Unit 14D – Evaluation of Installation and Maintenance of Hardware

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System Suitability for Purpose and User Requirements

We have modified the technology systems as requested by the client, Blink Photography, to fit the requirements stated in the clients' briefing. The client requested our help in identifying and repairing the technical issues with their computer systems and sought our advice on how to upgrade and maintain their systems. We believe we have fulfilled these requirements based on the evidence presented in previous reports which we will summarise and review in this report.

The client did not wish to replace or upgrade every component, they asked to retain and maintain some of their existing hardware, and we fulfilled this request by keeping the Intel i7-6700 quad-core processors, re-use the existing 8GB RAM sticks and re-using the 12 x 1TB 5400RPM hard disk drives to store the operating system.

During the briefing, the client stated that they need a lot of storage space across multiple hard drives in order to run and store their data, customer project files and software applications. We fulfilled this by retaining the existing 1TB hard drives for the operating system and installing two 2TB Seagate barracuda hard drives to store the other software applications and current customer projects onto.

They also stated they would like plenty of RAM on their desktop systems (between 16GB and 32GB) to allow their systems to access the data much faster. We fulfilled this by re-using the existing 8GB RAM in the modified systems alongside the new RAM to upgrade the system to 32GB of RAM.

The client also requested high spec graphics cards to increase the quality of the graphics and reduce the strain on the processor. We fulfilled this by replacing the graphics card with a Zotac GeForce GTX 980 Ti 6GB graphics card which is a CUDA supported graphics card, which is more than capable of handling the strain of processing high quality graphical data.

Finally, the client requested reliable, fast and easy to use backup storage, which will allow them to back-up their systems onto regularly without long periods of downtime as the client would like to keep this to a minimum so that it won't impact their business.

We fulfilled this request by recommending that the client use a network attached storage server to allow the client to store a large amount of data, photos and project files in one location for safe, dependable storage. The NAS device would provide the client with an affordable external back-up device which can connect to the systems network, and allow multiple users access to store their data on the device.

How the Feedback Affected the Modified System

The first part of the feedback was that we could have left the old 1 TB drive in and increased HDD storage rather than just replacing which we decided was a good idea since all we'd have

to do would be to clean up and defrag the existing hard drives and add two extra 2TB hard drives for each system to make sure we had enough storage on the systems.

The next suggestion in the feedback was that we could have added more RAM to the existing 8GB using all available slots, we decided the re-use the existing 8GB sticks of RAM to reduce costs, as we will need to purchase less RAM if we use the existing RAM as well.

Another point raised within the feedback was that we could've upgraded the hard disk drive for operating system to a different drive such as an SSD as it boots rather slowly on the hard disk drive and an SSD would definitely speed up the boot time. However, we decided not to implement this suggestion as we felt that this would be far too expensive and as the client wanted to keep some of their existing components, we felt it probably best to keep the hard drives for the OS and simply add an extra two 2TB hard drives for the clients data, files and software instead as the motherboard has room for a total of 3 hard drives.

The feedback also suggested that the existing graphics card was a cheap gaming card and therefore unsuitable for the client's requirements. The graphics card was obviously one of the major components for the system, due to the client's type of business (a photography company), we knew this had to be upgraded. Therefore, we had already considered this in our modified system and chosen to upgrade this graphics card for a Zotac GeForce GTX 980 Ti 6GB CUDA supported graphics card which is much more suited to a workstation system than the existing card.

Another aspect mentioned in the feedback was the spare PCIe slot which could fit a VGA card to allow the system to connect to a VGA monitor. This had not been previously considered, nor had it been mentioned by the client during the briefing, and as VGA monitors aren't widely sold much anymore - except for older systems, we weren't sure if this was really necessary. However, we later on decided to look into the cost of this anyway and discovered a VGA cards for around £10 per card. At such a low price we decided it was worth putting the additional VGA card forward with the system so that the client had the added flexibility of connecting the system to a VGA monitor.

The feedback then went on to suggest upgrading the operating system from windows 7 (32 bit), but again we had already considered this during our inspection of the client's systems, and we had decided to upgrade the OS to windows 10 pro (64 bit). We decided to do this so that the client would have the most updated version of windows professional operating system software, and updating it to a 64 bit version would allow us to upgrade the RAM to 32GB (which we would not be able to do with windows 32 bit, due to the limited amount of RAM you can have with windows 32 bit).

The next component mentioned was the power supply unit and the feedback asked if 300 watts was powerful enough to power the system? The answer was clear, no it was not powerful enough, and it probably would have rendered the system and its components dangerously unstable. So we took this into consideration and we found a Corsair Professional 80+ Gold Certified ATX Power Supply with 1050 Watts of power which would provide a more stable, dependable supply of power to the system.

