Empowering India: Analysing the Evolution of Union Budget Allocations for Sustainable Growth in this topic solution architecture

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Below is a clear, end-to-end Solution Architecture you can use for the topic:

“Empowering India: Analysing the Evolution of Union Budget Allocations for Sustainable Growth”
This architecture is suitable for academic projects, analytics case studies, and BI implementations.
1. High-Level Architecture Overview
The solution follows a layered data analytics architecture:
Data Sources → Ingestion → Storage → Processing → Analytics → Visualization → Decision Support
This ensures scalability, transparency, and future extensibility.
2. Architecture Layers Explained
🔹 A. Data Sources Layer
Collect structured and semi-structured data from multiple origins:
Union Budget documents (PDF, XLS, CSV)
Open Government Data portals from Government of India
Ministry-wise expenditure reports
Economic Survey datasets
Inflation index (CPI/WPI)
Population & GDP datasets
Purpose: Build a comprehensive historical dataset of budget allocations.
🔹 B. Data Ingestion Layer
Tools / Methods:
API connectors
Web scraping scripts
Manual bulk upload
Scheduled batch ingestion
Functions:
Validate formats
Handle missing values
Log ingestion status
Output: Raw datasets stored in staging area.
🔹 C. Data Storage Layer
Storage Types:
Raw Data Lake
Cleaned Relational Data Warehouse
Logical Tables:
Budget_Year
Ministry
Sector
Planned_Allocation
Actual_Expenditure
Growth_Rate
Inflation_Adjusted_Value
Purpose: Centralized, query-optimized repository.
🔹 D. Data Processing & Transformation Layer
Key Operations:

Cleaning & deduplication
Currency normalization
Inflation adjustment
Year-on-year growth calculation
Sector classification mapping
Technologies:
Python / R
SQL
ETL pipelines
Output: Analytics-ready datasets.

- E. Analytics Layer

Core analytical models:
Trend Analysis
CAGR computation
Sectoral Share Analysis
Correlation between budget & GDP growth
Forecasting (time-series)
Purpose: Extract insights about sustainability-oriented spending.

- F. Visualization & BI Layer

Dashboards and reports show:
Ministry-wise allocation trends
Sector growth heatmaps
Sustainable development priority ranking
Budget vs outcome indicators
Tools:
Tableau / Power BI / Looker
Output: Interactive dashboards.

- G. Decision Support Layer

Supports:
Policy recommendations
Scenario simulations
What-if analysis
Budget reallocation strategies
Users:
Policy analysts
Researchers
Students
Economists
3. Logical Architecture Flow (Text Diagram)
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[Data Sources]
    ↓
[Ingestion & Validation]
    ↓
[Raw Data Lake]
    ↓
[ETL & Processing]
    ↓
[Data Warehouse]
    ↓
[Analytics Models]
    ↓
[BI Dashboards]
    ↓
[Policy Insights & Recommendations]
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4. Security & Governance Architecture
Role-based access control
Data encryption (at rest & in transit)

Audit logs
Data quality rules
Version control
5. Non-Functional Requirements
Aspect
Requirement
Scalability
Handle 20+ years of data
Availability
99.5% uptime
Performance
Dashboards load < 5 sec
Accuracy
Automated validation
Maintainability
Modular pipelines
6. Mapping Architecture to Project Objectives
Objective
Architecture Component
Study budget evolution
Data Warehouse
Measure sustainable growth
Analytics Layer
Identify priority sectors
Visualization
Predict future trends
Forecasting models
Support policy decisions
Decision Support
7. Deliverables
Architecture diagram
Data model schema
ETL workflow
Dashboards
Final report with insights
If you want, I can next provide:
✔ Architecture Diagram (block diagram format)
✔ Data Model (ER diagram)
✔ Sample SQL queries
✔ Tableau dashboard layout
✔ PDF-ready documentation
Just tell me which you need first.