Problem 1: Azure Migration Solution for Our Setup

# Azure Services Mapping

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| **Our System** | **Azure Equivalent** | **Details** |
| **S1 (Linux app + MySQL)** | Azure VM (Linux) + Azure Database for MySQL | Host app on VM; database on Azure MySQL PaaS |
| **S2 (PHP/MySQL Web app)** | Azure App Service (PHP) + Azure Database for MySQL | Fully managed PHP app |
| **S3 (PHP/PostgreSQL Web app)** | Azure App Service (PHP) + Azure Database for PostgreSQL | Fully managed |
| **S4 (Python/Django/SQLite3 App)** | Azure App Service (Python) + Azure Files (for storage) | Use managed app; replace SQLite with Azure Files or small database |
| **S5 (Java Web App)** | Azure App Service (Java) + Azure Database for PostgreSQL | Managed service, highly available |
| **Backup Server** | Azure Backup + Azure Blob Storage | VM + DB backups into Blob |

# System Architecture on Azure

* S1 → Azure VM running the Linux standalone app.
* S2 → Azure App Service (PHP) + Azure MySQL (receives data from S1 via internal Azure VNET).
* S3 → Azure App Service (PHP) + Azure PostgreSQL (local).
* S4 → Azure App Service (Python) + Azure Files for data.
* S5 → Azure App Service (Java) + Azure PostgreSQL (receives from S3/S4).
* Backup → Azure Backup services scheduled weekly (VM snapshots + Database backups).
* All apps exposed securely via Azure Front Door (Global Load Balancer + HTTPS).

# Azure Network Components

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| **Component** | **Purpose** |
| Azure VNET | Private network for all apps and database services |
| Azure Subnets | Separate subnets for App Services, Database, and VMs |
| Azure NSG (Network Security Groups) | Firewall rules between subnets |
| Azure Front Door | Global public access, load balancing, SSL termination |
| Azure Private Link | Secure private connections to DB services |

# Backup and Security Plan

* We can use **Azure Backup** for VM (S1) weekly.
* We can use **Azure Database Backup** (automatic for MySQL/PostgreSQL) daily and weekly snapshots.
* Enabling **Azure Monitoring** (Azure Monitor + Log Analytics) on all resources.
* Enabling **Azure Security Center** (Free tier or Standard).
* We can use **Azure Key Vault** for credentials.
* Configuring **DDoS Protection** via Azure DDoS Basic (free) or Standard (optional).

# Azure Sizing and Pricing Estimation (Ballpark)

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| **Service** | **Type/Size** | **Estimated Cost (Monthly USD)** |
| Azure VM (S1) | Standard B2s (2vCPU, 4GB RAM) | ~$50 |
| Azure App Service (S2, S3, S4, S5) | Standard Plan (per app) | ~$60 × 4 = $240 |
| Azure Database for MySQL (S1/S2) | Basic SKU | ~$30 |
| Azure Database for PostgreSQL (S3/S5) | Basic SKU | ~$30 |
| Azure Blob Storage (Backup) | 500 GB | ~$10 |
| Azure Front Door | Small workload | ~$35 |
| Azure VNET + Networking | Flat cost | ~$10 |

Total Estimated Monthly Cost: ~$405–$450 USD  
*(depends on final storage/traffic usage)*

## Annual Cost (Recurring): ~$4,860–$5,400 USD/year

# Final Summary

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| **Aspect** | **On-Premises** | **Azure Cloud** |
| Capex (Hardware Purchase) | $13,300+ upfront | $0 |
| Opex (Running Cost) | ~$6,900/year | ~$5,000/year |
| Scalability | Medium (hardware limit) | Very High (scale up/down anytime) |
| Redundancy | Manual | Built-in |
| Backup | Manual (Bacula) | Automated (Azure Backup) |
| 24x7 Uptime SLA | Manual Setup | Azure SLA (99.9%+ Built-in) |
| Security | pfSense Firewall | Azure Security Center, NSG, Private Link |
| Maintenance | Manual (IT admin) | Azure Managed Services |

# Final Verdict:

* Migrating to **Azure Cloud** reduces upfront costs.
* Increases reliability, security, scalability, and automation.
* Saves ~**$2,000 per year** compared to on-premises maintenance.
* Easier management via Azure Portal.