Questions for Oral/Practical

Artificial Intelligence

Q1. What is a tree ,how is it different from graph.

Q.2 Explain the importance of stacks in implementing recursion.

Q.3 Explain the time complexity calculation in any given problem, for example explain how the time complexity of Selection sort came out to be O(n^2).

Q.4 Explain the different algorithm designing techniques :

For example: Greedy Methodology ,Dynamic Programming...etc

You should be able to explain the difference between any given two techniques.

Q.5 Explain the complete working of Prim's ,Kruskal's and Dijkstra's Minimal Spanning tree algorithm.

Q.6 What is a minimal spinning tree, characteristics of the same.

A **Minimum Spanning Tree(MST)** or minimum weight spanning tree for a weighted, connected, undirected graph is a spanning tree having a weight less than or equal to the weight of every other possible spanning tree. The weight of a spanning tree is the sum of weights given to each edge of the spanning tree. In short out of all spanning trees of a given graph, the spanning tree having **minimum weight** is MST.

Properties of MST

1. It must not form a cycle i.e, no edge is traversed twice.

2. There must be no other spanning tree with lesser weight.

Q.7 What is meant by asymptotic notations in context of time and space complexity calculation of an algorithm.

Q.8 Time complexity of every program in your file.

Time Complexity of BFS = O(V+E) where V is vertices and E is edges.

Time Complexity of DFS is also O(V+E) where V is vertices and E is edges. BFS requires more memory space.

The time complexity of the Prim's Algorithm is $O((V+E)\log V)$ because each edge is inserted in the priority queue only once and insertion in priority queue take logarithmic time.

Time Complexity of Dijkstra's Algorithm is $O(V2)$ but with min-priority queue it drops down to $O(V+E\log V)$.

O(E logE) or O(V logV) is the time complexity of the Kruskal algorithm.

Time complexity: O(N!) : The first queen has N placements, the second queen must not be in the same column as the first as well as at an oblique angle, so the second queen has N-1 possibilities, and so on, with a time complexity of O(N!)

The *time complexity* of this algorithm is O(N^2 * N!) where N is the number of tiles in the **puzzle**, and the space complexity is O(N^2).

And likewise others as well....

Q. Define Graph coloring problem...

Answer:

Graph coloring problem involves assigning colors to certain elements of a graph subject to certain restrictions and constraints. In other words, the process of assigning colors to the vertices such that no two adjacent vertexes have the same color is caller Graph Colouring.
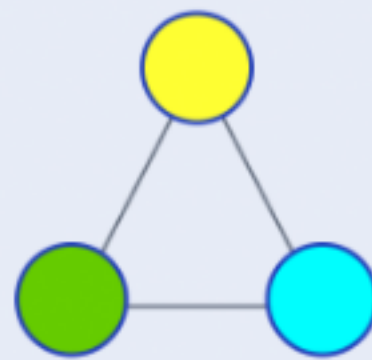
This is also known as **vertex coloring**.

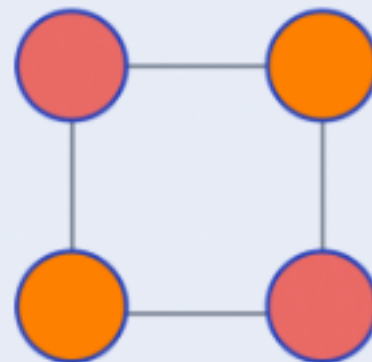**Chromatic Number:** The smallest number of colours needed to colour a graph G is called its chromatic number.

