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

I like to use arrays, because they are a fundamental data structure consisting of a collection of elements identified by at least one array index or key. Various situations where I could use them effectively are related to the need to store and access sequential elements (e.g. lists), but also in the use of random access data. For example when quick access to elements based on index (e.g. arrays) is needed. In another vein, I also prefer to work with graphs, which are non-linear data structures made up of nodes and connections. I can use them for orientation algorithms (e.g. GPS navigation), implementation of graph algorithms, representation of networks in hierarchies.

**You open a web browser and access**[**http://www.tss-yonder.com**](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?**

IP address: 104.26.1.62

To get the correct IP address, the browser is searching the cache for a DNS ( Domain Name System ). DNS system acts like a the internet’s address book, translating human readable domain names into machine-readable IP addresses.

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

For User Datagram Protocol (UDP) no connection is needed to start and end a data transfer. I would use this protocol for Real-time Multimedia Streaming because we need a real time communication that requires low latency transimission. Another application for UDP can be online gaming, like multiplayers game, facilitating real-time multiplayer interactions in games.

For Transmission Control Protocol (TCP) we need an established connection before transmitting data. Because of TCP s reliability feature ( error detection ), retransmission of lost packest will ensure that web pages are displayed accurately to users, so I would say that an application of Web Browsing is a good way of using TCP. At the same time, I would do an application for database Access, becaure database queries needs reliable ond ordered delivery of data to ensure its consistency.

**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.**

First of all, we re gonna need to choose a hosting provider for the infrastructure. I would go with Amazon Web Services ( AWS ), because they offers several advantages like global infrastructure, range of services, reliability and security, and one of the most important things…… the cost ! ( yes, the cost is very important in …. this economy ). We will need to Amazon EC2 for hosting the app server, Amazon RDS for hosting the database. We will also need to create a DNS record to map the domain name to the public IP addresses of my EC2 instance. Implementing monitoring and logging solutions or the performance, usage, health of application , we will need tools like Amazon CloudWatch. Whenever changes are made to the codebase, we will need to use tools like GitLab CI/CD. For the security measures, we can use encryption protocols (HTTPS) to secure data in transit, and implement authentication, authorization mechanisms for controlling user access ( to the app ).

**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.**

For first I would set up a VPN server on the hosting environment. It will require authentication using only the creditianls that me and my friends know ( like vpn connection details, server address, username, password). Another way for granting limited time access is to use temporary access tokens. I will invalidate the access tokens from time to time to prevent the unwanted access.

**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?**

I think implementing the end-to-end encryption enures that only the users who communicate can read the messages.

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

Cookies are a small parts of data stored on the user s device by a web brower while you are on a website. They are usually used to store information about the interactions that user has with the website ( like preferences, login credentials ).

\_ga\_F0QLVQFHM5 is a cookie that appears on the link that you provided and is a part of Google Analytics tracking mechanism, lie for collecting anonymous data about website usage ( number of visitors, pages they visit, interaction that they had on the website, their location)

**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?**

For Python first we will need to import the multiprocessing module for creating and managing child processes. After that, we need to define a function that will be executed by the child process and will contain the code that we want to execute. The next step is to create a Process Object and specifying the function that the child process will execute. Using the start() methos on the Process object is the way to start the child process.

**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?**

PID( Process ID) can be found using task manager, in the Details tab. I need to locate my application process and the PID column will display the PID.

For Debugging and to identify errors I would check the logs to look for error messages . At the same time, I would use debugger tools like pdb (for python) to inspect its tate and execution flow in real time.

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

I would use Oracle Database because its scalability, high availability, reliability and for the user interface. At the same time Oracel is designed to handle large volumes of data and ensures data integrity and reliability by supporting Automicity, Consistency, Isolation, Durability (ACID).

For storing the passwords, one common approach is to securely hash and salt the passwords before storing them in the database, using a cryptographic hashing algorithm ( SHA-512 for example).