FINAL EXAM

Q1: What is normalization?

**NORMALIZATION** is a database design technique that reduces data redundancy and eliminates undesirable characteristics like Insertion, Update and Deletion Anomalies. Normalization rules divides larger tables into smaller tables and links them using relationships. The purpose of Normalization in SQL is to eliminate redundant (repetitive) data and ensure data is stored logically.

Q2: What is 1NF? Explain with examples?

First normal form (1NF) sets the fundamental rules for database normalization and relates to a single table within a relational database system. Normalization follows three basic steps, each building on the last. The first of these is the first normal form.  
  
The first normal form states that:

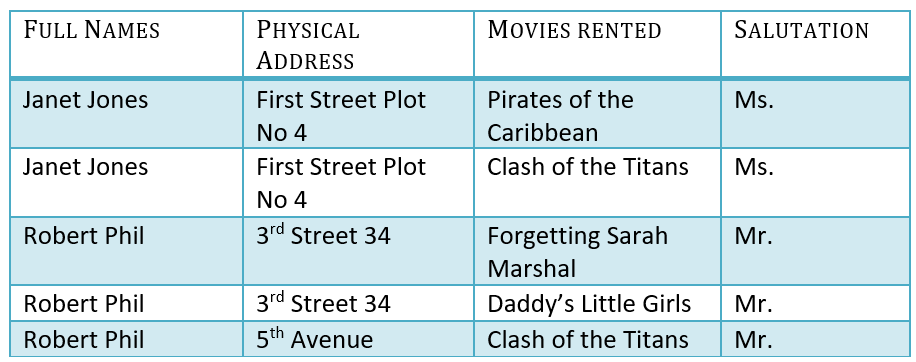
* Every column in the table must be unique
* Separate tables must be created for each set of related data
* Each table must be identified with a unique column or concatenated columns called the primary key
* No rows may be duplicated
* no columns may be duplicated
* no row/column intersections contain a null value

## ****1NF (First Normal Form) Rules****

* Each table cell should contain a single value.
* Each record needs to be unique.

The above table in 1NF-

### 1NF Example

[[](https://www.guru99.com/images/1NF.png)](https://www.guru99.com/images/1NF.png)

[Table 1: In 1NF Form](https://www.guru99.com/images/1NF.png)

Q3: What is 3NF? Explain with examples.

* Third normal form (3NF) is a database schema design approach for relational databases which uses normalizing principles to reduce the duplication of data, avoid data anomalies, ensure referential integrity, and simplify data management. Rule 1- Be in 2NF
* Rule 2- Has no transitive functional dependencies

To move our 2NF table into 3NF, we again need to again divide our table.

**3NF Example**

[[](https://www.guru99.com/images/2NFTable1.png)](https://www.guru99.com/images/2NFTable1.png)

[TABLE 1](https://www.guru99.com/images/2NFTable1.png)

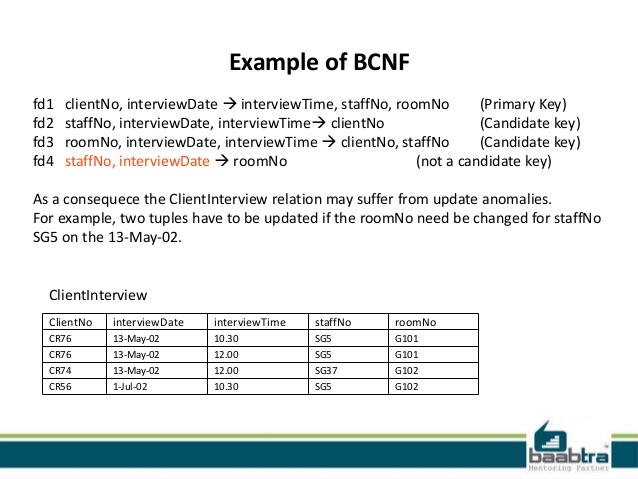
[[](https://www.guru99.com/images/2NFTable2.png)](https://www.guru99.com/images/2NFTable2.png)

