Problem 2: On-premises TCO

# Hardware Costs (One-time Purchase)

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Qty** | **Estimated Cost (USD)** | **Total (USD)** |
| Physical Servers (enterprise-grade, e.g., Dell/HP) | 4 | $3,000 each | $12,000 |
| Network Switch (Layer 3, VLAN support) | 2 | $300 each | $600 |
| pfSense Firewall Appliances | 2 | $500 each | $1,000 |
| Storage NAS (RAID-5, 10TB usable) | 1 | $2,000 | $2,000 |
| UPS (Power Backup for 24x7 uptime) | 2 | $400 each | $800 |
| Routers (business grade) | 2 | $200 each | $400 |
| Backup Storage (External Disk, 10TB) | 1 | $300 | $300 |

## **Subtotal (Hardware): ~ $17,100 one-time**

# Software Costs (mostly Open Source)

|  |  |  |
| --- | --- | --- |
| **Item** | **Software** | **Estimated Cost (USD)** |
| Operating Systems (Linux, Ubuntu/CentOS) | Free (Open Source) | $0 |
| pfSense Firewall OS | Free (Open Source) | $0 |
| Virtualization Platform (Proxmox, KVM) | Free (Open Source) | $0 |
| Backup Software (Bacula, Restic) | Free (Open Source) | $0 |
| Monitoring Tools (Prometheus + Grafana) | Free (Open Source) | $0 |
| Reverse Proxy (HAProxy, Traefik) | Free (Open Source) | $0 |

## **Subtotal (Software):** **~ $0**

# Network/ISP Costs (Monthly Recurring)

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Qty** | **Estimated Cost (USD/month)** | **Total (USD/month)** |
| Public IP Addresses (2 static IPs) | 2 | $10 each | $20 |
| Internet Connections (Business Line, 2× 100 Mbps Fiber) | 2 | $100 each | $200 |

## Subtotal (Networking): ~ $220/month

# Electricity Costs (Monthly Recurring)

## Power consumption calculation:

* Server power (avg.): ~350W × 4 = 1,400W
* Network devices (firewalls, switches, routers, NAS): ~150W
* **Total** = 1,550W = 1.55kW
* **Monthly Consumption:**
* 1.55kW × 24 hours × 30 days ≈ **1,116 kWh/month**
* **Electricity Rate Assumption:** ~$0.12/kWh
* **Cost:**
* 1,116 × 0.12 = **~$134/month**

## Cost = 576 x 0.12 = ~$134/month

# Maintenance / Labor Costs

|  |  |
| --- | --- |
| **Item** | **Estimated Cost (USD/year)** |
| IT Administrator (part-time, 15h/month) | ~$7,500/year |

Cost ≈ $625/month for basic admin/monitoring/updates.

# Summary

|  |  |  |
| --- | --- | --- |
| **Item** | **One-time (USD)** | **Monthly Recurring (USD)** |
| Hardware Setup | ~$17,100 | - |
| Software (Open Source) | $0 | - |
| Internet + IP | - | ~$220 |
| Power | - | ~$134 |
| Maintenance (Admin Labor) | - | ~$625 |

### First-Year Cost:

* Hardware + (Monthly costs × 12 months)

= $17,100 + (($220 + $134 + $625) × 12)

= $17,100 + ($979 × 12)

= $17,100 + $11,748

= **~$28,848 USD**

### Ongoing Annual Cost (after year 1):

* Only monthly recurring costs

= $979 × 12

= **~$11,748 USD per year**

# Final Output:

|  |  |
| --- | --- |
| **Year** | **Cost** |
| First Year | ~$28,850 USD |
| Every Year After | ~$11,750 USD |

# Notes:

* Highly optimized and reliable architecture using Open Source.
* Good hardware redundancy (extra servers, routers, internet lines).
* Security: pfSense + VPN + VLAN segmentation.
* Public access managed via NAT/Reverse Proxy + Firewall rules.
* Future scaling possible with almost no extra hardware cost.
* Optional: Cloud backup could be added ($50–100/month if needed).