# MN502 Assignment 2

SQL also known as sequel, is a programming language designed to manipulate data in relational database. Users of SQL can weld SQL by modifying, creating and deleting data in a database and it is one of the most popular programming languages in the 21st century.

Some people try to abuse SQL statements in the user input text fields on web pages or web applications. For example, a login page that checks the credentials of a user’s input to the database, hackers can put in SQL keywords to try and abuse and break the system.

If you had a login text field like below that said:

Text

Description automatically generated with low confidence

In SQL this would look like:

SELECT \* FROM USERS WHERE UserId = 105; DROP TABLE Suppliers

If the database isn’t set up correctly to ignore or invalidate SQL keywords. This would delete the table called “Suppliers” in the database and could do some major damage to the website’s database.

Another example of SQL injection can be seen below as well:

Graphical user interface, text, application

Description automatically generated

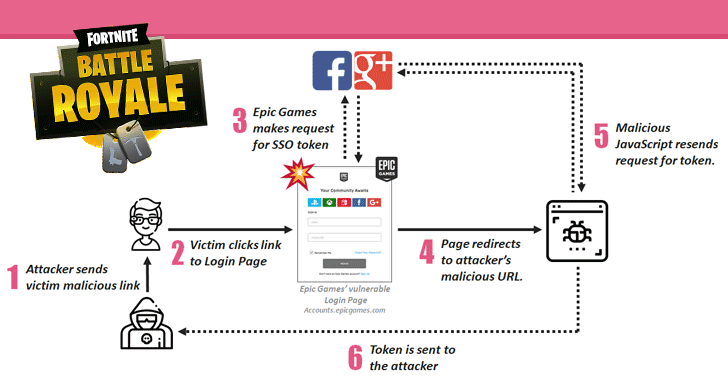
If a hacker enters in the above statement into a login web application page it could print out the following in SQL.

SELECT \* FROM Users WHERE Name ="" or ""="" AND Pass ="" or ""=""

Basically, saying if the Name and Pass field equals empty or if empty equals empty, login to the webpage. This could exploit admin only login panels and again could do serious damage, since someone could be getting unauthorized entry into the website’s database.

In 2019 a popular online game called Fortnite, a massive online multiplayer battle royale game that is very popular even today in 2021. Had a massive breach of player credentials from an online hacker group. Hackers would send players a malicious link it which the players would enter in their login details in. The player would then be redirected to another URL and would send the player’s SSO token to the hacker. Which allowed the player to SQL inject the player’s SSO token to be able to login to the account.

The following image below shows the process of the process of the hacker’s attack:



(Khandelwal, 2019)

According to (Khandelwal, 2019)some methods that are good defences against SQL injection are:

* Using store procedures

Using store procedures instead of dynamic SQL, since input values by the user are treated as text values and the user can’t put in SQL commands.

* Using object relational mapping (ORM)

This method turns SQL statements, database tables/objects into programming objects in the programming IDE. Which makes SQL execution safer for programmers to be able to execute without the vulnerabilities of SQL injection, since the objects are a lot harder to manipulate than a dynamic SQL statement.

B)

A load balancer is a device that distributes user activity over a network. There are many different types of load balancer algorithms, the most popular ones are:

* Least connection
* Least response time
* Round robin
* Weighted round robin

Load balancing is important to a network as it controls the direction of traffic for servers and prevents crashes and makes the network the most efficient it can be. Load balancing is also useful in network security against DDOS (Distributed Denial of Service). Which is a type of attack that users test the capacity limit of server, with the intent to crash it. A load balancer would be able to distribute the attacker’s activity across multiple servers, to prevent the crash as much as possible.

The round robin load balancing algorithm distributes networking traffic between multiple networking receivers.

An example of this is say we have two servers, server A and server B. When a user joins, they are connected to server A, when another user joins, they are connected to server B and the next server A. You can see where this algorithm gets its name from, it alternates traffic options as much as possible.

This gives the network an advantage as it makes the network as efficient as possible and doesn’t clutter all the network traffic on one server.

But because there is no priority for who should join what server, this is an obvious disadvantage to the round robin algorithm. It’s a first come first serve basis, it user one wants to join server B instead of sever A. They can’t, as the algorithm doesn’t allow for specific priority. Secondly

Weighted round robin is the same as round robin except with an added value to each server. This means that server A might have the weight of one attached to it and server B has weight three attached to it. Meaning that three users will get posted to server A and one user will get posted to server B. This algorithm is useful if you have one server with more CPU power than others, which means you can give some priority. Some disadvantages of weighted round robin is that failed or crashed servers aren’t removed from the rotation. Also doesn’t monitor server load, if a server load is near crashing the network activity can’t be transferred with this algorithm.

