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Q1. What are the legal issues when using cloud models ? Explain.

→ Cloud computing is a new name for an old concepts. The delivary of Computing services from a remote location. Cloud computing is internet-based computing, where shared resources, software and information are provided to computers and others devices on demand.

Legal Issues around cloud computing are follows :

① Security Procedures :

The majority of companies which implemented cloud solutions and services do not have security procedures in places. Also, they lack measures to approve or evaluvate cloud application When adopting the BYOD trends for example, organizations needed these security procedures more than ever. The bottom line is that security produres must be established according to every company's objectives and workflow.

② Third-Party Access Issues :

Third-party involvement could be a risk. All third parties using a multi tenant shared cloud are using the same administration interface, so make sure you see multi factor authentication and enhanced security. Also look for HIPAA-Compliant provider a business associate agreement (BAA) with a third-party vendor who access Protected Health information (PHI) is necessary to ensure privacy and security requirement. A partenship with a HIPAA solution provider that signs a BAA is an efficient method to ensure this goes smoothy and everythings. is secure.

③ Intellectual property Rights :

Intellectual property Rights differs from one country to another, so it has not very clear what intellectual property laws will apply in the cloud computing environment. make sure you know the regulations and rights of the country.

where you store your data. The provider you choose should know how to protect the intellectual property it stores and how to avoid potential infringement pitfalls.

④ Confidential Data Theft Attacks :

Data stored in the cloud might be compromised or breched. Therefore most cloud computing providers also offer the customer different levels of security protection. which allows for more enhanced security. Encryption might have failed to protect data from theft attacks, but there are other methods that you can implement. Some example include monitoring data access in the cloud to detect abnormal data access patterns. The customers must understands the cloud providers discloures policy and how quickly they would disclose the breach.

Q2. Explain various challenges in cloud computing ?

→ cloud computing is an on-demand allocation of computing resources such as data storage has various ups and downs. cloud services provides are providing enhanced services.

Most common challenges that are faced when dealing with cloud computing

① Data Security and Privacy :

Data security is a major concern when switching to cloud computing. User or organizational data stored in the cloud is critical and private. Even if the cloud services providers assures data integrity, it is yours responsibility to carry out user authentication and authorization. Identify management, data encryption and access control. Security issues on the cloud including identify theft data breaches., malware infections. and a lot more which eventually

decrease the trust amongst the users of your applications.

② Cost Management :

even as almost all cloud services providers have a "pay as you go" model which reduces the overall cost of the resources being used. There are times when there are huge costs incurred to the enterprise used cloud computing. When there is under optimization of the resources. If there is a degraded application performance or sudden spikes or overages in the usage.

③ Multi-cloud Environments :

Due to an increase in the options available to the companies, enterprise not only use a single cloud but depend on multiple cloud services providers. most of these companies use hybrid cloud tactics and close to 84 % are depends on multiple clouds. This often ends up beings hindred and difficult to manges for

④ Performance challenges :

Performance is an important factors while considering cloud based solutions. If the performace of the cloud is not satisfactory. it can drive away and users and decrease profits. Even alitte latecy while loading an loading an app or a web page can result in a huge drop in the percentages of users. This latecy traffic can be product of Inefficent. load balancing which means that the server cannot efficienHy split the incoming traffic so as to provide the best user experiance.

⑤ Interoperability and Hexibility :

When an organization uses a specific cloud services provider and wants to switch to another cloud-based solution. it often turns up to be a tedious procedure since applications written for one cloud with the application stack are required to be

written for one cloud with the appli cation stack required to be re-written for the other cloud.

⑥ Lack of Knowledge and Expertise :

Due to the complex nature and the high demand for research working with the cloud often ends up being a highly tedious task. It require immense knowledge and wide expertise on the subject. Although there are a lot of professional in the field they need to constantly update themselves. cloud computing is a highly paid job due to the extensive gap between demand and supply. Therefore there is a need for upskilling so these professionals can actively understand, manage and develop cloud based application with minimum issues and maximum reliability.

Q3. Explain various deployment models in cloud computing.

→ The cloud deployment models identifiers the specific types of cloud environment based on ownership. scale and acess. as well as the clouds nature and purpose. The location of the servers you are utilizing and who controls them are defined by a cloud deployment models. It specifies how your cloud infrasture will look what you can change and wheather you will be given services or will have to create everything yourself. Relationship between the infrastructure and yours users are also defined by cloud deployment types.

