* 1. **Research and list at least 5 benefits of cloud computing over traditional on-premises infrastructure.**

**My case study: Online Retail Management System.**

As per my research and understanding, upgrading to cloud computing from the traditional on-premises infrastructure might benefit my application in the following ways-

1. **Availability**-We would prefer having as minimum downtime as possible because it will result in a loss in business. Using cloud will enable the system to be more available, i.e., there is a high chance that the application will be available whenever the user needs, be at any time of the day.
2. **Elasticity**-In case there is a sudden surge in demand (considering it is a retail management system, there will be offers, discounts and sales, when we might expect an increase in traffic). In such cases, the feature of elasticity might come handy, and we will be able to scale up or down based on the need.
3. **Capex or Opex**-Using cloud will give us a choice to either use CapEx or OpEx as per our need.

Considering the scenario of my case study, i.e., in case of a retail management system, we would extensively use the Opex approach, to buy servers for our business as it will give us the flexibility to pay only as per our usage and will help us to avoid a huge CapEx investment. Since the amount of server usage is unpredictable, it is better to use the Opex model.

Also, in some cases, due to government rules and laws, we might need to store customer’s sensitive, personal information on a private server. In this case, we would be required to make an investment in servers upfront.

1. **Disaster Recovery**-Since Disaster Recovery is a feature of cloud computing, it will be helpful to keep track of data and recover data in case of any unavoidable circumstances, such as any natural calamity like flood or fire. In case of traditional on-premises infrastructure, the business is bound to suffer.
2. **Fault tolerance**-Since fault tolerance is a feature of cloud computing, it will be helpful to use cloud to make our application highly available since then our application will not be affected by things like power cut or network unavailability. Frequent downtimes of an ecommerce website would result in a loss of credibility and eventually we would lose customers. So, its better to use cloud.
3. **Scalability**-We can also easily scale up our application in size and across geography, in case need be.
4. **Agility**-The market is a competitive place. If a competitor comes up with some advanced upgradations like the integration of VR in their website, using which people can virtually try out their outfits before purchasing.

Now, it is definitely possible to make these changes ourselves, but that would require a lot of money, time and other resources with no guarantee of success. Also, by the time we are done with the development, the technology might become old.

But, if we are using cloud, it has a service for VR for example, which we can easily use in our application. Also, in case, in future, we feel that we do not need it anymore then it is also possible to easily discontinue the service. So, it does not become a dead investment.

1. **Security**-Using cloud would be much secure.
   1. **Describe the CapEx and OpEx models of financing IT infrastructure, providing examples of when each model might be preferred.**

Capital expenditures (CapEx) are major purchases a company makes designed to be used over a longer period of time while on the other hand, while Operating expenses (OpEx) are the day-to-day expenses a company bears to keep its business operations.

Considering the IT infrastructure of an ecommerce application, it makes more sense to follow the OpEx approach since the server usage is unpredictable. It might be low at times and at times, especially during sales, we might face a surge in demand, when the server use might turn out to be more. Therefore, using cloud would give us the flexibility to pay as per our use only.

Also, in some cases, due to government rules and laws, we might need to store customer’s sensitive, personal information on a private server. In this case, we would be required to make an investment in servers upfront.

**Part 2: Understanding Public, Private and Hybrid Clouds**

**2.1 create a brief report differentiating between public, private and hybrid clouds. Include a diagram that represents each cloud model.**

Based on the business needs, cloud computing offers various deployment models such as-

1. **Public Cloud –**

Public cloud is cloud computing that’s delivered via the internet and shared across organizations. All resources are made public over the internet by the service provider.

The resources anything like VMs, applications, storage, etc. it may be free of cost or with minimal pay-per-use.

It is the most common way of implementing cloud computing. The external cloud service provider owns, operates, and delivers it over the public network.

For eg,

Google uses the cloud to run some of its applications like google docs, google drive or YouTube, etc.

It is best for the companies which need an infrastructure to accommodate a large number of customers and work on projects which have diverse organizations i.e. research institutions and NGOs etc.

**Advantages:** Cost-effectiveness, no CapEx required, scalable, accessible, reliable.

**Disadvantages**: security issues, possibility of data breach, limited control over how our data is stored or managed since public cloud providers have full control over it.

1. **Private Cloud-**

Private cloud is cloud computing that is dedicated solely to one’s organization.

Resources are not made public over the internet. It only supports connectivity over the private network and has authentic users only.

For eg,

Google back-end data of the applications like Google Drive, Google docs, YouTube, etc are not available to the public, these types of data and applications run on a private cloud.

The infrastructure and services are maintained and deployed over a private network; hardware and software are dedicated only to a private company i.e. members of the special entity.

It is best for the companies which need an infrastructure that has high performance, high security, and privacy due to its best adaptability and flexibility.

**Advantages:** More control, more security, highly customizable

**Disadvantages:** High cost, maintenance has to be taken care of by the users, might not be very scalable.

1. **Hybrid Cloud –**

Hybrid cloud is any environment that uses both public and private clouds.

Apps and data workloads can share the resources between public and private cloud deployment based on the organization’s business and technical policies, considering aspects like:

Security

Performance

Scalability

Cost

Efficiency

For eg,

Organizations may use the public cloud for workloads and data that aren’t sensitive, saving cost, but opt for the private cloud for sensitive data.

**Advantages:** Policy-driven option, scale with security, reliable, cost control

**Disadvantages:** Might result in wasteful spending while toggling between public and private, added complexity, requires more management.

The choice between public, private, and hybrid cloud solutions depends on a variety of factors, use cases, and limitations. In the real world, this is rarely an either/or situation, especially since organizations tend to leverage all three types of cloud solutions for each’s inherent value propositions.

**2.2 for each cloud model, list one real-world application or scenario where that will be the most appropriate choice.**

1. **Public Cloud model-**

**Real-world applications like E-commerce websites, that experience fluctuating traffic might extensively use public cloud model. The ability to scale resources up or down based on demand ensures cost-efficiency, and the outsourced infrastructure allows the business to focus on its core functions.**

1. **Private Cloud model-**

**Real-world applications like Government agencies, that often handle sensitive data that requires strict control and don’t have a strict financial constraint would mostly make use of a private cloud model.**

**Using this type of model enables high customization and also ensures data security while adhering to all the rules and regulations.**

1. **Hybrid Cloud model-**

**Real-world applications like Healthcare Systems might use a hybrid cloud model.**

**Such a system often needs to balance data security, scalability, and interoperability. A hybrid cloud model allows them to keep sensitive patient data in a private environment while leveraging the scalability and collaboration tools of a public cloud for non-sensitive applications and collaborations with external partners.**