

1.4) Cloud Economics and Benefits

(a) Enlist Cloud Economics and Benefits.

(b) Explain Cloud Economics and Benefits.

Ans.: Cloud Economics and Benefits:

1. The main drivers of cloud computing are economy of scale and simplicity of software delivery and its operation. In fact, the biggest benefit of this phenomenon is financial: the pay-as-you-go model offered by cloud providers.
2. In particular, cloud computing allows:
 - Reducing the capital costs associated to the IT infrastructure
 - Eliminating the depreciation or lifetime costs associated with IT capital assets
 - Replacing software licensing with subscriptions
 - Cutting the maintenance and administrative costs of IT resources

3. Capital cost:

- A capital cost is the cost occurred in purchasing an asset that is useful in the production of goods or the rendering of services.
- Capital costs are one-time expenses that are generally paid up front and that will contribute over the long term to generate profit. The IT infrastructure and the software are capital assets because enterprises require them to conduct their business.
- At present it does not matter whether the principal business of an enterprise is related to IT, because the business will definitely have an IT department that is used to automate many of the activities that are performed within the enterprise: payroll, customer relationship management, enterprise resource planning, tracking and inventory of products, and others. Hence, IT resources constitute a capital cost for any kind of enterprise.
- It is good practice to try to keep capital costs low because they introduce expenses that will generate profit over time; more than that, since they are associated with material things they are subject to depreciation over time, which in the end reduces the profit of the enterprise because such costs are directly subtracted from the enterprise revenues.
- In the case of IT capital costs, the depreciation costs are represented by the loss of value of the hardware over time and the aging of software products that need to be replaced because new features are required.

4. Budget:

- Before cloud computing diffused within the enterprise, the budget spent on IT infrastructure and software constituted a significant expense for medium-sized and large enterprises. Many enterprises own a small or medium-sized datacenter that introduces several operational costs in terms of maintenance, electricity, and cooling.
- Additional operational costs are occurred in maintaining an IT department and an IT support center. Moreover, other costs are triggered by the purchase of potentially expensive software. With cloud computing these costs are significantly reduced or simply disappear according to its penetration.
- One of the advantages introduced by the cloud computing model is that it shifts the capital costs previously allocated to the purchase of hardware and software into operational costs inducted by renting the infrastructure and paying subscriptions for the use of software. These costs can be better controlled according to the business needs and prosperity of the enterprise.

5. Cost Saving:

- The amount of cost savings that cloud computing can introduce within an enterprise is related to the specific scenario in which cloud services are used and how they contribute to generate a profit for the enterprise.
- In the case of a small startup, it is possible to completely leverage the cloud for many aspects, such as: (i) IT infrastructure (ii) Software development (iii) CRM and ERP.

6. Indirect Cost:

- Another important aspect is the elimination of some indirect costs that are generated by IT assets, such as software licensing and support and carbon footprint emissions.
 - With cloud computing, an enterprise uses software applications on a subscription basis, and there is no need for any licensing fee because the software providing the service remains the property of the provider.
 - Leveraging IaaS solutions allows room for datacenter consolidation that in the end could result in a smaller carbon footprint. In some countries such as Australia, the carbon footprint emissions are taxable, so by reducing or completely eliminating such emissions, enterprises can pay less tax.
7. **In terms of the pricing models introduced by cloud computing, we can distinguish three different strategies that are adopted by the providers:**
- Tiered pricing: In this model, cloud services are offered in several tiers, each of which offers a fixed computing specification and SLA at a specific price per unit of time. This model is used by Amazon for pricing the EC2 service, which makes available different server configurations in terms of computing capacity (CPU type and speed, memory) that have different costs per hour.
 - Per-unit pricing: This model is more suitable to cases where the principal source of revenue for the cloud provider is determined in terms of units of specific services, such as data transfer and memory allocation. In this scenario customers can configure their systems more efficiently according to the application needs. This model is used, for example, by GoGrid, which makes customers pay according to RAM/hour units for the servers deployed in the GoGrid cloud.
 - Subscription-based pricing: This is the model used mostly by SaaS providers in which users pay a periodic subscription fee for use of the software or the specific component services that are integrated in their applications.
8. **Maintenance costs:**
- Finally, **maintenance costs** are significantly reduced: by renting the infrastructure and the application services, organizations are no longer responsible for their maintenance.
 - This task is the responsibility of the cloud service provider, who, thanks to economies of scale, can bear the maintenance costs.
9. All of these costs are based on a pay-as-you-go model, which constitutes a more flexible solution for supporting the delivery on demand of IT services. This is what actually makes possible the conversion of IT capital costs into operational costs, since the cost of buying hardware turns into a cost for leasing it and the cost generated by the purchase of software turns into a subscription fee paid for using it.
10. **Benefits:**
- The most evident benefit from the use of cloud computing systems and technologies is the increased economical return due to the reduced maintenance costs and operational costs related to IT software and infrastructure.
 - This is mainly because IT assets, namely software and infrastructure, are turned into utility costs, which are paid for as long as they are used, not paid for up front. Capital costs are costs associated with assets that need to be paid in advance to start a business activity.
 - Before cloud computing, IT infrastructure and software generated capital costs, since they were paid up front so that business start-ups could afford a computing infrastructure, enabling the business activities of the organization.
 - The revenue of the business is then utilized to compensate over time for these costs. Organizations always minimize capital costs, since they are often associated with depreciable values. This is the case of hardware: a server bought today for \$1,000 will have a market value less than its original price when it is eventually replaced by new hardware.
 - To make profit, organizations have to compensate for this depreciation created by time, thus reducing the net gain obtained from revenue. Minimizing capital costs, then, is fundamental.
 - Cloud computing transforms IT infrastructure and software into utilities, thus significantly contributing to increasing a company's net gain.
 - Moreover, cloud computing also provides an opportunity for small organizations and start-ups: these do not need large investments to start their business, but they can comfortably grow with it.