Project Requirements: Azure Cloud Migration, Analytics & Advanced Insights

Target Platform: Microsoft Azure

Database: `ecommerce_db`

BI TOOL : POWERBI

1. Azure Cloud Requirements

Objective: Migrate and secure the database on Azure while enabling scalable access

1.1 Azure SQL Database Deployment

- Service Selection: Use Azure SQL Database (General Purpose tier) for managed scalability.
    - Automate deployment using Azure Resource Manager (ARM) templates or Terraform.
- Firewall Rules:
    - Whitelist client IPs via Azure Portal > SQL Server > Networking > Public Access.
    - Enable Allow Azure services and resources to access this server for Power BI integration[3][6].

1.2 Security & Compliance

- Encryption: Enable Transparent Data Encryption (TDE) and enforce TLS 1.2[3].
- DoS Protection: Leverage Azure SQL's built-in DoSGuard for attack mitigation[3].
- Backup & Disaster Recovery:
    - Configure automated backups with 7-day retention and geo-redundancy[4].
    - Set up Auto-Failover Groups for regional redundancy[4].

1.3 Data Migration

- Method: Use Azure Database Migration Service (DMS) for minimal downtime[1][8].
- Validation:
    - Run checksums post-migration to ensure data integrity.

2. SQL Server & SSMS Requirements

2.1 Basic Queries

- Calculate the total sales revenue from all orders.
- List the top 5 best-selling products by quantity sold.
- Identify customers with the highest number of orders.
- Generate an alert for products with stock quantities below 20 units.
- Determine the percentage of orders that used a discount.
- Calculate the average rating for each product.

2.1 Advanced Queries

- Compute the 30-day customer retention rate after their first purchase.
- Recommend products frequently bought together with items in customer wishlists.
- Track inventory turnover trends using a 30-day moving average.
- Identify customers who have purchased every product in a specific category.
- Find pairs of products commonly bought together in the same order.
- Calculate the time taken to deliver orders in days.

2.3 SSMS Connectivity

- Steps:
    1. Install SSMS
    2. Connect using:
        - Server name: `<server-name>.database.windows.net`
        - Authentication: SQL Server Authentication
        - Database: `ecommerce_db.`

3. Power BI Requirements

Objective: Build interactive, real-time dashboards with SSMS integration

3.1 DirectQuery Configuration

- Connection: Use Azure SQL Database connector with DirectQuery for live data
- Authentication: Enable Microsoft Entra SSO for secure access

3.2 Dashboards

- Sales Performance:
    - Visualize monthly revenue, top-selling products, and regional sales.
    - MOM Growth.
- Customer Segmentation.
- products analytics

3.3 Data Modeling

3.3 - Data Cleaning & PreProcessing indeed.
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(Extra Mile) :

4. Advanced Insights & Machine Learning

Objective: Predict trends and automate analysis.

4.1 Automated Data Cleaning

- Tools: Use Mito for spreadsheet-like data cleaning:
- `python`

4.2 Predictive Modeling

- Libraries: `pandas`, `scikit-learn`, `azure-ai-ml`
- Sales Forecasting:
- `python`

4.3 Natural Language Queries

- Tool: Vanna.ai for NLP-to-SQL conversion12:
- `Python`
- `Pandas ai`
- `Mito`
- `yolopandas`

5. Submission & Judging Criteria

Deliverables:

- Cloud Task
- SQL QUERIES
- POWERBI DASHBOARD
- DOCUMENTATION (PDF - PPT)

Judging Criteria:

- Azure (30%)
- SQL QUERIES (20%)
- Dashboard (30%)
- ML innovation (10%)
- Documentation (10%)

Important Project Notes

- Azure Budget Limit:

  Do not exceed the Azure credentials budget of $100 for your entire project.

  - Monitor your Azure spending regularly using the Azure portal's Cost Management tools.
  - Choose the most cost-effective service tiers and scale resources appropriately to avoid unnecessary charges
  - Use serverless or auto-pause features if your database has periods of inactivity to save costs

- Project Deadline:
    - All projects must be finalized and submitted before the deadline.
    - **The Deadline is at 22 May.**
    - Graduation Day is 23 May 2025-ensure your work is complete and submitted well in advance to allow for any last-minute issues
    - Break your project into smaller tasks with internal deadlines to stay on track and avoid last-minute rushes
- Best Practices:
    - Regularly check your Azure resource usage and cost reports in the portal
    - Optimize queries and indexes to minimize resource consumption and costs
    - If you approach the $100 budget, immediately alert your supervisor and scale down or pause non-essential resources.
- Submission:
    - **Late submissions will not be accepted. Plan ahead and leave buffer time for testing and documentation.**

Stay within budget, manage your time, and submit on schedule for successful project completion