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1. **Suppose, you are managing an identity manager in a company. The company provides identity managers as a service.**

**a. What are the issues and challenges of such systems?**

➔ Identity Managers as a Service (IMaaS) are cloud-based solutions that offer identity and access management (IAM) functionalities as a service. They can simplify identity provisioning, authentication, authorization and federation by providing a centralized platform for managing user identities across different cloud services. Some of the issues and challenges of IMaaS are:

1. Security: IMaaS providers must ensure that they protect user data and credentials from unauthorized access, leakage or theft. They must also comply with various regulations and standards regarding data privacy and security.
2. Integration: IMaaS providers must ensure that they support different cloud platforms, devices and applications that their customers use. They must also provide seamless interoperability with existing IAM systems and processes within the customer's organization.
3. Performance: IMaaS providers must ensure that they deliver high availability, scalability and reliability of their services. They must also cope with increasing demand and complexity of IAM tasks and activities.

**b. What is Captcha? Can we implement a password-based Captcha? Justify your answer.**

➔ Captcha is a computer program or system intended to distinguish human from machine input, typically as a way of thwarting spam and automated extraction of data from websites. It is a type of Turing test that challenges users to solve a simple problem that is easy for humans but hard for bots.

A password-based Captcha is a Captcha that requires users to enter a password that is displayed on the screen in a distorted or obscured way. The idea is to prevent bots from guessing or cracking the password by making it difficult for them to read it.

Yes, we can implement a password-based Captcha by generating random passwords and displaying them on the screen with some distortion or noise. For example, we can use reCAPTCHA v2 which offers an option to use text-based challenges instead of images. However, this may not be very effective or secure for the following reasons:

1. Password-based Captchas are vulnerable to optical character recognition (OCR) techniques that can recognize text from images. Bots can use OCR tools or services to bypass the Captcha by reading the password and entering it correctly.
2. Password-based Captchas are also vulnerable to brute-force attacks that can try different combinations of characters until they find the correct password. Bots can use dictionaries or lists of common passwords to speed up this process.

3. Password-based Captchas may not be very user-friendly because they require users to type in long or complex passwords that may be hard to read or remember. This may frustrate users and reduce their satisfaction with the website.

Therefore, a better alternative may be to use reCAPTCHA v3 which does not require any user interaction but returns a score based on how likely the user is human or bot. This score can then be used to decide whether to allow, challenge or block the user.

**c. Why cannot we replace a password-based identity management system using an OTP?**

➔ A password-based identity management system is a system that facilitates a simple, secure way to store passwords and access them quickly when required. It relies heavily on passwords for every service, whether it's something as simple as marking daily attendance or as sensitive as accessing clients' unmasked financial details. On the other hand, an OTP (One-Time Password) is a unique security code used for online transactions. It is an automatically generated numeric string of characters, which acts as a PIN to authenticate various banking transactions. It is valid for only one login session or transaction, on a computer system or other digital device.

We cannot replace a password-based identity management system using an OTP for the following reasons:

1. An OTP is not a replacement for a password but an additional layer of security that complements the password. An OTP alone cannot verify the identity of the user but only the possession of the device that receives the OTP.
2. An OTP is not suitable for every service or transaction that requires authentication. For example, some services may require persistent login sessions that last longer than one-time transactions. An OTP would expire after each session and require users to generate and enter new codes repeatedly.
3. An OTP depends on external factors such as network availability, device battery life, and user accessibility. If any of these factors fail, users may not be able to receive or enter their OTPs and lose access to their accounts or services.

Therefore, a better alternative may be to use multi-factor authentication (MFA) which combines two or more factors such as something users know (password), something users have (OTP), and something users are (biometrics). This way, users can have more security and convenience than using either passwords or OTPs alone.

**2. Suppose, you are assigned to build a centralized shopping cart, named OurShop.com, where each shop owner can sell their products, generate revenues and they can brand their own shop. The clients can search their requirements in a single window and be given a search bar. Assume that almost all the shops in India are registered on OurShop.com.**

**a. What are the key Cloud Computing components of OurShop.com?**

➔ Some of the key cloud computing components of a centralized shopping cart, OurShop.com, are:

