D.A.-2 CSE THEORY

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**Q-1)Elaborate various APIs developed using C language and identify various challenges for API development using C.**

**Ans - *Skyscanner flight search***:

- Like Google Flights, Skyscanner is a metasearch engine that provides travel data for flights, hotels, car rentals and more. Skyscanner aggregates travel and flight data so you don’t have to go to multiple sites yourself to check each individual flight plan or price.

The Skyscanner API allows you to access this aggregated travel data to retrieve the cheapest flight dates and quotes, browse flight routes, and much more.

***Open weather Map***:

- Open Weather Map is an online service that provides weather data including forecasts and historical data. Their API provides access to weather maps and forecasts for multiple cities across the world.

***API FOOTBALL:***

-The API-Football API is the most popular RESTful API for football (soccer) data. It covers over 300 major and minor football leagues. Get live scores, pre-match odds, events, line-ups, standings, stats, and much more.

***The cocktail DB:***

- TheCocktailDB is a free API that provides a crowd-sourced database of beverages and cocktails from around the world. The API is free to use for non-commercial purposes. The API allows you to search for cocktails by:

Categories-

Glasses-type (example: flute vs standard cocktail glass)

Ingredients-

Alcoholic-type (Alcoholic vs non-alcoholic)

***Rest countries v1:***

- REST Countries is a simple RESTful API that provides data about the world’s countries. This API was recently acquired by apilayer and will be continued served as a free API for developers.

***Yahoo Finance:***

- Yahoo Finance is a property of Yahoo that provides financial news & data as well as online tools for personal finance management. It’s one of the more popular media properties for financial stock data.

***Love Calculator:***

- It gives compatibility between you and the name of your crush using the love calculator API. Simply insert your name and your partner/love/crush’s name and the API calculates the percentage and compatibility result between you two.

***URL Shortener Service:***

The URL Shortener Service API is a simple API that converts URLs to short links. It’s completely free to use. Just paste a link to cut it!

***Nasa API:***

- The Nasa API is an API that queries Nasa’s database and returns statistics about:

Asteroid Stats

Closest Asteroids

Earth Imagery

Pictures of Asteroids

Mars Rover Photos

and more

***Numbers:***

An API for interesting facts about numbers. Provides trivia, math, date, and year facts about numbers.

***MusiXmatch:***

- Here are some examples of MusiXmatch API endpoints:

Album – Get the album object

Album.tracks – Get the list of song within an album

Artist – Get the artist object

Artist.related

Artist.search

Matcher.lyrics – Get the lyrics for a song starting by title and artist

Matcher.subtitle.get

Matcher.track – Starting from your track title and artist name, find our correspondent track

Track – Get a track from musixmatch

***SYSTRAN.io – Translation and NLP:***

-The SYSTRAN Platform enables you to utilize and analyze both structured and unstructured multilingual content, such as user-generated content, social media, web content and more. Easy to use, scalable and reliable, the new SYSTRAN Platform brings the power of SYSTRAN’s best-of-breed language processing technologies to your apps and websites

***Chuck Norris:***

- The Chuck Norris API is a hilarious API that provides random jokes and memes about the great American hero.

***Hearthstone:***

- Hearthstone is a free-to-play online digital collectible card game developed and published by Blizzard Entertainment. The Hearthstone API is a free RESTful API that allows developers to access all Hearthstone card data such as card sets, classes, races, quality, types, factions, and more.

***Currency Exchange:***

The Currency Exchange API gets live currency exchange rates for currencies and foreign exchange rates around the world.

***Breaking News:***

The Breaking News API (created by MyAllies) is a free RESTful API that provides financial news data such as real-time news feeds, company news (about a specific company), and company details (by company ticker symbol).

***Booking:***

- The unofficial Booking.com API lets you query information such as available rooms, prices, facilities, policies, hotel reviews, and more from the Booking.com website.

***Free NBA:***

The Free NBA API is a Pro Basketball API that provides historical data for any game, team, or player.

***Deezer:***

The Deezer API allows developers access into Deezer’s massive music database of over 30 million tracks and playlists.

**Top 5 challenges of API testing:**

Building a meaningful and sustainable API testing practice within an organization can bolster test coverage and ensure reduced risk across public and internal interfaces. Testing APIs means going beyond the surface of the GUI layer to dissect the application to its core, which is hugely beneficial. However, there are many challenges that organizations face to successfully adopt a productive API testing process.

1. Tracking API Inventory:

-The numerous APIs involved in an application act independent of each other. While performing API testing, it gets challenging for testers to keep up with rapid updates and how those updates impact the overall application. Maintaining the API inventory is an important activity – without it, tests fail or miss evaluating recent changes to the application and APIs.

2. Knowledge of the business application logic:

-APIs usually have a number of rules and guidelines dictating their usage such as copyright policies, storage policies, rate limits, and display policies. Based on the overall business logic, a set of business rules are defined on which APIs are developed, used, and integrated. The lack of knowledge and understanding of these business logic and rules among API testers lead to ambiguity regarding the test objective.

3. Complex protocols:

-APIs interact with each other through a set of defined rules known as contracts or protocols. Often these protocols are complicated and might prove a hindrance to the proper integration and testing of the communication between components.