[Table 2](https://www.guru99.com/images/2NFTable2.png)

[](https://www.guru99.com/images/2NFTable3.png)

[Q4: What is BCNF? Explain with examples?](https://www.guru99.com/images/2NFTable3.png)

[Boyce–Codd normal form (or BCNF or 3.5NF) is a normal form used in database normalization. It is a slightly stronger version of the third normal form (3NF). ... If a relational schema is in BCNF then all redundancy based on functional dependency has been removed, although other types of redundancy may still exist.](https://www.guru99.com/images/2NFTable3.png)

[](https://www.guru99.com/images/2NFTable3.png)

[Q5: What is Operating system? Give examples?](https://www.guru99.com/images/2NFTable3.png)

[An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.](https://www.guru99.com/images/2NFTable3.png)

[Some popular Operating Systems include Linux Operating System, Windows Operating System, VMS, OS/400, AIX, z/OS, etc.](https://www.guru99.com/images/2NFTable3.png)

[](https://www.guru99.com/images/2NFTable3.png)

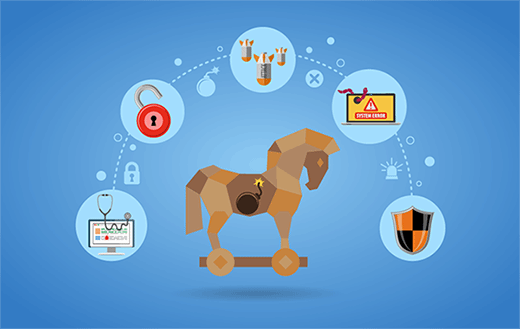
Q6: What is Linux operating system? Why it is considered as better alternative than windows?

Linux is a Unix-like, open source and community-developed operating system for computers, servers, mainframes, mobile devices and embedded devices. It is supported on almost every major computer platform including x86, ARM and SPARC, making it one of the most widely supported operating systems.

Parent os: Unix,License: GNU General Public License,Developer: Linus Torvalds. Privacy ,secure,reliability ,freedom,customization,free to use,open source nature are some reasons that it is considered as best rather than windows. Linux can be installed and used it as a desktop, firewall, a file server, or a web server. Linux allows a user to control every aspect of the operating systems. As Linux is an open-source operating system, it allows a user to modify its source (even source code of applications) itself as per the user requirements.

Q7 What is trojen horse?

A Trojan horse, or Trojan, is a type of malicious code or software that looks legitimate but can take control of your computer. A Trojan is designed to damage, disrupt, steal, or in general inflict some other harmful action on your data or network.A Trojan acts like a bona fide application or file to trick you. It seeks to deceive you into loading and executing the malware on your device. Once installed, a Trojan can perform the action it was designed for.A Trojan is sometimes called a Trojan virus or a Trojan horse virus, but that’s a misnomer. Viruses can execute and replicate themselves. A Trojan cannot. A user has to execute Trojans. Even so, Trojan malware and Trojan virus are often used interchangeably.Whether you prefer calling it Trojan malware or a Trojan virus, it’s smart to know how this infiltrator works and what you can do to keep your devices safe.



Q8 What is MD5 hash and exlpain its significance using a practical example?

MD5 hash is created by taking a string of an any length and encoding it into a 128-bit fingerprint. Encoding the same string using the MD5 algorithm will always result in the same 128-bit hash output. MD5 hashes are commonly used with smaller strings when storing passwords, credit card numbers or other sensitive data in databases such as the popular MySQL. This tool provides a quick and easy way to encode an MD5 hash from a simple string of up to 256 characters in length.

MD5 hashes are also used to ensure the data integrity of files. Because the MD5 hash algorithm always produces the same output for the same given input, users can compare a hash of the source file with a newly created hash of the destination file to check that it is intact and unmodified.