1. Storage: This is where we store our product data, customer data, order data, and other information related to our website. We can use cloud storage services like Amazon S3 or Google Cloud Storage to store our data securely and reliably.
2. Compute: This is where we run our website logic, such as processing orders, calculating prices, generating recommendations, etc. We can use cloud computing services like Amazon EC2 or Google Compute Engine to run our website code on virtual machines or containers that scale according to our demand.
3. Database: This is where we store and query our structured data, such as product catalogue, inventory, customer profiles, etc. We can use cloud database services like Amazon RDS or Google Cloud SQL to manage our relational databases in the cloud.
4. Networking: This is where we connect our website components and enable communication between them. We can use cloud networking services like Amazon VPC or Google Cloud VPC to create private networks for our website resources and control their access and security.
5. Load balancing: This is where we distribute our website traffic across multiple servers or instances to improve performance and availability. We can use cloud load balancing services like Amazon ELB or Google Cloud Load Balancing to balance our traffic automatically and handle spikes in demand.
6. CDN: This is where we deliver our website content faster and more efficiently to our customers around the world. We can use cloud CDN services like Amazon CloudFront or Google Cloud CDN to cache our static content (such as images, videos, etc.) at edge locations near our customers and reduce latency and bandwidth costs.
7. Monitoring: This is where we track and analyse the performance and health of our website components and identify any issues or anomalies. We can use cloud monitoring services like Amazon CloudWatch or Google Cloud Monitoring to collect metrics, logs, events, etc. from our website resources and visualize them on dashboards or alerts.
8. Management: This is where we manage our website components such as storage services, applications, runtime cloud infrastructure, security issues in the backend and establish coordination among them. We can use cloud management services like AWS Management Console or Google Cloud Console to access and control our website resources from a single interface.

9. Security: This is where we protect our website data and resources from unauthorized access or attacks. We can use cloud security services like AWS Identity & Access Management (IAM) or Google Cloud IAM to manage user authentication and authorization for accessing our website resources.

**b. How do you make your OurShop.com feasible?**

➔ To make a centralized shopping cart feasible, we need to consider several factors that can affect our website's performance, usability, and profitability. Some of these factors are:

1. Order summary: We should provide a clear and concise summary of the items added to the shopping cart, including their quantity, price, subtotal, taxes, shipping costs, and total amount. This helps our customers review their order and make any changes before proceeding to checkout.
2. Live chat: We should offer a live chat option for our customers to contact we in real time if they have any questions or issues with their order. This can increase customer satisfaction and trust, as well as reduce cart abandonment rates.
3. Mobile friendliness: We should ensure that our shopping cart is responsive and optimized for mobile devices, as more and more customers are using smartphones and tablets to shop online. We should use a readable layout, large buttons, easy navigation, and fast loading times for our mobile shopping cart.
4. Relevant questions: We should only ask our customers for the information that is necessary for completing their order, such as their name, email address, shipping address, payment method etc. We should avoid asking irrelevant or optional questions that can distract or annoy our customers and make them abandon their cart.
5. Payment options: We should offer multiple payment options for our customers to choose from according to their preference and convenience. We should also integrate with secure payment gateways that can process credit cards or other online payments safely and efficiently.
6. Trust signals: We should build trust with our customers by displaying trust signals on our shopping cart page such as security badges (e.g., SSL certificate), customer reviews (e.g., ratings), guarantees (e.g., money-back policy), social proof (e.g., number of orders), etc.

**c. What are the unique key components you would like to add to OurShop.com?**

➔ Following are some of the unique key components that can enhance our centralized shopping cart are:

1. Large, functional product images: We should display high-quality and zoomable images of our products that show their features and details clearly. This can help our customers visualize our products better and make informed decisions.

2. Product reviews: We should enable our customers to leave feedback and ratings for our products on our website. This can provide social proof and credibility for our products and increase customer trust and loyalty.
3. Layered and faceted navigation: We should allow our customers to filter and sort our products by various attributes such as price, colour, size, brand, etc. This can help our customers find what they are looking for faster and easier.
4. Single-page, fast checkout: We should simplify our checkout process by reducing the number of steps and pages required to complete an order. This can improve user-friendliness and streamline customer experience, as well as reduce cart abandonment rates.
5. Search: We should provide a powerful and accurate search function on our website that can help our customers find what they need quickly. We should also use autocomplete, spell check, synonyms, etc. to enhance our search results.
6. Coupons and discounts: We should offer incentives such as coupons, discounts, free shipping, etc. to attract more customers and increase sales conversions. We should also make it easy for our customers to apply these offers on our shopping cart page.
7. Universal cart: We should enable our customers to access their shopping cart across multiple channels such as online store, mobile app, physical store etc. This can provide a seamless and consistent shopping experience for our customers regardless of where they shop.

