Task 5

1.The difference between AVL Tree & RB Tree

	Red Black Tree	AVL Tree
Lookups	has fewer lookups because they are not strictly balanced.	provide faster lookups than Red-Black Trees because they are more strictly balanced.
Insertion & removal	Red Black Trees provide faster insertion and removal operations than AVL trees as fewer rotations are done due to relatively relaxed balancing.	AVL trees provide complex insertion and removal operations as more rotations are done due to relatively strict balancing.
Storage	Red Black Tree requires only 1 bit of information per node.	AVL trees store balance factors or heights with each node thus requiring storage for an integer per node.
Searching	It does not provide efficient searching.	It provides efficient searching.
Uses	Is used in most of the language libraries like map, multimap, multiset in C++, etc.	Is used in databases where faster retrievals are required.
Balancing	Take less processing for balancing i.e.; maximum two rotation required	Take more processing for balancing

2.Lambda Func VS Inline Func VS Anonymous Func

An anonymous class is an expression assigned to a reference variable of the class or interface it implements. Therefore, we also put a semicolon at the end. A lambda expression is a method without a name. We provide the signature of the unimplemented method in the functional interface without a name.

() => in C#? In lambda expressions, the lambda operator => separates the input parameters on the left side from the lambda body on the right side.

In JavaScript Inline function is better than anonymous when you want to reuse it. Anonymous is good for one-time use because you do not need to worry if its name will conflict with other variables, and it's shorter.

In python Lambda function is the same as the anonymous function but called lambda.

-Anonymous => definition of the function that is short and doesn't have a name .

-Lambda => a keyword is used for the same concept of the anonymous.

3. Struct in c VS Class in c++

In C++, a struct can have methods, inheritance, etc. just like a C++ class. In C++, a structure's inheritance is the same as a class except the following differences: When deriving a struct from a class/struct, the default access-specifier for a base class/struct is public.

In c# and c struct can't inherit.

4.The importance of moderator in python

A decorator is a design pattern in Python that allows a user to add new functionality to an existing object without modifying its structure. Decorators

are typically applied to functions, and they play a crucial role in enhancing or modifying the behavior of functions.

In fact, there are two types of decorators in Python — class decorators and function decorators.

Decorators are used to modify the behaviour of function or class. In Decorators, functions are taken as the argument into another function and then called inside the wrapper function.

```
@gfg_decorator
def hello_decorator():
    print("Gfg")

'''Above code is equivalent to -

def hello_decorator():
    print("Gfg")

hello_decorator = gfg_decorator(hello_decorator)'''
```

5.What is sql injection

Attackers use SQL injection to alter or update data in the database and add additional data. For instance, in the case of a financial application, an attacker can use SQL injection to change account balances. Even worse, attackers can gain administrative rights to an application database.

6.What is extreme programming

Extreme Programming (XP) is an agile software development framework that aims to produce higher quality software and higher quality of life for the development team. XP is the most specific of the agile frameworks regarding appropriate engineering practices for software development.

Is used when:

- Dynamically changing software requirements
- Risks caused by fixed-time projects using new technology
- Small, co-located extended development team
- The technology you are using allows for automated unit and functional tests

XP describes four basic activities that are performed within the software development process: coding, testing, listening, and designing.

7.What is the Devops tools and the most common

Two of the most popular DevOps tools for this phase of development are Jira and Git [1]: Jira: Although no specific DevOps tools are required for planning, many DevOps organisations use Agile project management software like Jira.

1. DevOps tools for continuous development (CD)

In the DevOps life cycle, continuous development encompasses the planning and coding of the software. Two of the most popular DevOps tools for this phase of development are Jira and Git [1]:

- **Jira:** Although no specific DevOps tools are required for planning, many DevOps organisations use Agile project management software like Jira. Agile project management focuses on continuous releases and incorporating customer feedback in each iteration. The Jira DevOps template can be an efficient tool for managing projects, creating workflows, and tracking bugs.
- **Git:** Git is an open-source version control system, meaning anyone can use it for free. As mentioned above, version control tools manage the source code of an application or software. Git is an excellent DevOps tool because it supports nonlinear workflows and collaboration among programmers. You can bridge the gap between development and operations with GitHub, a web-based hosting platform for Git code

repositories. It enables further collaboration through features like support ticket management.

2. DevOps tools for continuous integration (CI) and continuous delivery (CD)

In the DevOps pipeline, continuous integration requires developers to commit changes (like new features or bug patches) to the source code. One of the most used DevOps tools in this phase of development is Jenkins:

- **Jenkins:** Jenkins is a Java-based, open-source program. It can be used solely as a CI server or become a hub supporting continuous delivery. A few features Jenkins is known for include extensive workflow customisation, easy installation, the ability to distribute work across multiple machines for cross-platform development, and hundreds of plugins and integrations.

3. DevOps tools for continuous testing

Continuous testing in the DevOps life cycle means that the developed software is consistently checked for bugs and defects. DevOps automation tools are handy for constant testing. They allow quality assurance (QA) teams to enhance the scope of testing through features like automated test execution and parallel testing across multiple codebases. Selenium and Bamboo are two of the most relevant continuous testing solutions:

- **Selenium:** Selenium is another open-source development tool. It's an automated testing framework for writing test scripts in commonly used programming languages such as Java, Python, and C#. It is primarily used to automate web applications, but you can also use it to automate web-based administration tasks. Selenium's versatility provides automation support across several browsers and operating systems (OS).

