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| Modern System Architecture |
| Assignment 1 |

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# Introduction

Intro

## Monolithic and Character by Character Computer Architecture

This type of computer architecture, gave rise to the first personal computer. It arrived fully functional Out of the box. Input to the machine made via a built in keyboard only. Input made character by character. A built in green CRT display was your only choice. An example of this type of computer would be the Commodore Pet . Used by schools and colleges at a time when the programming language BBC Basic was first introduced to the mainstream public.

## P2P Network & Client Server Networks

Peer to Peer networks are networks where two or more computers are physically connected via Ethernet cable to one and other. This is achieved either directly or via a small hub. Configuring each machine with a unique ip address, allowing communication between each locally connected computer. An example would be two computers in the same house could be networked in this way for gamming purposes maybe. One advantage of networking in this way is the ability to share data. With each machine operating as a Client or Server respectively. Alternatively the same result could be achieved using a wireless router, perhaps connecting a printer to the network.

A client server network consists of one or more computers connected to a server. The computers or (clients) are individually capable of installing, running applications locally and storing data. However one of the most common implementations for client/server networks, is to have each client running its own applications and storing the most valuable data on a server. This has its advantages, for data security and a centralised storage environment, allowing for system and data management, to be administrated from the central location. An email server, using Microsoft exchange is a good example of the client server environment. Each client running Outlook, and the server end looking after the administration, security and access rights.

## Thick & Thin Clients

The term thick or thin client describes the type of computer architecture, generally on the user side of the network. Thick clients are more common. These machines are capable of being connected to a network or configured as stand-alone computers. In that each machine is equipped with an operating system, internal RAM hard drive storage video cards etc. As a result, the client is not completely dependent on the server. However such machines includes locally installed software applications often local access to the Internet. This increases the need for local machine maintenance and also increases the overall security risk to the network as a whole.

Alternatively a thin client is a machine with much less internal hardware and is far more dependent on server side applications to perform the task it is employed to do. Thin clients are effective and efficient because they are less expensive to install and maintain due to the fact that most of its services and applications come from the server. With all services centrally controlled, centrally administrated security protocols and access groups make the Thin client more secure in a network environment than the Thick client option.

## N- Tier Architecture

Multi tier (N Tier) is a term used when a client/server networks are split on managed in layers or tiers there are generally three tiers, the first-tier or layer is the presentation layer which in simple terms, is the layer which presents output to the user by a given application. A web browser for example or email client. In short what the user sees is handled by the presentation layer. The next layer is the application layer or middle layer. The application layer deals with the program logic and program rules and access rights to the software. Finally comes the data layer where the data is stored and updated. Each of these layers can be considered a separate, which in turn makes server maintenance more efficient. An example of this might be, you may wish to update your database application which might be stored in a different location to your application layer maintenance to the database can be carried out without the need for access to the presentation layer or the application layer. This is a far more efficient approach and would be invisible to end user.

## Distributed Computing

Distributed computing, is a term used when several computers on a network and their resources are used to accomplish the same task. For example a given project may require work from several different disciplines on many levels. The biggest example of distributed computing is the World Wide Web itself or as we know it the Internet. If for example you wish to gain access to a webpage and your local server, is out of service then the user will be redirected to a server that will provide access to the required information. This takes place without the user being aware.

Another use for distributed computing, is collaborative working. Perhaps a design team are beginning to work on the planning and design of the project. This may require planners to budget engineers to design buyers to buy product. While the physical location, of all the participants involved in the project may be global. Therefore while the project material data may be located in one particular location, the individual participants can work locally on their particular aspect of the project. Project management meetings could be held online. However overall the project is managed centrally.

## Parallel Computing

Parallel computing is a system used when several computers or processes are used to accomplish one single task. Where a calculation or task is large and time-consuming the task is then distributed between computers or processes in order to speed up the end result. A good example of parallel computing may be end of month payroll task for a large global organisation. For single computer to accomplish such a task would be less efficient than several computers or processes working on the same task simultaneously.