**d. How do you attract shopkeepers to sell their products on OurShop.com?**

➔ To attract shopkeepers to sell their products on our centralized shopping cart, we need to offer them some benefits that can motivate them to join our platform. Some of these benefits are:

1. Increased exposure: We can help shopkeepers reach more customers by listing their products on our website and promoting them through various channels such as Google Merchant Centre, social media, email marketing etc. We can also provide them with analytics and insights on their sales performance and customer behaviour.
2. Reduced costs: We can reduce shopkeepers' operational costs by providing them with a ready-made shopping cart solution that is easy to use and integrate with their existing systems. We can also offer them competitive fees and commissions for using our platform and services.
3. Enhanced customer experience: We can enhance shopkeepers' customer experience by providing them with features such as live chat, mobile-friendly checkout, coupons and discounts, free shipping etc. We can also handle customer service and support issues on behalf of the shopkeepers and ensure customer satisfaction and loyalty.
4. Multipurpose retail spaces: We can encourage shopkeepers to create multipurpose retail spaces that combine online and offline shopping experiences. For example, we can enable shopkeepers to offer in-store pickup or delivery options for online orders or allow customers to order online while browsing in physical stores.

**e. What are the hidden issues and challenges of such a system?**

➔ Some of the hidden issues and challenges of such a system are:

1. Shopping cart abandonment: This is when customers add products to their shopping cart but do not complete their purchase. This can result in lost sales and revenue for our platform. Some of the reasons for shopping cart abandonment are hidden costs, complicated checkout process, lack of trust, etc. We need to optimize our shopping cart page and offer incentives such as free shipping, discounts, etc. to reduce abandonment rates.
2. Cyber and data security: This is when our platform is vulnerable to cyberattacks or data breaches that can compromise our customers' personal and financial information. This can damage our reputation and customer trust. We need to implement strong security measures such as encryption, authentication, firewalls, etc. to protect our platform and data from hackers and malware.
3. Customer experience: This is when our platform fails to meet or exceed our customers' expectations and needs. This can result in low satisfaction and loyalty levels. We need to provide a seamless and fluid experience for our customers across multiple channels such as online store, mobile app, physical store etc. We need to use customer data to personalize our offers and content and deliver relevant recommendations.
4. Competition: This is when our platform faces stiff competition from other similar or superior platforms that offer better products or services. This can reduce our market share and profitability. We need to differentiate ourself from our competitors by offering unique value propositions such as exclusive products, loyalty programs, social responsibility etc.

**f. Discuss the advantages and disadvantages of such a centralised shopping cart.**

➔ Some of the advantages are:

1. Economy in investments: A centralized shopping cart can reduce the costs of building and maintaining multiple storage facilities and platforms for different shopkeepers. It can also lower the upstream shipping costs when buying products in bulk.
2. Simpler and more efficient management: A centralized shopping cart can make it easier to implement new solutions and technologies, such as smart shopping carts, that can enhance customer experience and satisfaction. It can also provide better product availability and security arrangements to prevent pilferage and theft.
3. Safer shopping: A centralized shopping cart can offer customers a safer shopping option, especially during pandemics or emergencies. Customers can avoid crowded physical stores and shop online from their homes. They can also use contactless payment methods and delivery options.

Some of the disadvantages are:

1. Bureaucratic leadership: A centralized shopping cart can create a dictatorial form of leadership where shopkeepers have little or no say in the decision-making process of the platform. They may have to follow strict rules and regulations that may not suit their needs or preferences. They may also lose their identity and uniqueness as they become part of a larger entity.
2. More material handling operations: A centralized shopping cart can increase the amount of material handling operations that are required to transport products from one location to another. This can result in more time, labour, energy, and risk involved in moving products across long distances.
3. Chances of misunderstanding: A centralized shopping cart can create chances of misunderstanding between shopkeepers who require certain products and customers who order them online. There may be delays or errors in communication or delivery that can affect customer satisfaction and loyalty.

