

## Assignment (Video- 2 & 3): Database System Impl. (COP6726)

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- 1) **DataPath:** The legacy database systems have been "Compute-Centric" that means computations requests for data from the database and then data is extracted from the system and requests are served. But this type of architecture creates problems such as latency in request processing and it also create similar concurrent request processing difficult made for the same data. Datapath is an open source data base management system based on "Data-Centric Approach" where queries do not request data. Instead, data are automatically pushed onto processors, where they are then processed by any interested computation.

Datapath is an open source data base management system, in order to perform large queries and handle large query load in database efficiently so they could be executed faster and without any latency issues, DataPath makes use of efficient modern architectures for large analytical queries. In order to do that DataPath uses system resources such as Multiple cores, large amounts of system memory, disks etc. The main advantage or feature of data path is that it can execute multiple queries in database efficiently without any issues associated with another data bases. and the most important thing is that these queries could be executed with the same speed if the structures are same.

- 2) **Single processor vs Multiprocessor Architectures:** Single processor systems are consisting of only one single processor. That means this single processor can only execute a single process at a time. generally, processes which are supposed to be executed wait in a queue to be picked by the processor for the execution. When one process is executed other processes wait in the queue for their turn. This is sequential processing of task by single available processor. On the other hand, multi-processor systems contain two or more processors hence in those systems multiple processes could be executed parallelly, the main advantage of multi-processor system is that they provide good throughput and they are cost effective because in such systems peripherals are shared among different processors.
- 3) **C++ and its Compiler:** C++ is a powerful general-purpose programming language. C++ is used to develop different types of software systems such browsers, operating systems, games etc. C++ also supports different programming paradigms such as procedural, object-oriented, functional etc. This makes C++ a powerful and a versatile programming language. C++ language incorporate abstraction and able to buildup " abstraction builders" for which its template mechanism is MT complete. This allows the C++ compiler a lot of chance to understand what the code is about to execute and hence it can perform very good optimizations. On the other hand, the C++ has low level components as part of its architecture which communicates closely with the real

hardware hence the C++ compilers are able to produce code with low abstraction overhead. It is important because all the abstraction related work is handled at compiler level.

- 4) **Macros in C++:** Macros are a piece of code or a code snippet in a program which is identified using some name. This code snippet can be used in the program by using the name reference whenever this name of the macro is encountered in the program then replaces the name with the actual piece of code. The macros can be defined using ‘#define’ directive. Macros can also be created with arguments as well, just like functions.
- 5) **Macros vs Functions in C++:** which means that all the macros would be processed before your program compiles. However, functions are not preprocessed but compiled. In case of macros type checking is not done when they are processed on the other hand in case of functions type checking is done. That is why there are more chances of errors in case of macros as opposed to functions. Functions are more reliable in terms of error and macros are faster than the functions because they do not have call overhead as in the case of functions bugs. Macros don't have namespaces hence macros in one section of the program can affect other sections. Macro name is replaced by the macro value or code when it is processed before the compilation of program on the other hand when a function is called a transfer of control takes place. Macros are generally containing small code snippet hence they are helpful in small code base or program however in the case where there are large number of lines of codes need to be handled functions are better suited.
- 6) **Header Files in C++:** A header file in C++ contains sets of predefined functions, data types and macros. When a header file is included in a C++ program all these predefined functions and macros and data types are available within the program for the use. The header files can be included in the C++ program using "#include" preprocessor directive. There are different types of header files in C++ , one type is Pre-existing header files these types of files are already available in C/C++ compiler they just needed to be imported in the program and the second type of header files are User-defined header files ,These files are defined by the user and can be imported using “#include”.
- 7) **SQLite Database:** SQLite is a self-contained, serverless, zero-configuration, transactional SQL database engine. The SQLite DB is an open source project hence its code is available in the public domain and could be used by anyone for any purpose. SQLite database is one of the best embedded database systems and its very reliable that is why it is used among all different types of software systems whether it be commercial or private systems. SQLite system is constantly supported and improved by the dedicated team of developers

who are working for SQLite hence it's an updated and highly capable database system. whether it be commercial or private. The main advantage of the SQLite database is that its serverless that means it does not require a separate server machine for installation and its functioning. This database can be embedded with the running programs and it is possible because of its small compact library size. The SQLite database makes use of disk files for read and writes operation. A complete SQL database with multiple tables, indices, triggers, and views, is contained in a single disk file. and the database file format is cross-platform that means it could be used among 32 bit and 64-bit systems without any problem.