For example, in the above image, vertices can be coloured using a minimum of 2 colours.
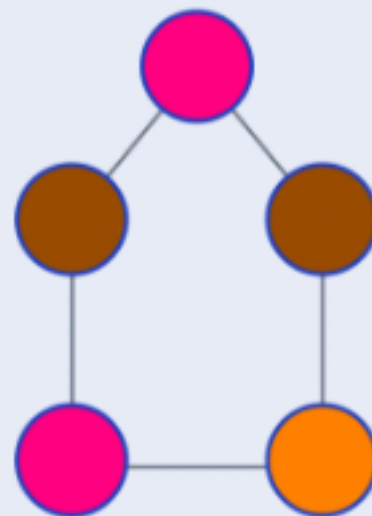
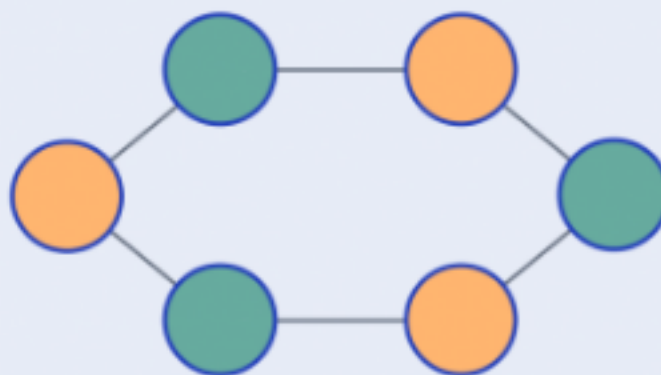Hence the **chromatic number** of the graph is 2.

Chromatic Number = 3

Chromatic Number = 2

Chromatic Number of Cycle Graph Exampls

Chromatic Number = 3

Chromatic Number = 2

Q. What is understood by an expert system.why is it called "expert"...

Answer: An expert system is a computer program that uses artificial intelligence (AI) technologies to simulate the judgment and behavior of a human or an organization that has expertise and experience in a particular field.

Examples:

A computer program that simulates the judgment of a human expert is known as an expert system in ai. A few examples of an expert system are DENDRAL, a molecular structure prediction tool for chemical analysis. Another example of an expert system that predicts the kind and extent of lung cancer is PXDES.

You should be able to comment on each expert system in your syllabus:

Hospital management / Stock market trading/employee performance etc
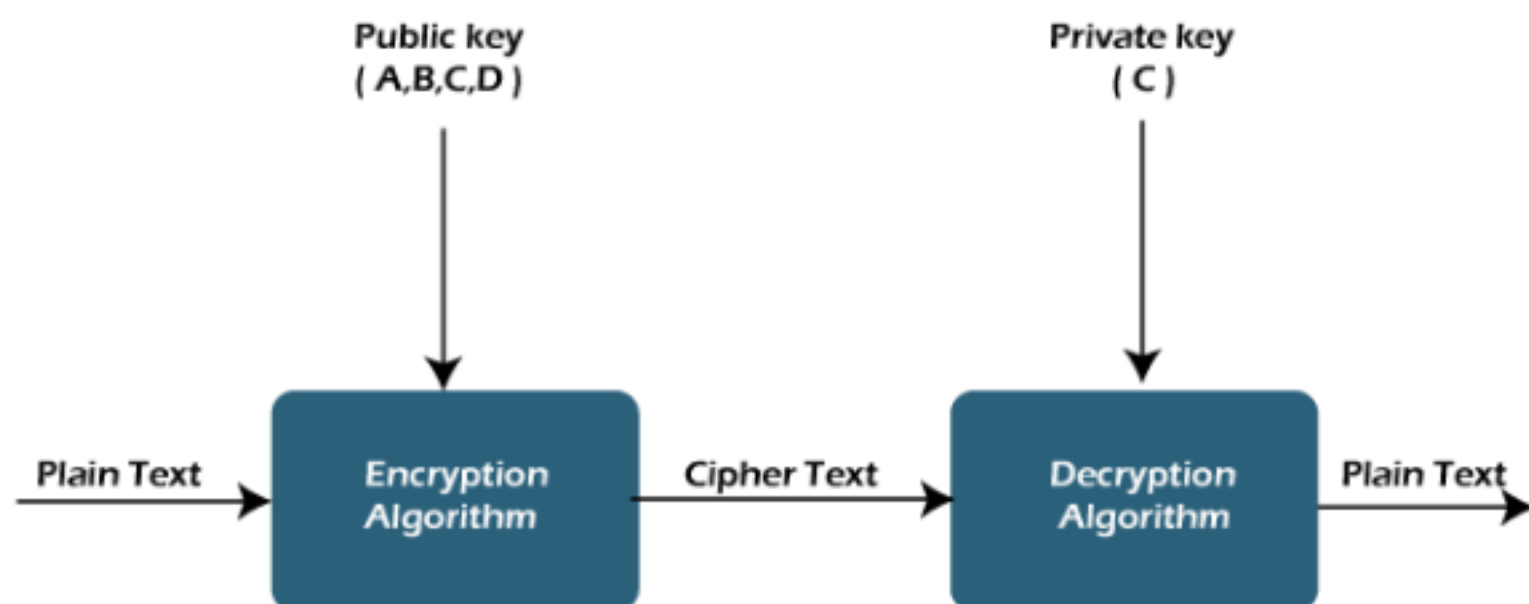
Questions for Information Security