**g. Why would such shopping carts be introduced in India?**

➔ Such shopping carts could be introduced in India for various reasons like:

1. Faster buying process: Customers can spend less time shopping for what they want and pay online without having to wait in long queues at the cash counter.
2. Store and product listing creation: Shop owners can create their own product listings and showcase their products to a large number of customers across India.
3. Cost reduction: Shop owners can save on rent, utilities, staff, and other expenses by selling online instead of having a physical store.
4. Affordable advertising and marketing: Shop owners can use online platforms and social media to promote their products and reach more potential customers.
5. Flexibility for customers: Customers can shop anytime, anywhere, and from any device according to their convenience.
6. Product and price comparison: Customers can compare different products and prices from different shops on one website and make informed decisions.
7. No reach limitations: Shop owners can expand their market and sell their products to customers from different regions, states, or even countries.
8. Faster response to buyer/market demands: Shop owners can track customer behaviour, preferences, feedback, and trends using analytics tools and adjust their products accordingly.
9. Centralized inventory management: Shop owners can keep stock in a single location and restock their store and fulfil orders from that central hub. This reduces inventory costs, errors, and wastage.

**h. How do you generate revenue using the shopping cart?**

➔ There are many ways to generate revenue using the shopping cart in such a system. Some of them are:

1. Offer one-click checkout: This can reduce the time and complexity of the checkout process and encourage customers to complete their purchase. We can use features such as saved payment methods, autofill forms, etc. to make it easier for customers to buy our products.
2. Optimize the mobile shopping experience: This can ensure that our platform is responsive and user-friendly on mobile devices. We can use features such as mobile-friendly design, fast loading speed, easy navigation, etc. to make it convenient for customers to shop on their phones or tablets.
3. Offer and promote "buy now, pay later" as payment options: This can increase customer confidence and flexibility in buying our products. We can use features such as instalment plans, deferred payments, etc. to allow customers to pay over time without interest or fees.
4. Offer subscription and recurring payment services: This can increase customer loyalty and retention by providing them with regular deliveries of our products. We can use features such as automatic billing, customizable plans, etc. to offer customers a convenient and personalized service.
5. Offer upsells and add-ons: This can increase our average order value by suggesting additional or complementary products that customers may be interested in buying. We can use features such as product bundles, cross-sells, etc. to show customers relevant offers based on their shopping cart contents.

**3. Suppose, you are assigned to build Tree Plantation as a Service, named TPaaS.com, where the users buy trees to plant in particular selected locations virtually. On TPaaS.com, the selected tree is planted in a particular location by the staff of TPaaS.com company, and they look after the growth of the tree.**

**a. What are the key Cloud Computing components of TPaaS.com?**

➔ Some of the key cloud computing components of TPaaS are:

1. Client infrastructure: A front end platform that provides a user interface for users to buy trees and select locations. This can be a website or a mobile app that communicates with the back end platforms via APIs.
2. Back-end platforms: A back end platform that handles the business logic and data processing of the service. This can include servers that run applications such as inventory management, payment processing, order fulfilment, customer service etc. It can also include storage systems that store data such as user profiles, tree information, location details etc.
3. Application: A cloud based delivery model that allows users to access the service on demand without installing any software or hardware. This can be achieved by using a cloud service provider such as Microsoft Azure, Amazon Web Services (AWS), Google Cloud Platform (GCP) etc. These providers offer various services such as infrastructure as a service (IaaS), platform as a service (PaaS), software as a service (SaaS) etc. that can help reduce costs and increase scalability and reliability of the service.
4. Network: A network that connects the front end and back end platforms and enables data transfer between them. This can be either public or private depending on the security and performance requirements of the service.
5. Service: This is the component that connects the application with the back-end platforms and handles requests from users. It can be a web service, a cloud service, or a microservice.

**b. How do you set up the company?**

➔ Some established steps that we can follow for setting up a cloud computing company with tree plantation as a service are:

1. Look for a business partner: We can collaborate with an existing reforestation organization or project that can help us with planting and maintaining the trees on the ground. We can choose from various options such as Digital Humani, Nelda Foundation or Sankalptaru.
2. Design some great marketing strategies: We need to promote our service and attract customers who are interested in planting trees online. We can use social media, blogs, podcasts, webinars, newsletters, or other channels to spread awareness and showcase our impact.

3. Buy required equipment: We need to invest in hardware and software that can support our cloud computing service. We may need servers, storage devices, routers, switches, firewalls, operating systems, databases, web frameworks, APIs, etc.
4. Arrange an office space: We need to find a suitable location to set up our office where we can manage our operations and staff. We may also need to hire employees such as developers, designers, marketers, accountants, etc.
5. Work according to the business plan: We need to follow our business plan and execute our strategies according to our goals and budget. We also need to monitor our performance and feedback from customers and partners.

