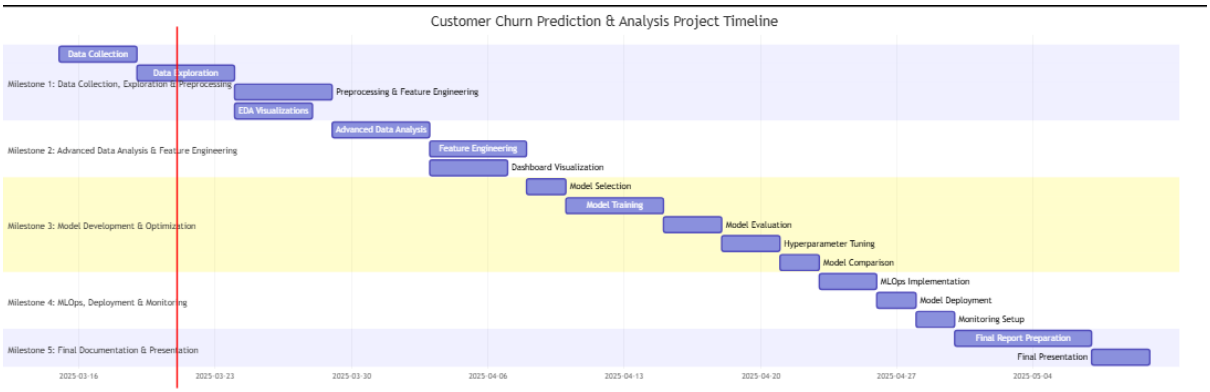
Project Planning & Management

A. Project Proposal

- **Overview:**
  The project focuses on developing a predictive model to identify customers likely to churn. By analyzing customer behavior and historical data, the model will enable strategic retention strategies. This initiative will guide the business in optimizing resources, tailoring marketing efforts, and ultimately improving customer retention rates.
- **Objectives:**
  - **Predictive Accuracy:** Develop a robust model that accurately identifies high-risk customers.
  - **Actionable Insights:** Provide detailed analytics to support targeted retention strategies.
  - **Scalability:** Create an architecture that supports integration into real-time or batch prediction systems.
  - **Business Impact:** Enhance customer retention by providing timely insights for proactive interventions.
- **Scope:**
  The project covers the entire machine learning lifecycle from data collection, exploration, and preprocessing to advanced analysis, model development, deployment, and ongoing monitoring. It also includes the design of an interactive dashboard for real-time insights and stakeholder reporting.

B. Project Plan

- **Timeline & Gantt Chart:**
  Major milestones phases include:



- **Milestones & Deliverables:**
  Each project phase is associated with specific deliverables:
    - **Milestone 1:** EDA Report, Interactive Visualizations, Cleaned Dataset.
    - **Milestone 2:** Data Analysis Report, Enhanced Visualizations, Feature Engineering Summary.
    - **Milestone 3:** Model Evaluation Report, Model Code, Final Model.
    - **Milestone 4:** Deployed Model, MLOps Report, Monitoring Setup.
    - **Milestone 5:** Final Project Report, Final Presentation.
- **Resource Allocation:**
    - **Data Scientists & ML Engineers:** Responsible for EDA, feature engineering, model training, and optimization.
    - **DevOps/MLOps Engineers:** Manage deployment, continuous integration/continuous deployment (CI/CD) pipelines, and monitoring.

C. Task Assignment & Roles

- **Defined Responsibilities:**
    - **Data Collection & Preprocessing Team Members:**
        - Gathers data from external sources (Kaggle, UCI, etc.) or generates synthetic datasets.
        - Performs data cleaning, preprocessing, and initial exploratory analysis.
    - **Data Analysis & Feature Engineering Team Members:**
        - Conducts advanced EDA and statistical tests.
        - Creates new features and selects the most predictive variables.
        - Develops interactive visualizations and dashboards.
    - **Model Development Team Members:**
        - Selects appropriate machine learning models.
        - Implements training, cross-validation, and hyperparameter tuning.
        - Evaluates model performance using key metrics.
    - **MLOps/Deployment Team Members:**

        - Manages model deployment (API/web service) using tools such as Flask, FastAPI, or cloud platforms.
        - Implements monitoring, logging, and retraining pipelines.
    - **Quality Assurance & Documentation Team Members:**
        - Ensures that all deliverables meet the required standards.
        - Prepares final documentation and presentations.

D. Risk Assessment & Mitigation Plan

- **Identified Risks:**
    - **Data Quality & Availability:** Incomplete, noisy, or biased data could impact model performance.
    - **Technical Challenges:** Integration issues with deployment platforms, scalability problems, or performance bottlenecks.
    - **Project Timeline Delays:** Unforeseen challenges in data preprocessing or model optimization could delay milestones.
- **Mitigation Strategies:**
    - **Data Quality:**
        - Implement data cleaning and validation processes.
        - Source data from multiple reliable platforms.
        - Regularly update datasets to reflect the latest trends.
    - **Technical Challenges:**
        - Leverage scalable and well-supported frameworks.
        - Conduct thorough testing (unit, integration, and load testing) prior to deployment.
    - **Timeline Management:**
        - Use agile project management techniques, with regular progress reviews and iterative adjustments.
        - Allocate additional time in the schedule to account for any unexpected delays or disruptions.

E. Key Performance Indicators (KPIs)

- **Project Success Metrics:**
    - **Model Performance:**
        - Accuracy, precision, recall, F1-score, and ROC-AUC of the predictive model.
    - **System Performance:**
        - **Response Time:** Average latency for real-time predictions.
        - **System Uptime:** Availability of the deployed model and supporting services.
    - **User Engagement & Adoption:**
        - **User Adoption Rate:** The number of business units or users actively leveraging the predictive insights.
        - **Feedback and Satisfaction:** Qualitative feedback from stakeholders on the usability and impact of the model.
    - **Business Impact:**
        - **Churn Reduction Rate:** The reduction in churn rate as a direct result of implementing retention measures guided by the model.
        - **Cost Savings/ROI:** Financial impact measured through increased retention and decreased customer acquisition costs.