also decided to change the graphics card as well felt this was one of the most important parts of the client's business, that it was essential we upgrade the graphics. As the client runs a photography business, it is essential that the quality of the graphics is important to allow the company to edit and manipulate images and videos on their PC systems. This requires a fairly powerful graphics card to handle the quality of the graphics displayed to the user on screen. We felt the ASUS GeForce GTX 1060 6GB Dual graphics card fitted this requirement as well as being compatible with the rest of the components.

Storage: 2 x Seagate Barracuda 3.5" 2TB HDD, 7200RPM (plus original 12x 1TB HDD 5400RPM)

Description: The hard disk drives are used to store non-volatile memory, so that when the power is switched off the users saved data is stored on the hard drive and the user can store and retrieve the data.

We plan to keep the existing 1TB hard disk drives and simply upgrade the operating system and defrag and clean-up the hard disk drives to help increase storage space. We will then dedicate two 2TB HDD drives to use for storing the clients more demanding software and current customer projects. We have chosen HDD over SSD as we feel the hard-wearing, reliability of the hard disk drives are greater value for money, over the more expensive solid-state drives which do not last as long as hard disk drives.

Power Supply Unit: Corsair Professional 1050W 80+ Gold Certified ATX Power Supply

Description: The power supply unit is used to power the hardware components, it connects via the mains socket and sends electric power to each of the components.

We have chosen a reliable and highly-efficient, 1050watt power supply with an 80+ gold certified rating to power the high-performance components in the upgraded system. We feel 1050 watts is a far better fit with this upgraded system than a 300 watt power supply, as a lower powering power supply could make the system unstable and may damage the components, or even fail to power the system. The higher wattage will allow for a more stable generation of power to the components which will help to increase their lifespan.

External Backup

For external back-up, we recommend using a network attached storage server to allow the client to store a large amount of data, images and files in one central location for safe, reliable storage. Storing data on an external hard drive can be difficult for multiple users to access, and cloud storage can prove very expensive to run, however, a NAS device would allow the client to store data on the server and connect it to the system network, providing a safe, affordable external back-up of data for every user.

Description of Software Resources

One of the things we need to do when we're upgrading the hardware components is to update the device drivers. The system drivers can help improve performance and stability of the system, these drivers are essential to allow the system to interact and communicate with the hardware devices. There are a number of driver updates that can be performed, however, we will only be running the BIOS for the new motherboard and the video drivers.

As part of installing the new motherboards, we will have to run the BIOS software to be able to configure the system settings as well as to perform a POST test later on. The other update we will need to perform is the update for the video drivers, for the graphics card we will be installing, this again is essential to allow the system to configure the video settings and screen resolution.

The final software resource required for this upgrade is the Windows 10 Pro (64 bit) software and licence. An operating system provides a user interface that allows the user to access the system's basic functions, software, and allows the user to communicate with the system and run applications. This is the most up-to-date operating system software and we have decided to upgrade this software as the old system was windows 7 (32bit), which – while still currently covered by the windows security updates, may be discontinued in the future which will compromise the security of the systems, as well as it being 32 bit which is not compatible with the amount of RAM that I plan to install into the system and the 64 bit can.

Justifications

Maintenance techniques

In order to prolong the lifespan of the system, we will need to perform regular maintenance activities on the system and its components. The first step is to ensure that all the components are clean and free from dust, so to "clean" them we will be using cans of compressed air which are specifically designed to remove dust particles without damaging the components. The next step is to ensure that the firmware for the system is updated to ensure the system and its components are performing correctly. We will use the manufacturer's updates, checking that they are the correct updates for each component to ensure a stable, high-performing system. And finally, we will defragment and clean-up the hard drives at regular intervals to increase the performance and lifespan of the hard drives.

Usage of tools and techniques

We will visually inspect the systems hardware components connections and cables, to check for any damage or disconnected components to ensure that the system is correctly connected, this is to make sure that all of the components are fitted correctly otherwise some components may not work. We will run the BIOS

when upgrading the motherboard to make sure that the settings are configured correctly, this is essential when upgrading the motherboard as these settings have not yet been configured. For example, if a power-on self-test needs to be performed, you can run the BIOS to check that the correct system settings are enabled to allow POST to be performed. A POST (Power-On Self-Test) will be performed when the system is first turned on to check that the hardware components such as have been connected to the motherboard, to make sure that every component is connected and functioning properly. We will perform software diagnostic performance tests to ensure the components performance is as it should be, this is a good way of benchmarking your components against how they should be performing to establish if the system is running efficiently. For example, you can benchmark the performance of the CPU to make sure it is operating as it should be.