Answering the questions of an interviewer or an examiner is an art ...

Deviate the questionnaire in favour of yourself by directing towards what you already know....

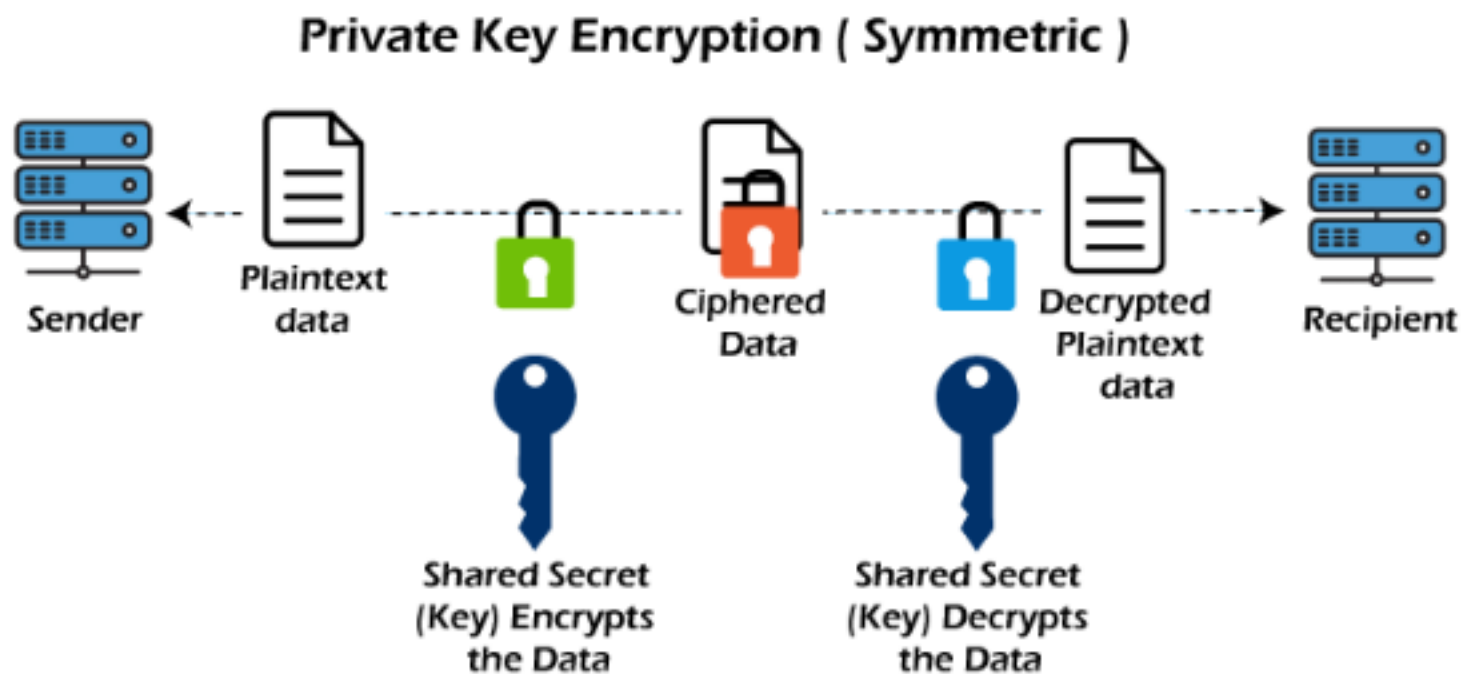*And of course there are other tricks as well...*