## Cloud Computing

What is Cloud computing?

The newest technology, brought to us recently is Cloud computing. As its name suggests it offers server side applications security and data management for its users whether business or private the advantages of such a service, being that most of the applications are provided via the Internet online. One such service that most users would be familiar with is Google Docs. This type of application allows users to log in to the service create documentation such as Word documents presentations alike. It allows data to be shared in one location, and lends itself to collaborative teamwork as members of the team could add input to the project that is available to the other members of the project team.

The biggest advantage is cost and availability. Using the above example a particular company would not have to invest valuable resources to install and maintain and run its own server provision. Where for fee Cloud services are available with the necessary applications security and data management being managed by the service provider and not by the company that employed the service. This must by its nature reduce the overall cost to the individual company. Without reducing its productivity or flexibility to carry out its business effectively.

There are downsides to Cloud computing, and these are to be considered when making the decision to use such service. The most obvious is the Internet connection that connects to the service in terms of its speed and reliability. Software integration may be an issue, in terms of the software used in house and the available applications online. You may as a company need specialist bespoke software to function effectively. As well as using the more widely known industry standard software. You as a service user have no control over server downtime, there is also the question of how to protect confidential business data and information critical to the running of your business. However this issue could be handled by employing a regular data storage practice and backup procedure in house. While the less critical information is stored and maintained online.

Software as a service is the term used in applications such as Word for example provided online for the user to create documents, while reducing the need to install and maintain such applications locally. Maintenance performance of such services are maintained by the service provider. Similarly infrastructure as a service, provides a hardware data security and maintenance to accompany while allowing such a service to be personally configured to a company needs. This type of service is often charged on an hourly basis so companies pay on an as needed basis again with order maintenance and security take care of by the service provider. A thin client approach is often used with the services. As most of the maintenance and running costs are taken up by the service provider. Thin clients are therefore more reliable due to the reduction of failure rates. They also are cheaper to install and maintain making them more cost-effective. The providers of such services use data centres to host required applications store data and alike. This provides security for the end-user. The advantages of using cloud services are a cost benefit ratio speed and availability security and disaster recovery.

Another advantage of Cloud computing is that it is accessible from mobile devices such as iPads mobile phones and tablets in general. Some of the most common services known to individual users of resources such as drop box sky drive and other online resources which are accessible from mobile devices this makes the services effective and efficient. From a business perspective an example of this may be a salesman who is often visiting potential customers, really visiting head office could use such a service to upload orders and invoices to head office from a portable device such as a laptop or tablet. This is achieved without the need to visit head office regularly. Which is a cost-effective approach to the business.

# Operating Systems

## Client Operating Systems

## Windows (7 & 8)

Windows as an operating system is well-known by most users. It is also widely supported by many hardware manufacturers. This includes peripheral manufacturer’s products such as printers and scanners cameras mice and keyboards and various hardware that integrates Windows. This makes Windows as an operating system a popular choice with both individuals and businesses alike. As Windows is so well-known in this regard, in my opinion reduces the need for user training and in turn the cost of training, when being considered for implementation by businesses. There is an exception in my opinion. As I have experienced in a professional regard in the past, a businesses need for bespoke software, may increase the need for user training. Otherwise modern Windows operating systems provide integration with many online services. Services such as Google Docs sky drive and drop box to name but a few, are easily integrated with Windows 8 for example. Another example of this is the Google Docs is based on a similar interface as Microsoft Office, therefore using such online services from a user’s perspective would be a more natural progression. In addition the initial cost of the hardware to support Windows environment largely depends on what the hardware is intended for. For example if a writer wishes to purchase a laptop on which to work it could cost as little as £300 with a printer as little as £50. Desktop machines can be built to budget, or you can spend as much of your budget will allow. For example a gamer may require more graphics capability more RAM speed storage space than an average user. Therefore increasing the cost of the initial purchase.