Constraints

The main constraint for this is the client's requirements, they wish to keep costs down as well as re-use some of their current components, and this makes it difficult to work around because in order to upgrade the faulty/outdated components I will have to find components that are compatible with the existing components. This isn't always so straight-forward and can increase the costs if the components are rare and hard to find. The other constraint is the need for high performance components to be able to achieve the required speed and functionality of the systems without over-spending or discarding all the current components, which again is difficult to follow as the components can be very expensive and the clients need for fast, high spec systems make it difficult to salvage existing components.

How will this system fulfil the clients' requirements?

Firstly, the system we have chosen allows the client lots of storage across multiple drives as requested by the client. Secondly, we have provided the client with 5TB of HDD storage per PC system, whilst utilising the existing hard drives and maintaining them as part of the clients request to retain and extend the lifespan of current components. We have upgraded the motherboard to allow for future upgrades up to 64GB of RAM which allows the client to upgrade their systems without having to change the motherboards again, thereby future-proofing the systems.

Finally, we have also provided the client with a large amount of RAM whilst still utilising the existing 8GB sticks of RAM that the client currently has in their system, therefore, again fulfilling the client's request that we retain and extend the lifespan of the current components. We have also suggested a network attached storage server, for fast, reliable and easy to use and access backup storage from a safe and affordable NAS server device as requested in the client's briefing. Overall, we believe we have fulfilled the requirements of the client based on the evidence we have presented.

Additional Improvements

To improve the system, we have suggested additional cooling fans to help disperse the heat generated by the components, to help cool the system and prolong the lifespan of the components. We also suggest that a CD/DVD driver update could be performed on the disc drive to prevent/fix any technical issues or detection errors, now or in future. Furthermore, we suggest an application of thermal paste to the CPU to eliminate gaps on the surface of the CPU to increase heat transfer, and a re-application of the paste when necessary, this can help to increase the lifespan of the CPU.

Fault-finding Tools

There are various tools that can be used to identify faults within a computer system, to help identify what issues blink photography's systems are having the following tools will be utilized:

Fault-finding Tool	Description	Where it will be used
Multi-meter	A multi-meter is a device used to test the circuits, check the voltage and analyse the resistance of the hardware components in a computer system.	A multi-meter can be used to check the voltage of the power supply unit to check that it is operating at the correct voltage. It can also be used when a system won't power on, with a multi-meter you can use it to check a system for faulty wires, faulty switches and faults with the power supply.
Software Diagnostic Tool	Software diagnostic tools are used for testing the different system components to ensure the system drivers and components are operating correctly.	This tool can be used to test the motherboard, hard drives, graphics card, RAM and the CPU to ensure they are operating correctly.
Windows Error Tool	This tool is used to view any critical errors that have been logged by the system.	This tool is used to check the system for errors.
Swap Components	This is simply removing suspected faulty components and swapping them with components that are known to be working correctly to check if the fault is the suspected component and not something else.	All components such as the graphics card, RAM, motherboard, fans, power supply, keyboard, mouse.
POST Screen (Power On Self-Test)	This tool is a power on self-testing tool that the	This tool checks that the RAM, disk drives, keyboard,

	<p>computer system's BIOS runs in order to ensure the systems components are working when the power is turned on.</p> <p>If an error is detected in the system the tools will display an error message or play a series of beep noises to flag up any issues.</p>	power supply, video card and other components.
BIOS (Basic Input Output System)	This is the system's firmware which is stored on the motherboard and is used to perform the initial boot-up on the systems hardware and performs a few basic utility functions such as configuring the hardware devices and their settings.	Altering hardware configurations and settings on the motherboard and connected components (such as fan settings, CPU settings, power settings).
Error Messages	These error messages appear when errors are encountered by the computer's system.	Any errors that occur within the system.
Visual Inspection	This is simply using your eyes to just look at the system components and devices to see if there is any damage to any of the components such as burn marks, melted plastic, cracks in the screen, missing keys, fans not spinning, lights not turned on when they should be.	All components.
Touch/Feel	This is using your hands to physically touch and check each of the hardware components to make sure they correctly connected to the system/motherboard.	All components.