Q.1 You should know the definition of public and private key encryption and examples.

Answer: private keys can be used for both encryption and decryption, while Public keys are used only for the purpose of encrypting the sensitive data. Private keys are shared between the sender and the receiver, whereas public keys can be freely circulated among multiple users.

Private Key Encryption (Symmetric)

Sender → Plaintext data → Ciphered Data → Decrypted Plaintext data → Recipient

Shared Secret (Key) Encrypts the Data

Shared Secret (Key) Decrypts the Data

Q.2 Transposition method of encryption?

Transposition Cipher is a cryptographic algorithm where the order of alphabets in the plaintext is rearranged to form a cipher text. In this process, the actual plain text alphabets are not included.

A simple example for a transposition cipher is **columnar transposition cipher** where each character in the plain text is written horizontally with specified alphabet width. The cipher is written vertically, which creates an entirely different cipher text.

Consider the plain text **hello world**, and let us apply the simple columnar transposition technique as shown below

h	e	l	l
o	w	o	r
l	d		

The plain text characters are placed horizontally and the cipher text is created with vertical format as : **holewdlo lr**. Now, the receiver has to use the same table to decrypt the cipher text to plain text.

Q.3 What can DES algorithm be used for?

DES is a symmetric block cipher that can be used to **encrypt 64-bits of plaintext into 64-bits of ciphertext**. The algorithm is the same for the process of encryption as well as decryption. The only difference is that the decryption procedure is the opposite of the encryption procedure.

Q.4 What are the issues in MD5 algorithm?

MD5 is prone to length extension attacks. MD5 can be used as a checksum to verify data integrity against unintentional corruption. Historically it was widely used as a cryptographic hash function; however it has been found to suffer from extensive

vulnerabilities.

Disadvantages of MD5

When compared to other algorithms, such as the SHA algorithm, MD5 is somewhat slow. You can use MD5 to construct the same hash function for two different inputs. Because it is more vulnerable to collision attacks, MD5 is less secure than the SHA algorithm.

Q.5 Questions on AES algorithm can be found at :

https://www.sanfoundry.com/cryptography-questions-answers-advanced-encryption-standard-ii/

Q. 6 RSA algorithm

RSA algorithm is an asymmetric cryptography algorithm. Asymmetric actually means that it works on two different keys i.e. **Public Key** and **Private Key**. As the name describes that the Public Key is given to everyone and the Private key is kept private.

An example of asymmetric cryptography:
1.   A client (for example browser) sends its public key to the server and requests some data.
2.   The server encrypts the data using the client's public key and sends the encrypted data.
3.   The client receives this data and decrypts it.

Since this is asymmetric, nobody else except the browser can decrypt the data even if a third party has the public key of the browser.

The idea! The idea of RSA is based on the fact that it is difficult to factorize a large integer.

 The public key consists of two numbers where one number is a multiplication of two large prime numbers. And private key is also derived from the same two prime numbers.

So if somebody can factorize the large number, the private key is compromised.

Therefore encryption strength totally lies on the key size and if we double or triple the key size, the strength of encryption increases exponentially.

RSA keys can be typically 1024 or 2048 bits long, but experts believe that 1024-bit keys could be broken in the near future. But till now it seems to be an infeasible task.

Be prepared to write the code (if not full...code snippets from the program that's the key element of the program)

Questions on Cloud Computing

Q1. What is Cloud?