**c. What are the unique features of you would like to add to TPaaS.com?**

➔ Some of the unique features that can enhance TPaaS.com are:

1. Offering a variety of tree species and locations: We can allow our customers to choose from different types of trees and planting sites that suit their preferences and goals. We can also provide information about the benefits and challenges of each option.
2. Providing transparency and accountability: We can use technology such as GPS, satellite imagery, drones, blockchain, etc. to track and verify the planting and growth of the trees. We can also share regular updates and reports with our customers and partners about the impact of our service.
3. Engaging with local communities and stakeholders: We can involve and empower the local people who live near or depend on the forests. We can provide them with training, employment, education, health care, etc. We can also collaborate with other NGOs, governments, corporations, etc. who share our vision.
4. Creating a user-friendly and attractive interface: We can design a website or an app that is easy to use, secure, fast, and appealing for our customers. We can also use gamification, social media integration, rewards system, etc. to motivate and retain our customers.

**d. How do you monetise the company?**

➔ There are different ways to monetize the company, such as:

1. Charging a fee per tree planted: We can set a price for each tree that our customers plant through our service. We can also offer discounts or incentives for bulk orders or subscriptions.
2. Selling carbon credits: We can generate and sell carbon credits from the trees that we plant and maintain. Carbon credits are certificates that represent a reduction of greenhouse gas emissions. We can sell them to individuals or organizations who want to offset their carbon footprint.

3. Offering additional services: We can provide other services related to tree planting, such as tree pruning, tree health management, stump removal, etc. We can also offer consultation or education services for customers who want to learn more about reforestation.
4. Creating partnerships and sponsorships: We can partner with other businesses or organizations who share our vision and values. We can also seek sponsorship from companies who want to support our cause or advertise their brand on our platform.

**e. What are the legal issues (Law)? How do you overcome the legal issues?**

➔ Some of the legal issues that may arise in TPaaS company are:

1. Liability for tree damage or injury: We may be held liable if our trees cause damage or injury to someone else's property or person. We may have to pay for the repair, replacement, or compensation of the affected party.
2. Compliance with tree preservation laws: We may have to follow the laws and regulations of different states or countries regarding the protection and conservation of trees. We may need to obtain permission from the authorities before planting, cutting, or transplanting any trees.
3. Land rights and ownership disputes: We may face challenges in acquiring or accessing land for our tree planting activities. We may have to deal with conflicts with local communities, landowners, governments, or other stakeholders who have claims over the land.

To overcome these legal issues, you can:

1. Ensure proper insurance and risk management: We can obtain adequate insurance coverage for our trees and our operations. We can also implement risk management strategies such as regular inspection, maintenance, pruning, etc. of our trees.
2. Research and follow the relevant laws and regulations: We can conduct thorough research on the laws and regulations of each state or country where we operate. We can also consult with legal experts or authorities before undertaking any tree planting activities.
3. Engage and collaborate with local communities and stakeholders: We can involve and empower the local people who live near or depend on the forests. We can also seek their consent and cooperation before planting any trees on their land. We can also partner with other organizations who share our vision and values.

**f. How do you find the locations to plant the trees?**

➔ There are different methods to find locations for tree planting, such as:

1. Collaborate with local communities and stakeholders: We may find the land and area to plant the trees by collaborating with local communities, farmers, governments or other stakeholders who have access to suitable land for tree plantation.

2. Using a planting zones map: You can use a map that shows the USDA gardening zones by ZIP code. This can help you find out which areas have suitable climate and soil conditions for different types of trees.
3. Inspecting the yard or site: We can check our yard or site for factors such as sunlight, water, nutrients, space, and drainage. These factors can affect the growth and health of the trees. We can also avoid planting near power lines, buildings, or other obstacles.
4. Following a planting guide: We can follow a step-by-step guide that shows us how to plant a tree properly. This can include tips on how to dig a hole, position the roots, fill the soil, water the tree, and mulch the area.

**g. How do you attract clients?**

➔ There are different ways to attract clients for a Tree Plantation as a Service company, depending on the target market, budget and goals. Some possible strategies are:

1. Use social media platforms like Facebook to grow and leverage word of mouth: We can create a page for our company, share photos and videos of our tree planting projects, invite reviews and testimonials from satisfied customers, and run ads or contests to reach more potential clients.
2. Set up and optimize the Google My Business profile the right way: This is a free tool that helps us appear in local search results, maps and reviews when people look for tree planting services near them. We can add relevant information about our company, such as contact details, hours of operation, service areas and special offers.
3. Offer a referral fee or incentive to existing customers who recommend our service to their friends, family or colleagues: This can help us generate more word of mouth and loyalty among our clients.
4. Offer and market less competitive services that complement the core service of tree planting: For example, we can offer tree pruning, mulching, fertilizing or pest control services that can help maintain the health and beauty of the trees we plant.
5. Partner with a non-profit organisation that shares the common vision of environmental conservation and social welfare: We can donate a portion of our profits to their cause, sponsor their events or campaigns, or collaborate on joint projects that can benefit both parties.
6. Provide a certificate or recognition to the clients for their green initiative: This can help them feel good about their contribution to the environment and also showcase their social responsibility to others.

