**UK Road Safety Dashboard Project Documentation**

**📌 Project Overview**

This project presents a UK Road Safety dashboard developed with Streamlit, using accident data sourced from the UK Department for Transport. The dashboard is hosted on Azure App Service and fetches data from an Azure SQL Database, enabling real-time, interactive analysis of road traffic accidents.

It was created as part of a cloud engineering hackathon, with the goal of building a cost-efficient, scalable, and monitored web-based solution that leverages cloud-native services.

**📂 Dataset**

* **Source**: UK Road Safety (imported to Azure SQL from Kaggle CSV).
* **Table**: Traffic\_Accidents\_2019\_Leeds
* **Data Cleaning**:
  + Filled or removed missing values
  + Converted Accident Date to datetime format using pd.to\_datetime
  + Cast Number of Vehicles to integer using .astype(int)

**⚙️ Tech Stack**

* **Frontend & Logic**: Streamlit (Python framework)
* **Data Processing**: pandas, matplotlib, pyodbc
* **Backend**: Azure SQL Database
* **Hosting**: Azure App Service (Linux, B1 Plan)
* **Monitoring & Cost**: Azure Monitor, Cost Management + Budget Alerts

**🧱 Features**

* ◾ Interactive sidebar filters (date range & vehicle count)
* ◾ Data preview and filtered data view
* ◾ Casualty severity bar chart (Fatal, Serious, Slight)
* ◾ Daily accident trend line chart
* ◾ Map visualisation using OS Grid Reference to Lat/Lon conversion
* ◾ Azure monitoring alerts and budget protection

**🩹 Key Insights**

* Most accidents occurred in dense urban areas, visible through the mapped clusters.
* Serious and slight injuries dominated, with few fatal incidents in 2019.
* Accidents were more frequent during weekdays, as shown in the line chart.
* The majority of incidents involved 2-3 vehicles.

**🧪 Sustainability & Cost Monitoring**

* By using Azure free tier (B1 App Service and Azure SQL Free Plan), infrastructure costs remained below £100/month.
* Auto-scaling was kept off to avoid budget overruns, but instance scale-out settings were reviewed for future scaling.
* Budget alerts set at £100 via Azure Cost Management.
* Health monitoring through Azure Monitor ensured uptime and stability.

**Key Screenshots**

**Dashboard Preview**

**A screenshot of a computer

AI-generated content may be incorrect.**

**Filtered Table View**

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**Azure Cost Analysis**

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AI-generated content may be incorrect.**

**Azure Monitor Alerts**

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**Challenges & Fixes**

|  |  |
| --- | --- |
| **Issue** | **Fix** |
| pyodbc.OperationalError (HYT00 timeout) | Increased Connection Timeout to 30s |
| TypeError comparing 'str' and 'int' | Used .astype(int) to convert number columns |
| Date parsing error | Used dayfirst=True with pd.to\_datetime() |

**🔧 Monitoring & Budget**

* **Azure Monitor Alerts**:
  + CPU usage
  + Response time
  + App Health
* **Smart Detection**:
  + Failure anomalies
* **Budget Configuration**:
  + Budget limit set to £100/month
  + Alerts triggered if budget is reached
* **Scaling**:
  + Set to *manual*, instance count = 1
  + Plan: Basic B1 (1.75 GB RAM, up to 3 instances)

**📂 GitHub Repository**

[UK Road Safety Dashboard Repo](https://github.com/HoreaLazar/cloud_engineering_hackatron)