Ans. It is a global network of servers, each with a unique function. It includes networks, hardware, services, storage, and interfaces that help in delivering computing as a service.

Q2. What is Cloud Computing?

Ans. Cloud computing is an emerging computing paradigm that allows data and applications to remain in cyberspace and allows users to access their data through any web-connected device.

Q3. Explain different types of clouds.

Ans. There are three types of clouds –

- Private clouds – Commonly offered as web applications or web services
- Public clouds – Deployed and managed within the user's organization
- Hybrid clouds – A combination of both public and private clouds

Q4. What are the benefits of cloud computing?

Ans. Primary benefits of cloud computing include-

- Data backup and storage
- Reduced costs of managing and maintaining IT systems
- Powerful server capability and scalability
- Better productivity and collaboration efficiency
- Access to automatic updates

Q5. What are the different platforms of cloud architecture?

Ans. It is one of the most commonly asked cloud computing interview questions. Following are the different platforms used by cloud architecture:

- **Infrastructure as a service (IaaS)** – It is a cloud service that provides services on a "pay-for-what-you-use" basis
- **Platform as a service (PaaS)** – It offers cloud platforms and runtime environments to develop, test and manage software
- **Software as a service (SaaS)** – It allows hosting and managing software applications on a pay-as-you-go pricing model

Which are the biggest cloud providers and databases?

Ans. It is one of the most commonly asked cloud computing interview questions. Some of the biggest cloud providers and databases are –

- Amazon Web Services

- SAP

- EnterpriseDB

- Garantia Data

- Cloud SQL by Google

- Azure by Microsoft

- Rackspace

- Google bigtable

- Amazon simpleDB

- Cloud-based SQL

Q. What is Salesforce Service Cloud?

Salesforce Service Cloud is a customer relationship management (CRM) platform for Salesforce clients to provide service and support to their business customers. Salesforce based Service Cloud on its Sales Cloud product, a popular CRM software for sales professionals.

Service Cloud enables users to automate service processes, streamline workflows and find key articles, topics and experts to support customer service agents. The purpose is to foster one-to-one marketing relationships with every customer across multiple channels and devices.

Q. Features of Apex as a Language

- Integrated. Apex has built in support for DML operations like INSERT, UPDATE, DELETE and also DML Exception handling. ...

- Java like syntax and easy to use. ...

- Strongly Integrated With Data. ...

- Strongly Typed. ...

- Multitenant Environment. ...

- Upgrades Automatically. ...

- Easy Testing. ...

- Apex Applications.

Q.What are the two types of application in salesforce

The simplest app usually has just two tabs. There are two types of Salesforce

Applications: Standard Apps. Custom Apps.

You should be able to create small apps like: feedback and survey apps/ customer review app etc on salesforce