4. Impact of change:

- Whenever there is a new version of an API, it will likely cause the entire application to go haywire. As there are multiple dependent components, implementing a change is often highly risky and unpredictable in terms of its effects.

5. Test data management:

- The numerous APIs with their various parameters require an enormous amount of data to test them effectively. Maintaining such a large amount of data and ensuring that the data is reusable is a big challenge for API testers. The diversity between the APIs and the limited access to the source platform further makes test data management challenging.

As organizations seek to incorporate API testing into their test automation, they are running into these challenges as they try to build a workflow that is sustainable and maintance.

**Q-2)Elaborate various C compliers. Discuss their strengths and limitations, Code, functions, syntax and all the functional modules in detail.**

**Ans -**iTop Compilars of C:

1. ***Borland Turbo C:***

-Turbo C is one of the basic and popular compilar of C language.This was first introduce in 1987.It was popular for its small size,compilation speed and low price.Once Turbo C++ is released in 1990,both the compilar are merged and the name Turbo C got continued in 2006.In 2006,Embarcadero Technologies re-released Turbo C as freeware.

***Limitations:***

-It is over a decade old and do not conform to the current standards.

-Only 16 bits DOS applications can be developed using that compiler.

-Maximum amount of memory available for programs is 64kb,while modern applications need a lot more than that.

-The compiler is buggy and do not issue proper diagonostic message of erroneous program.

-There are no database libery supporting this compilar.

-There are no modern graphics libraries supporting this compilar.

***CODE:***

#include<stdio.h>

#include<conio.h>

int main()

{

Cout<<”welcome to vellore institute of technology”;

getch();

return 0;

}

1. ***Tiny C compiler:***

-It is designed to work on small computer with little disk space.This is an ARM processor C compiler.This compiler started its support to windows from 2005.

***Features:***

The Tiny C Compiler is designed to work on slow computers with little disk space. This is an ARM processor C compiler. This compiler started its support to Windows from 2005. Some of its features are mentioned below.

Its file size is small and according to the owner of this compiler (Fabrice Bellard). The fastness of this compiler is around nine times faster than GCC. The compilation, assembling and linking of code were the main attributes considered for measuring the fastness of this compiler.

This compiler had included many compiler-specific features to boost up the optional memory, bound checker and had greater code stability.

This compiler allows automatic execution of programs during the compile-time only using command line arguments. This way, programs are executed under UNIX, using shell scripts. The latest version was released on December 2017.

***3) Portable C Compiler:***

The Portable C Compiler (PCC) was a very early used and established compiler for the C programming language that is almost around mid-1970. This compiler had a long life span. This was prevalent during a period in such a way that many of the C compilers were based on it. The advantages of PCC depended on its capabilities and probability predictions. PCC compiler was made such that source files were machine-dependent, not all but only a few of them. It can detect syntax errors and can perform perfect validity checks. A new version of PCC was released on 10 December 2014.

***4) GCC:***

GNU Compiler Collection is the compiler produced by the GNU Project. This supports many programming languages and it is a free software foundation under the General Public License. This compiler was first released in 1987 and it supported only C- Programming language during the start. Slowly it expanded to C++, Java, Android, and IOS. Here, each of the different language compilers has its own program that reads the code written and sends the machine code as the output. All of these have a common internal structure. When a high-level language is written, as per the language it is written, the compiler parses the code in that language and produces an abstract syntax tree. GCC uses LALR parsers, but slowly switched to recursive-descent parsers for C in 2006. Coming to the optimization part, as already known this can occur during any phase of the compilation. However, here the bulk optimizations are performed before the code generation and after the syntax, semantic analysis. Below are a few of the optimizations performed by GCC.

It can eliminate the Dead Code pieces.

It can eliminate the redundancy at the code level.

Replacement of Aggregates with respect to the scalar level.

Can perform optimizations with Arrays.

In GCC back end is specified by preprocessor macros and functions specific to a particular architecture. This code is generally built by first calling a small snippet code which is associated with each pattern and generate instructions from the instruction set. It is done using registers, offsets, and addresses that are chosen during the re-load phase. The current version of GCC is 9.2, which was released on August 12, 2019.

1. ***Clang:***

Clang; including C, is also a compiler for C++, Objective-C, and objective-C++ programming languages. This compiler uses LLVM for the back end code related compilations. This compiler has been designed to act as a replacement for the GCC by supporting many of its compilation flags and language extensions.

Clang has many contributors including Apple, Microsoft, Google, Sony, and Intel. It is open-source software. LLVM was first used by GCC for the front end compilation, but GCC had caused some problems for developers at Apple, as the source code is large and difficult to use. So, they had come up with Clang.

One of the major goals for Clang is to provide library-based architecture. It is designed to keep more information during the compilation process than GCC. This also helps to preserve the overall shape of the original code.

The error report generated by Clang during compilation is always in a detailed and specific in a machine-readable format. Clang had always aimed to reduce the over usage of memory space and increase the compilation speed as compared with GCC, and due to these qualities, it had become one of the fastest-growing used compilers during a point of time. But over a period the performance of Clang started to come down. The reports told the performance had lagged with almost large differences as compared with GCC and started to have slower performance. The most recent comparisons indicate that both the compilers had come up and increased their performance and once again creating great competition between them. Yet, GCC remains to top the list.er 2017.