An MD5 hash is NOT encryption. It is simply a fingerprint of the given input. However, it is a one-way transaction and as such it is almost impossible to reverse engineer an MD5 hash to retrieve the original string. A four-word buffer (A,B,C,D) is used to compute the message digest. Here each of A, B, C, D is a 32-bit register. These registers are initialized to the following values in hexadecimal:

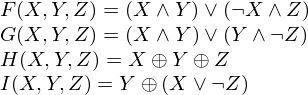
word A: 01 23 45 67

word B: 89 ab cd ef

word C: fe dc ba 98

word D: 76 54 32 10

We first define four auxiliary functions that each take as input three 32-bit words and produce as output one 32-bit word.



where http://practicalcryptography.com/media/latex/88babfa1f949de9c492cc62a37aefbff7c41c7a3-11pt.png is logical and, http://practicalcryptography.com/media/latex/5d62e0c45b69e386fc3517714b8a6e0fe7024913-11pt.png is logical or and http://practicalcryptography.com/media/latex/cbe8301ece8ef60fc2ca6f37919d712119b97d7c-11pt.png is logical xor. Do the following:

/\* Process each 16-word block. \*/

For i = 0 to N/16-1 do

/\* Copy block i into X. \*/

For j = 0 to 15 do

Set X[j] to M[i\*16+j].

end /\* of loop on j \*/

/\* Save A as AA, B as BB, C as CC, and D as DD. \*/

AA = A

BB = B

CC = C

DD = D

/\* Round 1. \*/

/\* Let [abcd k s i] denote the operation

a = b + ((a + F(b,c,d) + X[k] + T[i]) <<< s). \*/

/\* Do the following 16 operations. \*/

[ABCD 0 7 1] [DABC 1 12 2] [CDAB 2 17 3] [BCDA 3 22 4]

[ABCD 4 7 5] [DABC 5 12 6] [CDAB 6 17 7] [BCDA 7 22 8]

[ABCD 8 7 9] [DABC 9 12 10] [CDAB 10 17 11] [BCDA 11 22 12]

[ABCD 12 7 13] [DABC 13 12 14] [CDAB 14 17 15] [BCDA 15 22 16]

/\* Round 2. \*/

/\* Let [abcd k s i] denote the operation

a = b + ((a + G(b,c,d) + X[k] + T[i]) <<< s). \*/

/\* Do the following 16 operations. \*/

[ABCD 1 5 17] [DABC 6 9 18] [CDAB 11 14 19] [BCDA 0 20 20]

[ABCD 5 5 21] [DABC 10 9 22] [CDAB 15 14 23] [BCDA 4 20 24]

[ABCD 9 5 25] [DABC 14 9 26] [CDAB 3 14 27] [BCDA 8 20 28]

[ABCD 13 5 29] [DABC 2 9 30] [CDAB 7 14 31] [BCDA 12 20 32]

/\* Round 3. \*/

/\* Let [abcd k s t] denote the operation

a = b + ((a + H(b,c,d) + X[k] + T[i]) <<< s). \*/

/\* Do the following 16 operations. \*/

[ABCD 5 4 33] [DABC 8 11 34] [CDAB 11 16 35] [BCDA 14 23 36]

[ABCD 1 4 37] [DABC 4 11 38] [CDAB 7 16 39] [BCDA 10 23 40]

[ABCD 13 4 41] [DABC 0 11 42] [CDAB 3 16 43] [BCDA 6 23 44]

[ABCD 9 4 45] [DABC 12 11 46] [CDAB 15 16 47] [BCDA 2 23 48]

/\* Round 4. \*/

/\* Let [abcd k s t] denote the operation

a = b + ((a + I(b,c,d) + X[k] + T[i]) <<< s). \*/

/\* Do the following 16 operations. \*/

[ABCD 0 6 49] [DABC 7 10 50] [CDAB 14 15 51] [BCDA 5 21 52]