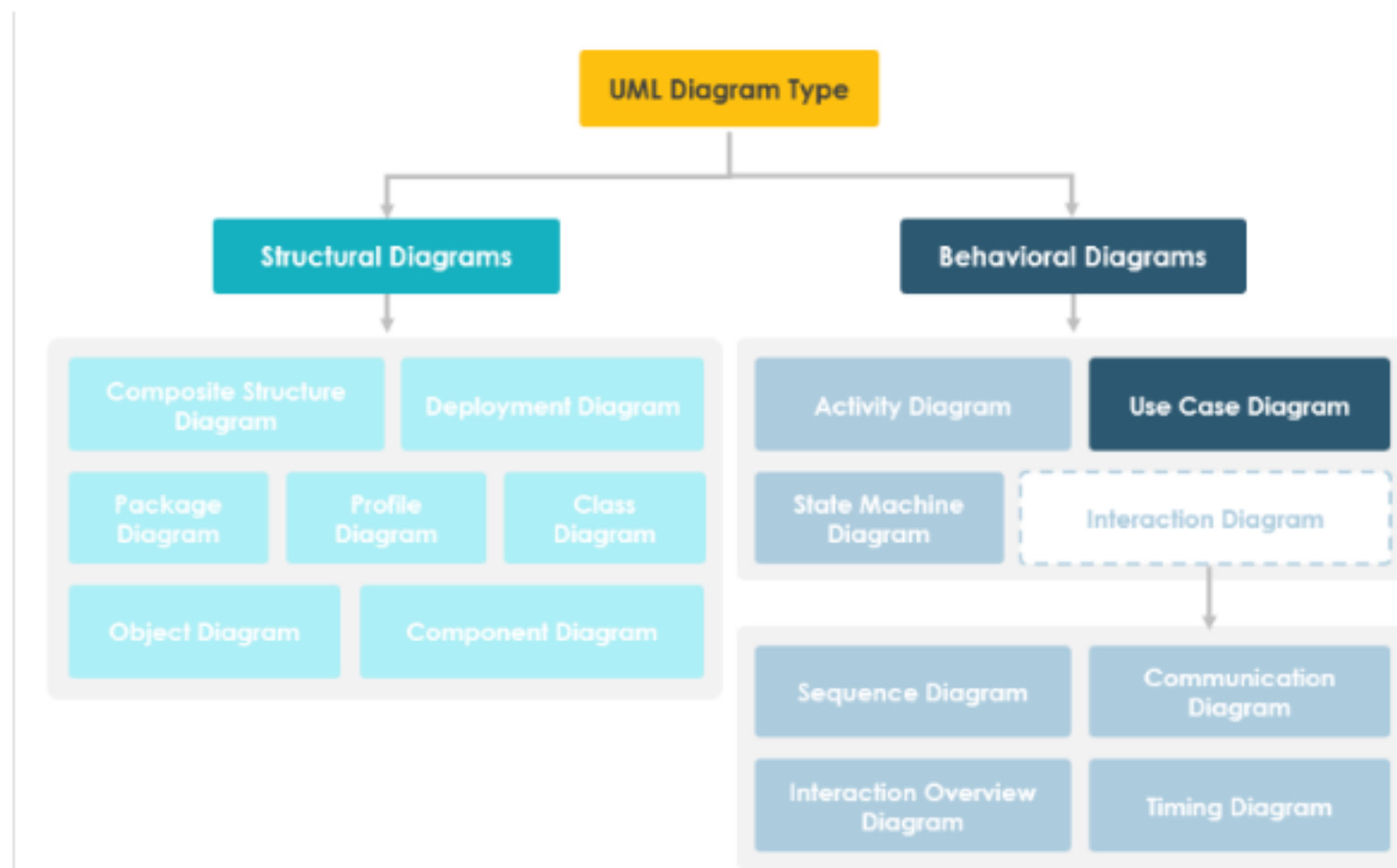Create an account on Salesforce and follow the steps to create an app.

https://trailhead.salesforce.com/content/learn/modules/lightning_app_builder/lightning_app_builder_apphome

