1. **Calculate the overall on-prem cost for the e-commerce architecture. State all the assumptions. You can omit the costs related to the IT staff. – 20 points**

**General Assumptions**

* Prices are in US dollars with assumptions that the enterprise headquarters are in the United States.
* The prices are not the actual equipment market tag but approximated after comparison with different vendors and specifications provided.
* The enterprise will continue to operate in the foreseeable future and equipment investment considerations factors such as durability and reliability.
* Business growth is expected to increase over time and datacenter scalability will be a factor to take into consideration to adopt a deployment that will support that growth.
* The data center is expected to be utilized at full capacity with the assumption that equipment functions optimally.
* **Estimate Cost for User Authentication Layer and API Gateway**
* **3 Instances, each with 4CPU, 8GB RAM, and 512GB HDD.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Description |  | Estimated Cost $ | Total Cost/yr |
|  | Hardware | 3 | 5,000 | 15,000 |
|  | Electricity & Cooling | 2 | 400 | 800 |
|  | Maintenance and Support | 10% | 500 | 1,500 |
|  |  |  |  | **17,300** |

Assumption:

* User authentication servers will each use approximately 450 watts of electricity per year at $0.12/kWh. The estimated cost for cooling the servers is the same as electricity.
* Maintenance and support services include software updating and patching, backup and disaster recovery, security (firewalls, antivirus software, access controls, cyber security), monitoring and performance optimization, documentation etc.
* **Estimate Cost for Backend Server.**
* 10 Servers, each with 8CPU, 32GB RAM, and 512GB SSD.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Description |  | Estimated Cost $ | Total Cost/yr |
|  | Hardware | 10 | 5,000 | 50,000 |
|  | Electricity & Cooling | 2 | 2,000 | 4,000 |
|  | Maintenance and Support | 10% | 500 | 5,000 |
|  |  |  |  | **50,000** |

Assumption:

* Backend servers will each use approximately 200 watts of electricity per hour at $0.12/kWh. The estimated cost for cooling the servers is the same as electricity.
* Maintenance and support services include software updating and patching, backup and disaster recovery, security (firewalls, antivirus software, access controls, cyber security), monitoring and performance optimization, documentation etc.
* **Estimate Cost for File Storage**
* 5 TB.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Description |  | Estimated Cost $ | Total Cost/yr |
|  | Hardware/Chasis | 1 | 5000 | 3,700 |
|  | Storage Drive | 3 | 1730 | 5,190 |
|  | Electricity & Cooling | 2 | 288 | 576 |
|  | Maintenance and Support | 10% | 900 | 900 |
|  | Networking – switches & Cabling | 1 | 5,000 | 5,000 |
|  |  |  |  | **15,366** |

Assumption:

* A File storage server will use approximately 200 kilowatts of electricity per month at $0.12/kWh. The estimated cost for cooling the servers is the same as electricity.
* Maintenance and support services include software updating and patching, backup and disaster recovery, security (firewalls, antivirus software, access controls, cyber security), monitoring and performance optimization, documentation, etc.
* **Estimate Cost for open-source MySQL version 8 Database and Backup**
* Database with 16CPU, 64GB RAM, and 2TB SSD.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Description |  | Estimated Cost $ | Total Cost/yr |
|  | Hardware | 2 | 15,000 | 30,000 |
|  | SQL License |  | 0 | 0 |
|  | Electricity & Cooling | 2 | 300 | 600 |
|  | Maintenance and Support | 10% | 1,500 | 3,000 |
|  |  |  |  | **33,600** |

Assumption:

* User authentication servers will each use approximately 450 watts of electricity annually at $0.12/kWh. The estimated cost for cooling the servers is the same as electricity.
* Maintenance and support services include software updating and patching, backup and disaster recovery, security (firewalls, antivirus software, access controls, cyber security), monitoring and performance optimization, documentation etc.
* **Estimate Cost for Hand-held Devices**
* 50 Hand-held Devices.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Description |  | Estimated Cost $ | Total Cost/yr |
|  | Devices | 50 | 500 | 25,000 |
|  | License | 50 | 100 | 5,000 |
|  | Network Infrastructure (WI-FI) |  |  |  |
|  | Routers, Switches, Cabling | 1 | 5,000 | 5,000 |
|  |  |  |  | **35,000** |

* **Other Related Costs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Description |  | Estimated Cost $ | Total Cost/yr |
|  | Space and Facilities |  |  | 109,872 |
|  | Insurance |  |  |  |
|  | Depreciation and Amortization |  |  |  |
|  | Compliance and Regulation |  |  | 25,726.50 |
|  |  |  |  | **135,598.5** |

Assumption:

* The operations office for the e-commerce business is located in the Seattle area. The average size of a rentable office is approximately $22.89 per square/month for class B office space. The data center occupies approximately 400 square feet.
* Other costs like insurance, depreciation, and amortization of equipment, compliance, and regulatory costs are approximated to be 10% of the data center costs.

|  |  |
| --- | --- |
| **Total Cost per year for On-Prem Infrastructure** | |
| User Authentication Layer and API Gateway | 17,300.00 |
| Backend Server | 50,000.00 |
| File Storage | 15,366.00 |
| Open-source MySQL version 8 Database and Backup | 33,600.00 |
| Hand-held Devices | 35,000.00 |
| Other related Costs | 135,598.50 |
| **TOTAL** | **286,864.50** |

1. **The organization wants to migrate the application to the cloud (Lift and Shift). What risks do you anticipate? – 5 points**

* **Compatibility Issues:**

The on-premises application may have dependencies or configurations that are not fully compatible with the cloud environment leading to compatibility issues with specific operating systems, libraries, frameworks, or third-party software.

* **Performance Issues:**

The performance of the application may not be optimal in the cloud due to differences in network latency, storage performance, or compute capabilities. If the application was not designed with scalability in mind, it may not take full advantage of cloud scalability features. The lift and shift approach moves applications to a totally different environment without any change. As a result, on-premises and legacy projects might have latency or performance issues after migration.

* **Security and Compliance:**

Data security and compliance requirements may differ in the cloud compared to on-premises. Lift and shift can introduce new security threats if the cloud environment is not properly configured or secured. Inadequate security configurations or misconfigured permissions can lead to data breaches or compliance violations.

* **Dependency on Vendor Lock-In:**

Moving the application as-is to a specific cloud provider can create a dependency on that provider's services and technologies making it difficult to switch providers in the future or take advantage of multi-cloud strategies.

* **Training and Talent Gaps:**

IT teams may lack the necessary skills and expertise to effectively manage the application in the cloud environment. Training and upskilling may be required to operate and maintain the application in the cloud.

* **Data Transfer and Bandwidth:**

Moving large amounts of data from on-premises to the cloud can be time-consuming and may incur data transfer costs. Limited bandwidth can affect the speed and efficiency of migration.

* **Cost Management:**

Without optimizing for the cloud environment, organizations may not realize cost savings or may even incur higher costs due to inefficient resource utilization, data transfer, or storage. A lack of understanding of cloud pricing models can lead to unexpected bills.

* **Lack of Cloud-Native Features:**

By simply lifting and shifting, organizations miss out on leveraging cloud-native features and services that could improve efficiency and scalability. Failure to take advantage of features like auto-scaling, managed services, or serverless computing can limit the benefits of the cloud.

* **Data Integrity issues:**

In the process of migration to the cloud, data may be corrupted or lost.

* **Insufficient Testing:**

If applications have not been tested and configured before migration, they run the risk of failing to run after migration. This is not an error with migration, but with a flawed implementation plan.