Finally, the USB connected printer was mentioned in the feedback. This feedback suggested that the old printer was unsuitable for the client's systems due to the amount of systems that needed to be connected (12 desktop pcs), it would be unsuitable to expect 12 PCs to wait one at a time for someone to run around the systems with a printer and a USB cable printing out from each system, it would be a nightmare.

So we took this into consideration and decided it would be best to recommend a printer connectable via a network to the client, which would allow multiple systems to connect to at one time, thereby increasing the productivity, usability and efficiency of the printer without the hassle of USB connection cables.

How the Constraints Affected the Modified System

As previously stated the main constraint was the client's requirements. They asked for high specification systems at a lower cost with as little upgrades as possible because they wanted to retain some of their existing components.

This not only made it hard to work with due to the compatibility of the components but with the conditions on some of the components such as the graphics card being a non-gaming graphics card, and the need for so much storage on a budget seemed to be nit-picking considering their original system was a Frankenstein-mashup of an intel i7 processor workhorse crumbling under the weight of old cast-away components.

It seemed so strange that their requirements for a system were so high spec and precise, when the combination of components in the existing systems were so random and seemingly thrown-together. They needed speed and flexibility which made it extremely difficult to rescue existing components which simply weren't compatible (the graphics card for example).

The Planned Upgrade 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

The Refined 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: Zotac GeForce GTX 980 Ti 6GB (with CUDA support)

Extra PCIe Card: ATI Rage XL 8 MB PCI 3d VGA card

Storage: 2 x Seagate Barracuda 3.5" 2TB HDD, 7200RPM (and the existing 12x 1TB 5400rpm HDD)

Ethernet: 10/100 Ethernet

Bluetooth: Bluetooth 4.0

Video Interface: HDMI x 2, DVI-D x 2, Display Ports x 2, VGA port x 1

Audio Interface: 3.5mm jack

Optical Disk Drive: DVD/RW with double layer support

Memory Card Reader: SD Memory Card Reader

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

Justifications

The first refinement we made was to the graphics card, we changed the ASUS GeForce GTX 1060 6GB Dual Video Card to the Zotac GeForce GTX 980 Ti 6GB CUDA supported graphics card as the ASUS graphics card was a gaming graphics card and the client specifically asked for a non-gaming graphics card, so we refined this component to a Zotac graphics card which is better suited for a workstation system as it is a non-gaming graphics card. We have also chosen to update the graphics card drivers to the latest update to improve the functionality and ensure compatibility with the new graphics card.

Furthermore, we decided to refine the system to incorporate an extra VGA card to fit in the spare PCIe slot, for the purpose of adding additional flexibility with the type of monitors the

client could then connect to the systems, we chose the ATI Rage XL 8 MB PCI 3d VGA card for £10 per card for this purpose.

For the RAM we have decided to keep the existing 8GB sticks of RAM and purchase the 16GB (2x 8GB) of the Crucial DDR3 RAM. We chose DDR3 to help keep the costs down as we will be able to use the existing RAM as well, the other reason we opted to stick with DDR3 RAM is that the DDR3 is compatible with the DDR3 240-pin connector slots on the motherboard, whereas DDR4 is compatible with 288-pin slots so it would not be possible to connect DDR4 RAM to a DDR3 connector slot in the motherboard.

Finally, we chose to keep the existing 1TB hard disk drives to store the operating system software. We thought that by running the operating system of the 1 TB hard drive, it would free up space of the other two 2TB hard drives for the projects and other data and software that the client would want to store, without slowing down the system.

Further Improvements

One way to improve the storage for the system is the altering the RAID configurations of the hard drives. RAID stands for redundant array of independent disks and it is a way of storing data, by distributing data across multiple disks, to increase their performance and reliability.

To setup RAID configurations within the systems we would probably be looking for RAID 5 configurations this is because the disk striping with parity of RAID 5, which allows the distribution of the data across multiple drives to help aid data recovery.

Typically you would use 4 drives in this RAID setup, though you can also use 5 drives, and in a RAID 5 setup if one of these 4 drives were to fail, the data can be rebuilt using the parity from the other drives. The RAID 5 setup read/writes are more stable and recoverable in the event of a hard drive failure, making this the best RAID setup for the systems.

Another improvement we can suggest is a dual monitor setup for the desktop systems to allow for flexibility and increased productivity for blink photography's employees. This can be setup very easily by connecting two monitors up to each of the desktop systems in any of the video output ports available (HDMI x 2, DVI-D x 2, Display Ports x 2, VGA port x 1), and adjusting the "multiple display" settings on windows to tailor the settings to suit your workspace.

Finally, the last improvement we can suggest is upgrading the Ethernet cards to a gigabit Ethernet card which is to say upgrading the Ethernet from 10/100 Mbps to 10/100/1000 Mbps which increases the rate of data transfer substantially for faster transfers of data, thereby improving the system.