Project Design Phase
Solution Architecture

Date	26 June 2025
Team ID	LTVIP2025TMID52193
Project Name	Cosmetic Insights : Navigating Cosmetics Trends and Consumer Insights with Tableau
Maximum Marks	4 Marks

Solution Architecture:

1. User Interface Layer

- Platforms:
    - Web (React.js)
    - Mobile (Flutter or React Native for future expansion)
- Features:
    - Interactive dashboards (embedded Tableau views)
    - Filters for product categories, regions, timeframes
    - User login/profile for saved views and preferences
    - Export/share insights functionality
- Interaction:
- RESTful API calls to backend services for data queries and user management
- Tableau JavaScript API for embedding and interaction

2. Application Layer

- Backend Framework:
    - Node.js / Django (for API orchestration and business logic)
- Microservices:
- Trend Analysis Service: Aggregates and analyzes product and market trends
- Sentiment & Review Service: Processes customer feedback and social media sentiment
- User Management & Authentication: Handles login, roles, and preferences
- Data Aggregation Service: Interfaces with external APIs and internal data sources

3. Data Layer

- Databases:

    - Relational: PostgreSQL for user data, dashboard configurations
    - NoSQL: MongoDB for unstructured data like reviews and social media content
- External APIs:
- Social Media APIs (Instagram, TikTok, Twitter)
- E-commerce APIs (Amazon, Sephora, Nykaa)
- Public datasets (Statista, census data, beauty trend reports)

4. Analytics & Intelligence

- Tools:
    - Tableau for data visualization and dashboarding
- ML Models:
    - Trend forecasting (e.g., ingredient popularity)
    - Customer segmentation and clustering
    - Sentiment analysis using NLP (spaCy, NLTK, or Hugging Face)
- ETL Pipeline:
- Apache Airflow for scheduled data ingestion, transformation, and loading into the warehouse

5. Infrastructure Layer

- Cloud Provider:
    - AWS / Azure / Google Cloud Platform
- Components:
- Load Balancer (AWS ELB / Azure Front Door)
- Auto-scaling groups for microservices
- CDN (Cloudflare or AWS CloudFront)
- CI/CD (GitHub Actions / Jenkins)
- Containerization (Docker + Kubernetes for orchestration)

6. Security & Compliance

- Security Protocols:
    - HTTPS, OAuth 2.0, JWT for secure access
    - IAM roles and RBAC for data access control
    - Data encryption at rest (AES-256) and in transit (TLS 1.2+)
- Compliance:
- GDPR, CCPA, and other regional data privacy regulations

- Audit logging and user consent tracking