Enterprise Data Architecture Blueprint for TrendyThreads

(kappa-like Architecture)

1. Identification and definition of key architectural layers for FashionMart

1.1. List of all critical data sources.

Key data resources	Description	Examples
E-commerce platform data	Capture operational data on customer behavior, product interactions, orders, and transactions from the platform	Clickstream, shopping cart, purchase history, order tracking data from host platform like Shopify
Customer data/CRM	Data from customers' online activities and journey across all online channels' touchpoints.	Registration info, preferences, reviews, loyalty program data.
Inventory data/IMS	Store customer profiles, loyalty program data, financials, and operational data	Real-time stock levels, warehouse data, replenishment triggers
Marketing data	Company digital marketing activities data in-house or from partner platforms.	Email campaigns, paid social ads, affiliate marketing, promotions.
External data	Marketing Intelligence, social media aggregated data, data brokers products.	Weather feeds, competitor pricing, social sentiment, market trends

1.2. Definition of practical applications for the data

Critical use cases	Description
Real-time inventory management	Predict future stock needs based on sales trends and seasonality
Personalized recommendations	Personalized product recommendations for online shoppers using advanced recommender systems and real-time data.
Demand forecasting & S&OP	Align supply chain with predicted demand to optimize stock levels.
Advanced supply chain analytics	Practices and technologies that enable supply chain optimization, anticipatory logistics, procurement strategy improvement, etc.
Customer analytics & segmentation	Track customer behavior, lifetime value, retention, and segmentation
Dynamic pricing & promotion optimization	Use advanced revenue management pricing strategy based on predictive and prescriptive analytics methods and algorithms to personalize prices and CX.
Marketing analytics	Marketing attribution, KPI de
Fraud detection	Use advanced ML algorithms and cloud technology to monitor transactions for potential anomalies and fraud risk alerts and automatic remediation.

1.3. Outline of data compliance standards and regulations.

Data compliance requirements	Tasks
GDPR	- Apply if the company handles the - personal data of EU citizens - Ensure data minimization, lawful processing, and user consent - Provide mechanisms for data access, rectification, and deletion
California Consumer Privacy Act (CCPA)	- Protects data privacy of California residents - Enables users to opt out of data sales and request data access or deletion
Environmental, Social, and Governance (ESG) Regulations	- Monitor and report sustainability data in supply chain operations
ISO 27001	- Implements an Information Security Management System (ISMS) to protect sensitive data
PCI DSS (Payment Card Industry Data Security Standard)	- Build and Maintain a Secure Network - Protect Cardholder Data from unauthorized access, mask and encrypt at rest and in transit. - Maintain a Vulnerability Management Program through - Implement Strong Access Control Measures - Regularly Monitor and Test Networks - Maintain and update Information Security Policies regularly
Other local laws that apply if the customer base extends to those geographic regions.	- Brazil LGPD, UK Data Protection Act, etc.

2. Identification and definition of the core components of the data architecture

2.1. Data sources: identification and categorization.

Data source type	Examples
Internal	ERP/CRM systems, WMS/TMS, POS systems, Online Store data, Order Management System
External	SupplierDB/ APIs, Payment gateways, Social Media platforms APIs, Logistics service providers, Market research platforms, Webscrapping etc.

2.2. Data ingestion: determine methods.

Ingestion method	Description	Examples	Tools
Batch ingestion	Processes data at scheduled intervals	Daily supplier reports	SSIS, Talend, or Python scripts

File-based ingestion	Upload or transfer structured files periodically	CSV/Excel export of customer loyalty data, store transaction logs, supplier invoices	FTP/SFTP, Python ETL scripts
Semi-automated/manual ingestion	Manual entry or low-frequency data capture for legacy systems	Manual customer surveys, in-store adjustments, offline promotional data	Excel imports, Google Sheets integrations, custom scripts
API ingestion (limited)	Pull data from external partners or systems	Supplier inventory APIs, loyalty program integrations, online store orders	REST APIs, Mulesoft, Postman, Python scripts
Real-time ingestion (selective)	Near-real-time updates through streaming where needed	Online store transactions, real-time stock updates,	Kafka, Spark Structured Streaming

2.3. Data storage: define the data storage types.

Storage type	Purpose	Examples
Data Warehouse	Stores structured, analytical data	Snowflake, On-prem SQL Server
Data Lakehouse	Stores both batch and real-time data in an architecture that allows scalable storage and querying.	Amazon s3 + Iceberg, Databricks Delta Lake, etc.

2.4. Data processing: define methods.

Processing method	Description	Examples
ETL/ELT pipelines	Extract, Transform and Load raw data for further analysis.	Kafka, Spark + dbt, Apache Flink, Talend, etc.
Legacy systems data transfers	Eventually move data from an outdated system to another system manually.	External Disks Storage

2.5. Analytics: Identify and report the business intelligence capabilities.

Analytics type	Description	Examples/Use cases	Tools
Descriptive Analytics	Explore, analyze and summarize historical data for reporting	Customer and product segmentation, dashboarding, data analysis and visualization.	Power BI or Tableau dashboards
Predictive analytics	Forecast future trends using statistical models	Demand forecasting, supplier lead time prediction, calculate LTV, churn prediction, Personalized	PowerBI, CRM analytics tools, Redshift/SageMaker, etc.

		marketing, loyalty program optimization	
Prescriptive Analytics	Recommend actions based on data	inventory replenishment strategies, transportation optimization, procurement strategy	Gurobi

2.6. Data governance: define governance tasks.

Governance task	Description	Examples/Tools
Data ownership & stewardship	Define roles and responsibilities for data management	Alation, SAP master Data Governance, etc.
Access policies	Establish guidelines for who can access the data	RBAC and Microsoft Active Directory, physical access control, MFA, Oauth, SSO, etc.
Compliance & audit	Ensure data usage complies with regulations and maintain audit trails	Collibra, EDPB website auditing tool, internal and external periodic audits.
Governance & lineage	Use tools to track data flow and ensure data integrity	Collibra, Oracle Enterprise Data Management etc.

Appendix

TrendyMart EDA Blueprint Diagram