IFB102: Further Investigation Questions

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**Class 5: Languages and Libraries**

1) Programming Languages

**Rust**

The programming language Rust is a relativly new programiing language coming out in 2010, that has gaind a a wide user base due to its abillity to be used well in almost all uses. Rust is a strong, staticly typed language. The closest existing language would be C++ sysntaticly but is better with memory safty and speed. The origins of Rust stem from Mozilla who where the creaters of thelanguage in the intent to use this new language to help aid in the development of there browser Mozilla Firefox. Due to its better fetures it became favored by many developers over C++. The Rust programiing language has developed support over the years for almost every aplication, from embedded systems, creating CLI tools, WebAssembly with or without the combination of javascript and even networking. The only downside to using Rust instead of a language like C++ is that C++ has been around since 1985 and has a wider user base with more support and more framworks. Where as Rust is still new and is still in the early stages of the life cycle of programming languages.

**Class 6: The Web**

2) Big Web Sites

**Scalability**

Poular websites such as facebook and google have have billions of users every day alone. Due to this no one server can handel every request coming from every user. Thus the solution is to have many servers alll doing the same thing. Each server can handel 1000 people so if you have 10 servers you can handel 10000 people all making requests to the servers at once.

The problem with this aproch is in how the internet actuly works. If you had multible servers just facing the open net derectly each server would have a seprate ip address, and due to DNS (Domain name system) if you type “google.com” it get translated to the ip address 142.250.204.14. The problem is how do we share the load between the servers if the ip address always sends the traffic to the same ip address.

Loadba Bancesers

A load balancer sits infrount of all the servers, while the servers sit on there own sub net with only the load balancer facing the open net derectly. The functiion o the load balancer is to share the user connections between the servers. There are many aproches to this like Round Robin, where as a user connects it gets givin to the next server, then the next connection is given to the next one. There are otheres like Resourse based where the next user goes to the server with the least amount of conections.

**Class 7: Security**

2) Securing Home PC

There are a few main chalanges in securing a home PC, some of them from incompatance in the part of a user,

**Security vanrabilitys and chalanges:**

**General preventatives:**

**Firewall** - on your PC and router that blocks all traffic from un trusted sites and ip addresses

**Dont be stupid** – The biggest curse of systems being infected is downloading and running random files even from people you know. To help prevent this never enable the ability for files to run scripts unless you know what you are doing. eg. Dont enable macros on any office 365 suite, unless you know you can trust is or have written it yourself.

**Anti Viris** – A antiviris is not a catch all solution to all malweare and viris on a computer, a antivirise uses a couple of tools to detect a viris. It has a data base of already found virises and compares programs with this data base, but this data base doesnt get updated straight away. The anti viris also watches a programs and dectects if they are doing suspisios things to important system files.

**Malweare**

For malweare there are a couple of preventativivs and solutions incase this does occur.

**Backup** – Having a backup for all your important data or even a complete backup of your intire system. This will make any aatempt to exploit you for accsess to your files pointless.

**Virisis (Bot net)**

Being infected with a virise that creates a backdoor in you PC and adds yout computer to a bot net

**Monitor your network usage** – The only way a program can communicate with the outside world is through your network. Thus if you monitor this and what is being sent and recived you will be able to see if programs are connecting to unwanted computers.

**Outdated softwear**

**Update softwear if security vanrabilitites are found** – The most common way to get hack into a server is using its out dated softwear as an entrie point, but this can also be used on a home PC, The most comon programs you want to keep up tto date is your Internet Browser, or prety much anything that relies on the internet to funtion.

**Physical accsess to your PC**

**TPM Module** – A TPM (Trusted Platform Module) is a module in a computer that is used to enahance a computers secrity with encyption and dycription, it also used for protection authentiction credentials

**Encryption on the storage device** – If some has pysical accese to your computer its very hard to stop them but if the system it turned off you can enrypt all t]your data and thus nothing can be read off your storage.

**Dont ever use a computer** – this will prevent all cyber attakes and if you must use a computer do not plug in anything nor connect it to a network ever, thust to stop it being compramised by the outside world

**Class 8: Mobile, Cloud and the Internet of Things**

2) Internet of Things

The real reason for IoT is the ability to have everthing connected to eachother and the internet (Smart Devices), this can means a very low cumputaional task that happens frequently to a fring that connects to a shopping list app on your phone. Ill be looking at a possible aplication on a farm. On generlal a farm has a large amount of land with many different fields, crops and animals. With this you could want to have a “smart farm” where each field sends soil data, weather data, and sets up a system to turn on irigation when certen critira are met. For animals the level of the water trough could be messured and a variose of other metrics. The data collection alone could be greatly beifical for the farm owner as with all this data predictions on future sessions could be done more pricisly and each field could be treated diffrently to the field next to it from information gathered, increeseing yeild and decreeseing loss. The data would also be coming in, in real time thus the farmer can monitor all farms at once from any location, greatly increeseing the response time of a farmer to respond to matters on the farm.

Due to limited things the IoT deviceses would need to do, the hardweare would not need to be fast nor big, reducing cost, power consumption, and size in comparision to a fully capable desktop commputer. The transmission of data great distrances is also much more power efficant as hardly any data needs to be sent.

IoT would be perfect for an aplication like this and counless others.

**Refrances:**

D. (2022, March 24). *Trusted Platform Module Technology Overview (Windows) - Windows security*. Microsoft Docs. https://docs.microsoft.com/en-us/windows/security/information-protection/tpm/trusted-platform-module-overview

*Elastic Load Balancing*. (2022). Amazon Web Services, Inc. https://aws.amazon.com/elasticloadbalancing/

NGINX, Inc. (2022, January 3). *What Is Load Balancing? How Load Balancers Work*. NGINX. https://www.nginx.com/resources/glossary/load-balancing/

*Rust Programming Language*. (2022). Rust Programming Language. https://www.rust-lang.org/

*Standard C++*. (2022222). Standard C++. https://isocpp.org/