Yonder Technical Assessment

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I run command :

docker run -d --name=yonder -p 30000:8080 yondermakers/yonder-devops-tech-assessment:latest

through wsl2 terminal on my windows laptop

In my browser I accessed localhost:30000 to read the questions.

1.Exemplify two data structures that you know and describe some situations where you would use them.

Hash Table is a structure that can map keys to values, it uses a hash function to compute an index into an array in which an element will be inserted or searched. We can use this data structure for a fast lookup because we have a rapid access to data, operations like insertion, lookup and deletion have a time complexity of O(1), we also use them to avoid duplicates because each key is unique in a hash table.

A tree is a hierarchical data structure consisting of nodes, where each node contains a value and a list of references to other nodes. We can use a tree for searching, especially binary search trees, because they allow for binary search in hierarchical data.

2.You open a web browser and access http://www.tss-yonder.com. What is the IP address behind this website and how does the browser know how to get the correct IP?

I used in my command prompt command: nslookup www.tss-yonder.com to find the ip addresses:

2606:4700:20::681a:3e

2606:4700:20::681a:13e

2606:4700:20::ac43:49b1

172.67.73.177

104.26.1.62

104.26.0.62

The browser knows how to get the correct ip because it sends a DNS query to DNS Server which returns the ip of the domain

3.Exemplify two transport protocols and think of two applications that would use each of them.

UDP, or User Datagram Protocol, operates at the datagram level and is built directly atop the IP layer for facilitating application-to-application communication within a TCP/IP network. It is characterized by its lack of data delivery guarantees, rendering it an unreliable protocol. Consequently, applications that necessitate the reliable transmission of data streams are better served by employing TCP.

UDP is used for:

-Live Video Streaming: Applications that stream live video often use UDP because it reduces latency compared to TCP.

-Online Multiplayer Games: Many online multiplayer games use UDP for fast data transmission.

TCP serves as a dependable method for transferring packets across hosts on the internet. It segments a data stream into individual datagrams, dispatches them via IP, and then reconstructs the datagrams into the original stream at the receiving end. Should any datagrams go missing or become corrupted en route, TCP identifies these issues and initiates the retransmission of the affected datagrams. As a result, the received data stream faithfully replicates the original, ensuring reliability in the transmission process.

TCP is used for:

Web Browsing: TCP underpins web browsers' use of HTTP/HTTPS to securely connect and exchange web page data with servers, ensuring pages load accurately without errors.

Email: Email services utilize TCP with SMTP, POP, and IMAP protocols to guarantee the reliable delivery of emails, leveraging TCP's error-checking to maintain communication integrity.

4.You wrote a chat web application in your favorite programming language. You need to host this somewhere and run it so that the entire world can start using it. Describe how you would do that and the tools you would use.

To host the application for the entire world, I would use an Azure Virtual Machine. After configuring the vm to suit my needs (instance type, network rules to allow traffic on port 443 only through network security groups, static ip address etc) I would buy a Domain Name and create a DNS Record for it to point to my public ip adress and associate it with my vm. Next step would be to deploy the aplication. Lastly I would also obtain an ssl/tls certificate and install it to serve https traffic.

5.Now your application is famous but unfortunately it has a lot of bugs. You want only you and a couple of your friends to be able to access it until you patch it. Describe two ways you can achieve this.

A fast method that I would use in an emergency to only let a few friends use my application, I would ask them for their ip addresses and block every connection but theirs by whitelisting their ip addresses.

6.Your application is ready for the public once again. You realize that you forgot about security and any network administrator can see the messages that a user sends or receives. How would you improve your application to prevent this? Is there any way to do this so that not even the application owner (you) can see the messages between two random users?

To prevent any administrator to read the messages that a user sends or receives I would change the application so that the messages will be end to end encrypted. In this way the messages are stored encrypted and only the sender and the receiver can read them.

7.What are cookies and what are they used for? Find a cookie used by http://www.tss-yonder.com and copy its name and value. What do you think is its purpose?

Cookies are text files with small pieces of data, they are used to track, personalize and save information about user's session.

Cookie used by http://www.tss-yonder.com:

Name: CONSENT

Value: WP.28940a

I think the purpose of this cookie is to let the end-users decide whether to allow cookies and trackers to be activated to process their personal data or no.

8.While writing your application you need to create more worker processes for processing some data. How can you create child processes in your favorite language? What are the possible states of a process?

Even though I would not use my favorite language in this application, but in my favorite language which is C I would use fork() method to create child processes.

Possible states of a process are: New, Ready, Run, Wait, Terminated, Suspend Ready, Suspend wait.

9.Your application is running but it still has a few problems. Occasionally, it returns an error page. How can you find the PID of your application? What would you do to debug it?

I imagined my application to be a Node application, so to retrieve it's PID i would do : ps aux | grep node.

To debug I would try to check the logs, I would try to replicate the issue so that I can diagnose it, collect any information from the stack trace/ error message or other details.

10.What DBMS would you use to store your application data and why? How would you store the passwords of each user?

To store my application data I will use PostgreSQL DBMS, because PostgreSQL offers a robust mix of scalability, reliability, advanced data management capabilities, and it is free. It also have more features comparing to other DBMSs as table inheritance, a rich set of data types, the ability to define column as an array of column types.

To store the passwords for each user I would use the SHA-256 hashing algorithm, because hashing algorithms are one way, once the password is transformed by the algorithm, it is nearly impossible to revert.

In python, I created a class DriversLicense for the data that I want to consume from the API.

In this class we've got:

-constructor method for the class

-getters for "suspendat" and "categorie" attributes

-is_valid(self) method that verifies if the license is past expiration date by casting the data_de_expirare from string to datetime so it can be compared to today's date.

- to_list(self) returns a list made from the attributes of the class, I used this in the excel method from the class Utils

- __str__(self) returns a string made from the attributes of the class

In Utils class:

-method get_data: I am using the get method from requests library to retrieve 150 data points and return them in json format.

-method excel: this method is used to write in an excel file the list passed as a parameter

-method get_suspended_licenses: I used an inline function to retrieve only licenses that are suspended and return them after I write them in excel file

-method get_valid_licenses: I used an inline function to retrieve only licenses that are suspended using method is_valid() and return them after I write them in excel file.

-method get_licenses_by_category: I am iterating through the list of licenses and check if the caregory exists as a key in the dictionary, if it does not exist I initialize the key with value 1 otherwise I increment it by 1. I return the dictionary after I write it in excel file.

In main class we use the get_data() method from Utils class to get the data and then store all the driver licenses in the list licenses. We also have a operation menu where we can choose which operation to run

from the keyboard. For every operation I use specific method from the Utils class and print the result returned from the method.