- **Bamboo:** Bamboo is a server-based DevOps tool. It allows users to create complex build plans and trigger them to start automatically. Bamboo is well known for its tight integration with Jira and parallel testing capabilities.

4. DevOps tools for continuous deployment

Continuous deployment in the DevOps life cycle refers to the phase wherein code is deployed to the production servers. Since this occurs continuously, DevOps tools that can support fast and frequent deployments are essential. Both **container management tools** and **configuration management tools** can be beneficial for continuous deployment:

- **Docker** (container management): A development team can use the Docker application to package, manage, and execute distributed applications. A few of Docker's key functionalities include a standardised packaging format, tight integration with GitHub, and Docker Hub. Docker Hub encourages collaboration among DevOps team members by providing a platform for easy image publishing and access management.
- **Ansible** (configuration management): Ansible is an open-source automation platform used primarily for configuration management and infrastructure orchestration. Its minimalistic nature makes it easy for developers, IT professionals, and administrators to use. Ansible enables the creation of machine groups and controls how they will run in production environments.

5. DevOps tools for continuous feedback

Analysing and incorporating feedback is a crucial component of DevOps methodology. Continuous feedback enables continuous improvement. It requires the collection of internal insights like employee surveys and bug

reports **and** external responses like support tickets or social media mentions. Several DevOps tools exist to support your continuous feedback loops:

- **Jira Service Management:** Jira Service Management is a DevOps tool built into the Jira platform. Its primary purpose is to enhance communication by organising feedback from various sources in a single hub. It allows customers to submit service requests and feedback by widget, portal, email, or a customisable help centre.
- **Parlor:** Parlor is a customer feedback tool for user relationship management. It engages with active users in real time to gather contextual insights. It is integrative with business tools, such as support ticket systems like ZenDesk, technical task management platforms such as Jira, communication tools like Slack, and data management programs like Excel.

6. DevOps tools for continuous monitoring

In the DevOps pipeline, continuous application monitoring requires frequent checks for bugs, system errors, performance issues, and anything else that could impact product quality. Your DevOps monitoring tools should support two types of monitoring: application and server.

- **Prometheus:** Prometheus is an open-source, community-driven performance monitoring database that supports continuous monitoring processes. It equips developers and QA teams with strong reporting capabilities and extensive client libraries. Prometheus is also suitable for DevOps because it has multiple modes for data visualisation.

7. DevOps tools for continuous operation

Continuous operation means that applications and services must be continuous, with no interruptions or downtime. Several of the tools mentioned

above have features that can assist you in constant operations. However, an incident management platform like Opsgenie may be beneficial.

- **Opsgenie:** Opsgenie is a DevOps tool used to prepare for, predict, and resolve service disruptions. It integrates with continuous monitoring tools, chat platforms, ticketing systems, and other business applications. Opsgenie enables scheduled customisations to ensure the right people are notified through the proper communication channels when a challenge occurs. Its automated escalation features provide that critical bugs are caught.

8. What is the Dataops tools and the most common

1. **Badook** - Best for comprehensive data testing and validation
2. **StreamSets** - Best for managing data in motion with agility
3. **HighByte** - Best for industrial data integration and orchestration
4. **RightData** - Best for data quality validation and reconciliation
5. **DataKitchen** - Best for creating and governing data pipelines
6. **Databricks** - Best for large-scale data engineering and analytics
7. **Apache Nifi** - Best for real-time data ingestion and streaming
8. **Apache Hive** - Best for querying and managing large datasets
9. **Elastic** - Best for real-time search and data analytics
10. **Azure Data Factory** - Best for hybrid data integration at aglobal
11. **Alteryx** - Best for advanced analytics and business intelligence
12. **IBM** - Best for robust enterprise-grade data operations

9. What is the MLops tools and the most common

-Data storage and versioning

Some of the most popular data storage and versioning tools are Git and DVC.

-Model Training Frameworks

various model training frameworks that are highly used by data scientists for machine learning development.

TensorFlow

popular machine learning framework developed by Google that offers the implementation of a wide range of neural network models.

PyTorch

Developed by Facebook's AI Research Lab (FAIR), PyTorch is a popular machine-learning framework that offers a flexible and dynamic approach to building and training neural networks. Unlike TensorFlow, PyTorch provides more control over the training process as things are not abstract. This is the main reason why companies like Tesla and Netflix use PyTorch for their different ML use cases.

Scikit-learn

is a machine learning library in Python that is majorly used for data mining and data analysis. It is built on top of NumPy, SciPy, and Matplotlib, and offers a wide range of supervised and unsupervised learning algorithms, as well as tools for model evaluation and preprocessing.

-Collaboration and Experiment Tracking Platforms

MLFlow is a popular collaboration and experiment tracking platform for managing the end-to-end machine learning lifecycle. MLFlow can streamline the process of building, training, and deploying ML models by providing features like model packaging, experiment tracking, model versioning, etc.