Round robin and weighted round robin are good algorithms against DDOS attacks as mentioned before. As they defer the traffic over the network to different servers. These two algorithms don’t comprise security, if anything they are a security feature against a certain type of cyberattack, being DDOS.

The internet of things also known as IOT, is all the devices around the world that are connected by the internet. The devices phones, computers, gaming consoles are all connected to each other by the internet, which is how IOT is formed. Any device that can be connected to the internet is included in the IOT, collecting and sharing data with each other.

Blockchain is a new technology that acts as a database, it steers away from the typical relational database SQL style. Blockchain is a bunch of blocks that are chained together, when a new block is created it is added onto the chain in front of the previous block. Blockchain data is irreversible and everyone in the database can see the changes that have been pushed into the blockchain.

Blockchain (decentralized network) vs centralized network, have different types of advantages and disadvantages. A centralized network is a network controlled by the a central authority and an uncentralized network is run by no one and by everyone in the network.

There are different types of advantages and disadvantages of both networks, which are:

Advantages of centralized network

* Control stays in central power
* Consistent workflow output

Advantages of uncentralized network

* Control is not just by one person
* High security as it’s harder to hack a blockchain than a SQL database
* Fees are lower

Disadvantages of centralized network

* Higher fees
* More prone to hacks and data leaks

Disadvantages of uncentralized network

* Volatility
* Misuse of authority, since a lot more people have control and a say

With blockchain technology data is put into blocks and then chained together, hence the name blockchain. This database type of security makes it so you can’t delete or alter data in the blockchain. You can only create new data, which is then added onto the block chain, in front of the previous block. This type of security makes it a lot harder to hack this type of data and keeps it tightly secure.

With covid starting in 2020, cloud technology has become even more popular since work from home has increased in popularity. There are four different types of service models in cloud technology these, services are:

Software as a service (SaaS)

Is a product that is ran by the cloud provider to customers as a service, it is subscription-based product that customers pay. Examples of SaaS is Microsoft Office subscription, accessible from any platform by the customer.

Platform as a service (PaaS)

Is a product for development software that are used by developers. Example of PaaS are products and services such as web servers, developer tools or database management. An example of this service is AWS which is ran by Amazon.

### Infrastructure-as-a-Service (IaaS)

IaaS are products that are remote cloud services that are data space storage, servers and networking. IaaS products can be customized to fit your needs, for example the company can increase or decrease the size of the remote server storage to fit their needs.

### Unified Communications-as-a-Service (UCaaS)

Are products that are communication based as a service, these services tend to be subscription based. An example of this is your phone plan or Microsoft popular product of Skype. UCaaS products help your company communicate, chat and mail each other, BI tools are also another step where UCaaS products are now going.

Making sure cloud data is encrypted and regular backed up is a great security feature for cloud computer technology. If data is somehow lost in the system or accidentally corrupted, a backup of the data will be required. Not doing so could be extremely catastrophic for all stakeholders and parties involved in the cloud storage data. Making sure administration policies are also in place, for maximum protection. Only giving certain roles on the cloud computing product, will ensure that not just anyone can delete, modify or create new data on the cloud technology.

|  |  |
| --- | --- |
| **Microsoft Azure** | **Amazon AWS** |
| Launched in 2010 | Launched in 2006 |
| 140 regions hosting locations | 61 regions hosting locations |
| Has 11% market share in the cloud market | Has 31% of the market share in the cloud market |
| Pricing is per hour | Pricing is per hour |
| Supports MS SQL and SQL Sync | Supports MySQL, Oracle and DynamoDB |
| Virtual Network | Virtual private Network |
| Security is by permissions on the account | Security is by role hierarchy based |
| Offers hybrid cloud options | Does not offer hybrid cloud options |

Overall, the advantages and disadvantages of AWS vs Azure can be seen in the following table above. In my opinion it entirely depends on your situation and the technologies that you’re willing to work with the cloud computing. If you have MSSQL you are not going to go with AWS as it is not a supported database type. Both services are very similar and same with pricing too, the choice entirely depends on your project and circumstances.

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