	You can also feel for any unusual vibrations or if any cables are leaning against the fans.	
Smell	This is using your sense of smell to identify any unusual odours such as burning plastic to identify any faults with components in the system.	All components.
Hearing/Listening	This is listening out for any unusual sounds with the system components such as grinding noises, faulty speakers, components overheating.	All components.

Installation and Maintenance

Activities

Component	Current Specification	Install or Maintain?
Operating System	Windows 7 (32-bit)	Install new windows 10 pro 64 bit software.
Processor	Intel Core i7-6700 Quad-Core Processor 3.4Ghz/4.0Ghz with Turbo Boost 8mb Cache	Maintain To maintain, make sure the CPU is fitted correctly, free from dust and firmware is up-to-date. Add thermal paste to keep the heat

		dispersal on the surface of the CPU balanced, to prevent the CPU from overheating.
Memory (RAM)	8GB DDR3 (16GB Maximum installable RAM)	<p>Install and maintain</p> <p>Installing new 32GB crucial DDR3 RAM while using the existing RAM.</p> <p>To maintain, make sure the RAM is fitted correctly, free from dust and firmware is up-to-date.</p>
Graphics Card	NVIDIA GeForce GTX 745 (4GB)	Install new ASUS GeForce GTX 1060 6GB Dual Video Card
Storage	1TB HDD 5400RPM	<p>Install new 2 x Seagate Barracuda 3.5" 2TB HDD, 7200RPM</p> <p>Maintain original 12x 1TB HDD 5400RPM by defragmenting and cleaning the hard drives to increase storage space.</p>
Ethernet	10/100 Ethernet	Maintain firmware updates.
Memory Card Reader	SD Memory Card Reader	Maintain firmware updates.
Power Supply	220watts	Install new Corsair Professional 1050W 80+ Gold Certified ATX Power Supply.
Motherboard	ATX motherboard with 16GB maximum installable RAM	Install new ASUS Z170-P D3 ATX LGA1151 (64GB maximum installable RAM).
Optical Disk Drive	DVD/RW with double layer support	Maintain firmware and cd/dvd driver updates.

Alternative Ideas

Operating System: Windows 10 Pro (64 bit, £POA)

Processor: Intel Core i7-8700K, 3.7GHz, 6 cores (£321.32 per component)

CPU Cooler: Cooler Master - Master liquid cooler (ML240L, £58.59 per component)

Memory (RAM): Corsair vengeance LPX 32GB DDR4 (2 X 16GB RAM, £351.99 per component)

Motherboard: AS Rock B360 PRO 4, ATX, LGA1151 (64GB maximum installable RAM, £85.85 per component)

Graphics Card: EVGA GeForce GTX 1080 (8GB, £631.19 per component)

Storage: 2x Seagate Barracuda Pro2TB HDD, 7200RPM (3.5inch, £102.99 per component)

1x Samsung 850 Pro 2TB SSD (2.5inch, £729.99 per component)

Ethernet: 10/100 Ethernet

Bluetooth: Bluetooth 4.0

Optical Disk Drive: Pioneer BDR -2209 Blu-Ray/DVD/CD Writer (£94.00 per component)

Memory Card Reader: SD Memory Card Reader

Expansion Card Slot: Yes

Power Supply Unit: Corsair Professional AX1200, 80 GOLD 1200W Modular (ATX, £299.99 per component)

Why I discarded This Plan

The alternative idea for the clients' technology systems has been discarded as it has a high level of down-time which will affect the productivity of the business, the components are extremely expensive and does not fit with what the client has asked for. The client wanted to keep costs down and they would like to use some of the old components, and this system is both expensive and removes/replaces all the components of the current system. Based on the incompatibility with the core requirements for the client, I have scrapped this plan as it is far too expensive and does not adhere to the clients requirements (such as re-using/maintaining some of the current system components).