Different types of cloud computing deployment models are :

① Public cloud :

The public cloud makes it possible for anybody to access system and services. The public cloud may be less secure as it is open to everyone

The public cloud is one in which cloud infrastructure services are provided over the internet to the general people or major industry groups.

Advantage of Public cloud.

- Minimal investment : Because it is a pay-per-use services. There is no substantial upfront fee.
- Not setup cost : The entire infrastructure is fully subsidezed by the cloud services providers thus there is no need to setup any hardware.

Disadvantages :

- Less secure
- Low customization : it is accessed by many public so it can't be customized ale to personal requirement.

② Private cloud :

The private cloud deployment model is the exact opposite of the public cloud deployment models. its a one-on-one environment for a single user

There is no need to share your hardware with anyone else. The distinction between private and Public clouds is in how you handle all of the hardware. It is also called 'internal cloud". & if refers to the ability to access System and services within a given border or organization

Advantages of Private clouds:

- Better control: you can gain complete command over service integration.
- Data Security and Privacy.
- Customization: unlike a public cloud deployment, a private cloud allows a company to tailors its solution to meet its specific need.

Disadvantage:

- & Less Scalable
- costly.

③ Hybrid cloud:

By bridging the public and private words with a layers of proprietary software, hybricle clouds computing gives the best of both worlds.

Advantage of Hybrid cloud model :

- Flexibity and control.
- Security because data is properly seperated, the chances of data theft by attackers are considerbly reduced.

Disadvantage.

- Difficult to manage.
- Slow data transmission.

④ Community cloud :

It allows systems and services to be accessible by a group of organization It is a distributed system that is created by integrating the services of different clouds to address the specific needs of a community industry or business.

Advantages of Community cloud:

- It is cost Effective.
- Security.
- collaboration and data sharing.

Disadvantages :

- Limited scalability.

- Rigid customization.

⑤ multi cloud :

It is similar to the hybrid cloud deployment approach, which combines public and Private cloud resources. Instead of merging private and privet public clouds. multi cloud uses many public clouds.

Advantages of multi cloud :

- It reduced Latecy.
- High availability of services.

Disadvantage of multi cloud :

- It is very complex.
- It has many security issues.

Q4. What is the role of Network in cloud? And Explain protocol used in cloud?

→ cloud Networking is a kind of Information Technology (IT) infrastructure in which some or all of an organizations networking resources are hosted in the cloud, wheather in public cloud, private cloud, or a hybrid clouds

Combination. Cloud networking focuses on the ability of a cloud customers or cloud services provider to design configure and manage the underlyin network in cloud services. This enable a shift of Network management control and data connectivity from an organization premises to cloud infrastructure.

Types of cloud Networking :

The two main types of cloud Networking are cloud enabled networking and cloud-based Networking.

① Cloud enabled Networking is a cloud networking method where network architecture is on the customer premises but some or the rest of other network resources used for management are in the cloud. For example core Network infrastructure such as packet forwordin and rowing.

② Cloud based Networking is another method in which the entire network

is based in the cloud. This process is used to enable connectivity between the reasources and application deployed in the cloud.

Advantages of cloud Networking :

① On-Demand self Services :
cloud computing provides requred application services and utility to client with login key. they can begin to use besides any human interplay and cloud service provider.

② High scalability :
It requirest grant of resources on large scale besides any human intervention with every services provider.

③ Agility :
It shares the assets efficiently amongst customers and works qui

④ Multi sharing :
By distributed computing distinctive client from couple of area share

identical resources through fundamental infrastructure.

⑤ Low cost :
It is very economical and can pay in accordance with its usage.

⑥ High availability and Realiability :
The servers and accessible at the proper time besides any delay or disappointment.

Protocols used in cloud computing :

① MQTT is a standard Publish / subscribe protocol that is frequently used and supported by embedded devices and is also common in machine to machine interaction.

② HTTP is a "connectionless" protocols with the HTTP bridge, devices do not maintain a connection to cloud IoT core. Instead they send request and receive responces. Cloud IoT core supports HTTP 1.1 only.

Q5. What is Map Reduce ? Explain three Stage of Map-reduce program execu

→

Hadoop map Reduce is a programming model and software frameworks used for writing application that process large amount of data. There are two phase in the map Reduce program. Map and Reduces.

The map task includes splitting and mapping of the data by taking a dataset and converting it into another set of data. where the individual element get broken it into another ~~set of data. where~~ tuples. i.e value or pair. After which the reduce task shuffles and reduces the data, which means it combines the data tuples based on the key and modifies the value of the key accordingly.

map reduce model is the core component for data processing. using this model it is very easy to scale an application to run over hundreds. thousand and many more machines in a cluster by only making configurat change.