**h. Why does a client believe in your services?**

➔ A client should and does believe in our services because we provide:

1. Quality and professionalism: We use the best practices and standards for tree planting and care. We have a team of trained and experienced staff who can handle any project with efficiency and expertise. We also use high-quality saplings and materials that ensure the survival and growth of the trees we plant.
2. Transparency and accountability: We keep our clients informed and updated about every step of the process through a public profile on the social media and/or the company website.
3. Convenience and satisfaction: The client can plant trees online or offline without having to worry about the logistics, costs or maintenance of the project. The client can choose from a variety of locations and species that suit their preferences and goals. The client can also track the progress and impact of their tree planting through our website or app.
4. Environmental and social benefits: The client can contribute to the restoration and conservation of natural habitats, biodiversity and ecosystem services. The client can also support local communities, farmers and organisations that benefit from the tree planting projects. The client can also reduce their carbon footprint and enhance their green image by planting trees.

4. **Suppose, you are assigned to build a Secret Store as a Service, named SecretStore.com, where a client can store their data without worrying about the leakage. SecretStore guarantees that no one can steal the data from its database and the company people cannot retrieve and decrypt the data from their own database.**

**a. How do you achieve SecretStore.com? Elaborate.**

➔ To build your own Secret Store as a Service, you might want to consider some of the following steps:

1. Choose a cloud platform that offers key vault services: Example: Azure Key Vault or AWS Secrets Manager.
2. Create a key vault and generate or import secrets, such as passwords, connection strings, API keys, etc.: We can use the portal or the command-line interface of our cloud provider to do this.
3. Configure access policies and permissions for the key vault and secrets: We can use role-based access control (RBAC) or identity-based authentication to grant or deny access to your secrets.
4. Integrate the key vault with the applications using the Secrets Store CSI Driver: This will allow us to mount secrets as volumes in our pods. We can also use environment variables or SDKs to access our secrets programmatically.
5. Monitor and audit the key vault activity using logs and metrics: We can use tools like Azure Monitor or AWS CloudTrail to track who accessed our secrets and when.

**b. How does a client benefit from the service?**

➔ A client can benefit from a Secret Store as a Service in several ways, such as:

1. Enhanced security: A Secret Store as a Service can help protect the client's sensitive data from unauthorized access, leakage, or theft. The service can encrypt the secrets before storing them and use strong access policies and authentication mechanisms to prevent unauthorized access.
2. Reduced costs: A Secret Store as a Service can help reduce the costs of installing and maintaining physical infrastructure for storing secrets. The client can pay only for the storage space they need and scale up or down as needed.
3. Improved efficiency: A Secret Store as a Service can help improve the efficiency of the client's applications and workflows by providing easy and fast access to secrets. The service can also automate tasks such as secret rotation, revocation, and auditing.

**c. What are the issues and challenges of the service?**

➔ A Secret Store as a Service can also face some issues and challenges, such as:

1. Lack of visibility: It can be hard to keep track of all the secrets that are stored and used across different systems, resources, accounts, and applications. This can lead to secret sprawl, duplication, or leakage.
2. Hardcoded credentials: Some secrets might be hardcoded or embedded within applications or systems, making them vulnerable to exposure or theft. Hardcoded credentials also make it difficult to rotate or revoke secrets when needed.
3. Cloud computing privileges: Cloud environments often require more privileges and permissions for accessing secrets than on-premises environments. This can increase the risk of unauthorized access or misuse of secrets by malicious actors.
4. Manual processes: Managing secrets manually can be time-consuming, error-prone, and inconsistent. Manual processes can also introduce human errors or delays that can compromise the security or availability of secrets.
5. Lack of centralized management: Having a centralized system for managing secrets can help improve security, efficiency, and compliance. A centralized system can also provide features such as encryption, rotation, revocation, auditing, and backup of secrets.