High Level Design Document

Introduction

This High Level Design (HLD) document outlines the architecture and core components for the **GreenYield - Agriculture Production Insights** project. The purpose of this project is to deliver a Tableau dashboard that visualizes crop yields, farm locations, and seasonal trends using agricultural data, supporting research and business insights.

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1. System Architecture Overview

Architecture Description:
The system consists of three main layers: Data Source, Data Processing, and Visualization. Data is ingested from agricultural datasets, processed and transformed, then visualized in Tableau dashboards.

Module/Component	Role/Responsibility
Data Source	Stores raw agricultural data (yields, locations, dates)
Data Processing Layer	Cleans, transforms, and aggregates data for Tableau
Tableau Dashboard	Visualizes data (maps, time-series, trends)

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2. Component Interactions

Step	Source Component	Target Component	Interaction Description
1	Data Source	Data Processing Layer	Data extraction and initial loading
2	Data Processing Layer	Tableau Dashboard	Processed data published to Tableau for visualization
3	Tableau Dashboard	End Users	Users interact with dashboards for insights

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3. Data Flow Overview

- **Raw Data Ingestion:** Agricultural data (yields, locations, dates) is imported into the Data Processing Layer.
- **Data Transformation:** Data is cleaned, normalized, and aggregated (e.g., by crop, season, location).
- **Data Publishing:** Processed data is published to Tableau as data sources.
- **Visualization:** Tableau dashboards render maps and time-series charts for user exploration.

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4. Technology Stack

Layer/Function	Technology/Tool
Data Storage	CSV, Excel, or Database (e.g., SQL)
Data Processing	Tableau Prep, SQL, or ETL scripts
Visualization	Tableau Desktop/Server
Deployment/Access	Tableau Server/Online

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5. Scalability & Reliability

- **Scalability:** The solution supports additional data sources and larger datasets by leveraging Tableau's data engine and scalable data storage.
- **Reliability:** Data processing includes validation steps to ensure data quality. Tableau dashboards are published to a secure, reliable Tableau Server or Online environment.
- **Security:** Access to dashboards and data is managed via Tableau's user authentication and permissions.

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