However the fact that Windows is familiar to most of the IT user population, and given that is so widely supported is the very reason why it is open to attacks from hackers and virus developers alike. This is due to the fact that Windows tries to support many different products as peripherals and is compatible with many different software’s. This makes Windows vulnerable and prone to security attacks in many different ways. Security procedures must be considered.

## Apple OSX

Apple’s approach to its operating system is very different in that the company designed its operating system to operate and support its own products. Buying an Apple Mac for example is most likely to be more expensive than Windows alternative because the machine is designed to work very efficiently with Apple peripherals. However Apple as a manufacturer has a proven record in graphic design environments. This approach does have its advantages as generally Apple products are less prone to hacker and virus attacks. Virus attacks for example almost unheard of on Apple products because they limit their connectivity to specific products. Rather than open the so-called door to many manufacturers. This makes the operating system perhaps faster and more efficient energy use memory and RAM. In regard to software many developers provide versions of the products to run under the Apple operating system. The downside is the initial cost of equipment.

## Linux

LINUX is what is known as an open source operating system. This means that business choosing to implement LINUX as an operating system, can develop its own applications and modify the operating system as is necessary according to its particular needs. Unlike the previous operating systems are not tied to copyright. As a professional user of IT systems I am aware that LINUX is often implemented as a front-line defence firewall for larger networks and Windows-based systems. Although it is a flexible operating system it is not so resource dependent as a Windows-based operating system therefore cost of initial hardware is once again less than a Windows alternative. However It is not as well-known as previous examples. Therefore to my knowledge not as widely supported.

# Server Operating Systems

## Windows Server 2012/2008

Windows server operating systems are well known to most of IT staff and server technicians. The software allows for the technician to configure server protocols and administrative rights to particular files or domains, available on a particular server. This also gives rise to security access permissions for general users. This allows for security configurations.

## Apple Server

Apple server software is similar in functionality, however it is designed specifically for use with Apple’s own operating systems. Making efficient use of this kernel as its compatibility is limited Apple’s own products. This is an advantage in many respects due to limited hardware support makes the software efficient.

## Linux Server

in comparison to the above server operating systems, LINUX server is once again an open source operating system. Software’s like Red Hat for example provide a base operating system upon which developers then produce applications and software tools specific to the needs of their particular business. This is ideal for companies more often use dedicated bespoke software needs to run on their servers and through the networks.

# Mobile Device Operating Systems

## Windows

Windows Mobile operating system for its mobile phones and tablets computers was developed primarily the touchscreen alternative to previous versions of Windows like Windows 7 and the keyboard/mouse method of access. The operating system is very much application based and is designed to be more user-friendly.

## Apple iOS

Apple’s iOS seven latest incarnation of its mobile operating system as used on the iPad tablet is fast and efficient due to the same reasons as mentioned before Apple’s limited support for its own products rather than multipurpose support known to most Windows users. The iPad for example has no USB support. However it does have cloud connectivity. As an advantage generally Apple’s operating system is less prone to virus attack.

## Android

android is a very popular mobile operating system and is a clear alternative to Apple and Windows. There are many applications available for the android mobile operating system and it is quite user-friendly environment to use.

## Blackberry

blackberries mobile operating system used to be a popular alternative to those mentioned has unfortunately its popularity and availability has diminished

# Recommendations

The conclusion and my recommendations are as follows

1. Due to the familiarity of the software I would recommend that Windows 7 be implemented as the client software. This allows for compatibility with currently used software such as Microsoft office, and Adobe products such as photo shop Dreamweaver to name but but a few. I would implement a server for far security email server and web server, using Microsoft server 2008 or above this allows for security, the ability to backup critical documentation. From mobile environment I would allow for wireless access points for mobile connectivity. With a view to making use of cloud environment such as drop box sky drive in a professional capacity allowing for occasional users to save gain access to the documentation whilst allowing flexibility of using mobile products such as Microsoft surface to more Apple’s iPad with local storage being limited drop box sky drive would be the more than adequate solution.

# Appendix

# Bibliography