- Phases of map Reduces.

① Input Splits : An input in the map reduces model is divided into small fixed size parts called input splits.

② Mapping : This is the first phase in the map reduces program execution where the data in each split is passed by line by line to a mapper function to process it and produce the output values.

③ Shuffling : It is a part of the output phase of mapping where the relevant records are consolidated from the output.

④ Reduce : All the value from the shuffling phase are combined and a single output value is returned. Thus summarizing the entire dataset.

Advantages of MapReduces :

- Big data can be easily handled.
- Dataset can be processed parallely.
- High scalability provided.
- Load balancing time is offered in large cluster.

Q6. List out and Explain the steps of Hadoop configuration?

→ Hadoop is a globally-used open source software programming framework which is based on Java programming with some native code of C and shell scripts. It can effectively manage large data, both structured and unstructured formate on clusters of computer using simple programming models.

Map / Reduce and HDFS are the primary components of Hadoop cluster.

① Map / Reduce is a programming model associated for implementation by generating and processing big data sets with parallel and distributed algorithm on a cluster.

② HDFS (Hadoop distributed file system):
It is a part of Apache software foundation designed to support a fault-tolerant file system that can run on any hardware commodity.

The following are the steps to configure file to set up HDFS and Mapreduce environment :

Step 1 : Extract the core Hadoop configuration files into a temporary directory.

Step 2 : The file are in the path : configuration_files /core_Had directory

Step 3 : Make necessary changes in the configuration files.

Step 4 : In the temporary directory, locate the files and edit their properties based on your environment

Step 5 : Search for TODO list in the files for the properties to replace.

- Installing and configuration of Hadoop in standalone mode ste·setup :
  1. Extract all downloaded files.
  2. Create soft links.
  3. Configure. bashrc
  4. Configure Hadoop in stand-alone mode.
  5. Exit and reopen the command prompt
  6. Run a Hadoop job on standalone cluster.

Assignment NO: 02

Q1. Enlist and Explain different technologies for data security in cloud computing ?

→ Data security technologies come in a variety of forms, including the following :

- **Firewalls :**

A Firewall is the initial security layer in a system. It is designed to keep unauthorized source from accessing enterprise data. A Firewall serves as an intermediary between a personal or enterprise network and the public internet.

- **Authentication and authorization :**

Two processes are used to ensure only appropriate users can access enterprise data authentication and authorization. Authentication involves users providing proof that they are are who they claim to be. This proof can be providing a secret, such as password or PIN, or biometric authentication.

- **Data encryption :**

Data encryption converts data into coded ciphertext to keep it secure at rest and while in transit between approved parties. Encrypting data ensures only those who have the proper decryption key can view the data in its original plaintext form.

- Data Masking :

Data masking obscures data so that even if criminals exfiltrate it, they can't make sense of what they stole. Unlike encryption which uses encryption algorithm to encode data data masking involves replacing legitimate data with similar but fake data.

- Hardware-based Security :

Hardware-based security involves physical protection of a devices rather than relying solely on software installed onto the hardware. Because attackers target every IT layer, companies need protections built into the silicon to ensure hardened devices.

- **Data backup and resilience :**
Organizations should save multiple copies of data, especially if they want to fully recover following a data backups in place, companies can resume normal business function faster and with fewer hiccups.

- **Data erasure :**
It is important organization properly delete data and ensure that deleted data is not recoverable. known as data erasure this process involves completely overwriting stored data so that it cannot be recovered.

Q2. Differentiate between Network level host level and application level.

→

Network level	Host level	Application level
① Network level deal with routing and transferring of packets across a Network.	① Host level Concerned with the operation of a single computer or devices.	① Application level manages the communication between application or processes.

) TCP/IP, ICMP, RP etc are the rotocols used in Network level.	② UDP, TCP, ICMP etc are the protocol used in Host level.	② HTTP, FTP, SMTP are the protocol used in application level.
) It uses IP addresses and ports for communi- cation.	③ It uses IP address and ports for communication between processes	③ It uses domai names, URLs and port numbe s for communi- cation between applications.
) It focuses on Network infras- tructure.	④ It focuses on managing resource of a single host.	④ It focuses on managing communication between applicat
) Examples of asks includes Routing, switching Packet filtering.	⑤ ~~Example~~ It includes tasks like managing hardware and software resources of the host.	⑤ It includes tasks like manging request, response and data transfers between applicat
) The tools involves n Network level re Routers, witches, firewalls, etwork analyzer.	⑥ The tools involve in Host level are operating system, system monitoring tools, diagnostic tools.	⑥ The tools involves in application level are web browser, email clients, file transfer client, ,messaging applicat

Q3. What is Dataset in C# ? How to declare Dataset in C# ? Explain the important property of datasets.