[ABCD 12 6 53] [DABC 3 10 54] [CDAB 10 15 55] [BCDA 1 21 56]

[ABCD 8 6 57] [DABC 15 10 58] [CDAB 6 15 59] [BCDA 13 21 60]

[ABCD 4 6 61] [DABC 11 10 62] [CDAB 2 15 63] [BCDA 9 21 64]

/\* Then perform the following additions. (That is increment each

of the four registers by the value it had before this block

was started.) \*/

A = A + AA

B = B + BB

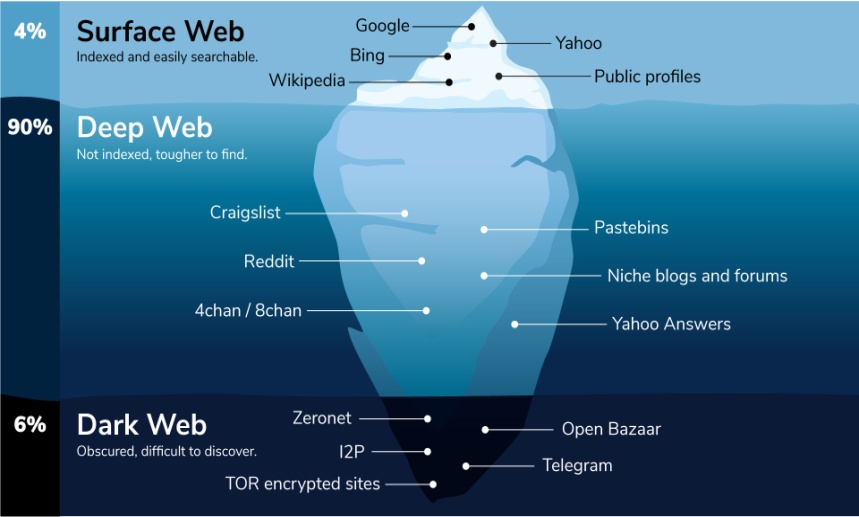
C = C + CC

D = D + DD

end /\* of loop on i \*/

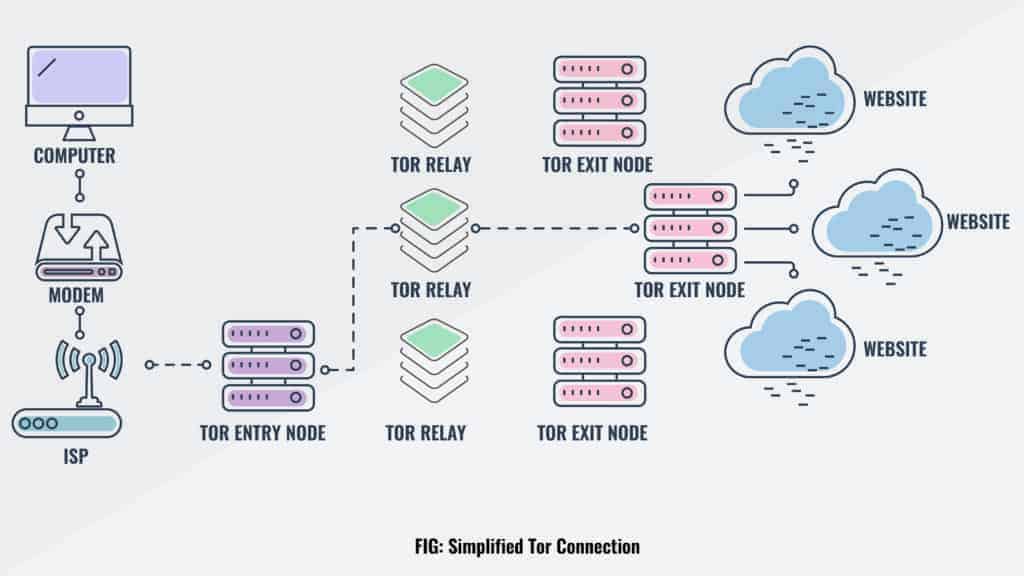
Q9: What is dark web?