Software Modeling and Architectures

For SMA everyone should focus on basic /elementary questions such as

Software models and their definitions

UML diagrams

Particularly pay attention on

Use Case diagram

Activity Diagram
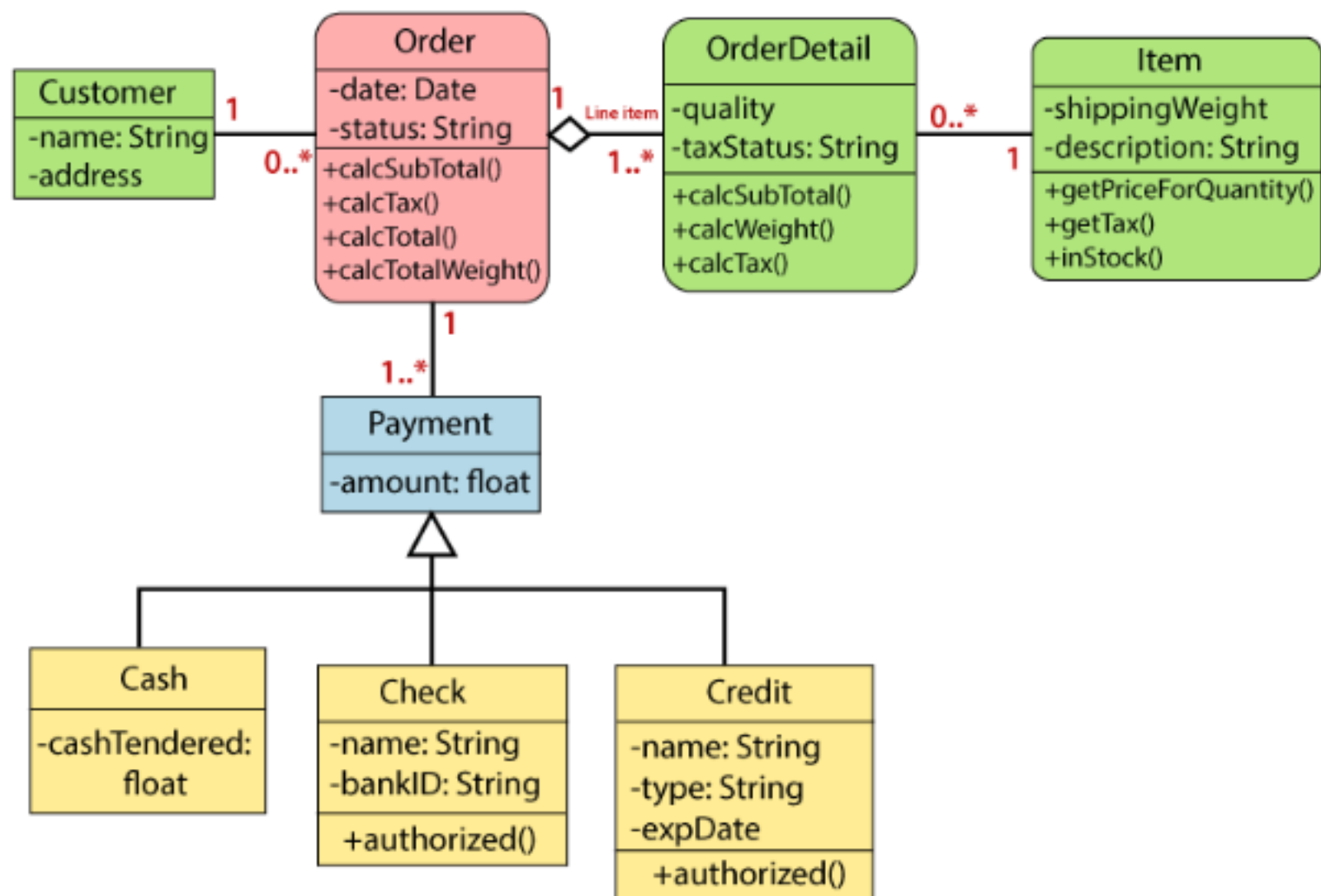
Class diagram

Sequence diagram

Study about their utilities: https://www.visual-paradigm.com/guide/uml-unified-

For example

Utility of a class diagram is:

The main purpose of class diagrams is to build a static view of an application. It is the only diagram that is widely used for construction, and it can be mapped with object-oriented languages. It is one of the most popular UML diagrams. Following are the purpose of class diagrams given below:

1. It analyses and designs a static view of an application.
2. It describes the major responsibilities of a system.
3. It is a base for component and deployment diagrams.
4. It incorporates forward and reverse engineering

Usage of Class diagrams

The class diagram is used to represent a static view of the system. It plays an

essential role in the establishment of the component and deployment diagrams. It helps to construct an executable code to perform forward and backward engineering for any system, or we can say it is mainly used for construction. It represents the mapping with object-oriented languages that are C++, Java, etc. Class diagrams can be used for the following purposes:

1. To describe the static view of a system.
2. To show the collaboration among every instance in the static view.
3. To describe the functionalities performed by the system.
4. To construct the software application using object-oriented languages.