→

Dataset is a disconnected architecture it represents the data in table structure which means the data into rows and columns. Datasets is the local copy of your database which exists in the local system and makes the application execute faster and reliable. Dataset works like a real database with an entire set of data which includes the Contraints, relationship among tables. and so on. it will found in the namspace " system. Data"

Syntax :

The syntax of dataset as shown below :

```
Public class Dataset : Sy
{

}
```

Declaration of dataset in C# :

① create your frame.
② Drop a data Grid View control.
③ Create a dataset (xsd) file.
④ open your xsd file.
⑤ Drag the table that you want to work with from the server explorer. your table and table adapter will be created.
⑥ Enable the insert, update and delete properties in your data grid view control clicking the option control button.
⑦ In that same box. choose your data table as your data source.

Dataset in C# provides four Constructors are as follows :

- Dataset () : It derives from the System Data. Dataset class and initializes the new instance of a class.

- Dataset (string dataset Name) It represents the name and it initialize the new instance of the system.

- Datasets (serialization info,

streaming context) is the same as above it initialize the new instance of the system.

- Dataset (serialization Info, Streaming Context Context bool construct schema) is the same as above it initializes a new instance of system Data set class

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Q4. Why C# is known as widely used professional language?

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C# is a high level programming language that was developed by microsoft in the early 2000s. It is an object-oriented language that is designed to be simple, modern and general purpose.

There are several reasons why C# is widely used as a professional language:

① Backed By Microsoft: C# is backed by microsoft, which is one of the

largest software companies in the world. As a result, it has excellent documentation, support and development tools.

② Versatile : C# is a versatile language that can be used to develop a wide range of application including desktop application, web application game application, mobile applica

③ Object oriented : C# is an object oriented language which means that it focuses on creating objects that can interact with each other This makes it easier to develop complex applications with multiple components.

④ Cross-platform : C# can be used to develop application on multiple platform including windows, Linux and MacOS. This make popular choice for developer who need to create application that run on multiple operating system.

⑤ Strongly typed : C# is a strongly

typed language which means that it requires developers to define the data types of each variable. This helps prevent error and makes the code easier to read and maintain.

⑥ Large Community : C# has a large and active community of developers who contribute to open source projects and share knowledge through forums, blogs and social media. This makes it easier for new developers to learn and get help when they need it.

Q5. Explain how Azure maximize data availability and Minimize security risk ?

→ Azure is a cloud computing platforms that provides a wide range of services to help organization store, manage and analyze data securely. Azure provides a wide range of services that can be used for data mining while also ensuring maximum

data availability and minimizing security risks.

Here are some ways in which Azure maximize data availibility and minimize security risk in data mining:

① Scalability: Azure provides scalable services that can be used for data mining such as Azure machine learning and Azure databriks. These services can handle large amount of data and can be scaled up or down as needed to meet demand.

② Redundancy: Azure provides reduden storage for data which ensure that data is available even in the event of hardware failure. This especially important for data mining where large volumes of data are processed and analyzed.

③ Backup and recovery: Azure provides backup and recovery services for data mining operation which helps protect against accendental deletion

hardware failure or other diasters.

④ Encryption : Azure provides encryption for data in transit and at rest, which helps protect against unauthorized access.

⑤ Identify and access management : It provides identify and access management capabilities through Azure Active Directory (AAD) which helps ensure that only authorized users have access to data.

⑥ Compliance : Azure has a range of compliance certifications such as ISO 27001, HIPAA and GDPR, which ensure that Azure meets industry standards for security and data protection.

Q6. Compare windows Azure table storage and SQL database.

→

Azure table storage	SQL database.
① In Azure table storage the data model is NO SQL.	① In SQL database, the datamodel is Relational.
② It has limited querying.	② It has full-featured querying.
③ It Horizontally scalable.	③ It scalable with planning / config.
④ Azure table storage is less expensive for storage.	④ SQL database is cost-effective for frequent querying / data manipulation.
⑤ It has high avalibility and redundancy.	⑤ It has high avalibility and redundancy.
⑥ It has eventual consistency.	⑥ It has strong consistency.
⑦ It is familier to non SQL developers.	⑦ It is familier to SQL developer.