The dark web is the World Wide Web content that exists on *darknets*: overlay networks that use the Internet but require specific software, configurations, or authorization to access. Through the dark web, private straphanger networks can communicate and conduct business anonymously without divulging identifying information, such as a user's location. The dark web forms a small part of the deep web, the part of the Web not indexed by web search engines, although sometimes the term *deep web* is mistakenly used to refer specifically to the dark web. The darknets which constitute the dark web include small, friend-to-friend peer-to-peer networks, as well as large, popular networks such as Tor, Freenet, I2P, and Riffle operated by public organizations and individuals. Users of the dark web refer to the regular web as clearnet due to its unencrypted nature. The Tor dark web or onionland uses the traffic anonymization technique of onion routing under the network's top-level domain suffix .onion. The dark web, or dark net, is a small part of the deep web that is kept hidden on purpose. Websites and data on the dark web do typically require a special tool to access.The type of site most commonly associated with the dark web are marketplaces where illicit goods such as narcotics, firearms, and stolen credit card numbers are bought and sold. The darkest corners are used to hire hitmen, engage in human trafficking, and exchange child pornography.More than that, though, the dark web contains content and data that can be accessed with anonymity. It could be a blog, forum, chat room, or private gaming server.The beauty of the dark net is anonymity. No one knows who anyone else is in the real world, so long as they take the necessary precautions. Users’ identities are safe from the prying eyes of governments and corporations.



Q10: How can be we access dark web?

To access the vast majority of the dark web, you’ll need **Tor**. Tor is a network of volunteer relays through which the user’s internet connection is routed. The connection is encrypted and all the traffic bounces between relays located around the world, making the user anonymous.



Q11: What is black and white hat hackers?

Black Hat hackers are criminals who break into computer networks with malicious intent. They may also release malware that destroys files or steals passwords

A white hat hacker — also referred to as a “good hacker” or an “ethical hacker” — is someone who exploits computer systems or networks to identify security flaws and make improvement recommendations.

Q12: Which operating systems are used for hacking and penetration testing?

* Kali Linux. ...
* BackBox. ...
* Parrot Security Operating System. ...
* DEFT Linux. ...
* Network Security Toolkit. ...
* BlackArch Linux. ...
* Cyborg Hawk Linux. ...
* GnackTrack.
* Nodezero

Q13: Why windows are more prone to viruses?

Since Windows is by far the most prevalent operating system, just the sheer number of devices ensures that Windows users will end up getting more viruses. Now that Macs are selling pretty well, the number of incidents of viruses and malware has gone up too. OS X is inherently not any more secure than Windows.

Q15: What is open source softwares?

Open-source software is a type of computer software in which source code is released under a license in which the copyright holder grants users the rights to use, study, change, and distribute the software to anyone and for any purpose. Open-source software may be developed in a collaborative public manner. Open source software is software with source code that anyone can inspect, modify, and enhance."Source code" is the part of software that most computer users don't ever see; it's the code computer programmers can manipulate to change how a piece of software—a "program" or "application"—works. Programmers who have access to a computer program's source code can improve that program by adding features to it or fixing parts that don't always work correctly.

Q16: Why windows Vista was a big failure?

Microsoft either forgot or disregarded that fact when it released Windows Vista, because, despite a long beta period, a lot of existing software and hardware were not compatible with Vista when it was released in January 2007. ... In other words, Vista broke a lot of the things that users were used to doing in XP.

* compatibility issues when upgrade to vista from older operating system.
* requires alot of resources in order to function-need a powerful machine to run it.
* very expensivc.
* prone to security issues.
* in some cases the new appearance is harder for some to use such as smaller buttons.
* It broke too much stuff
* Window was slow