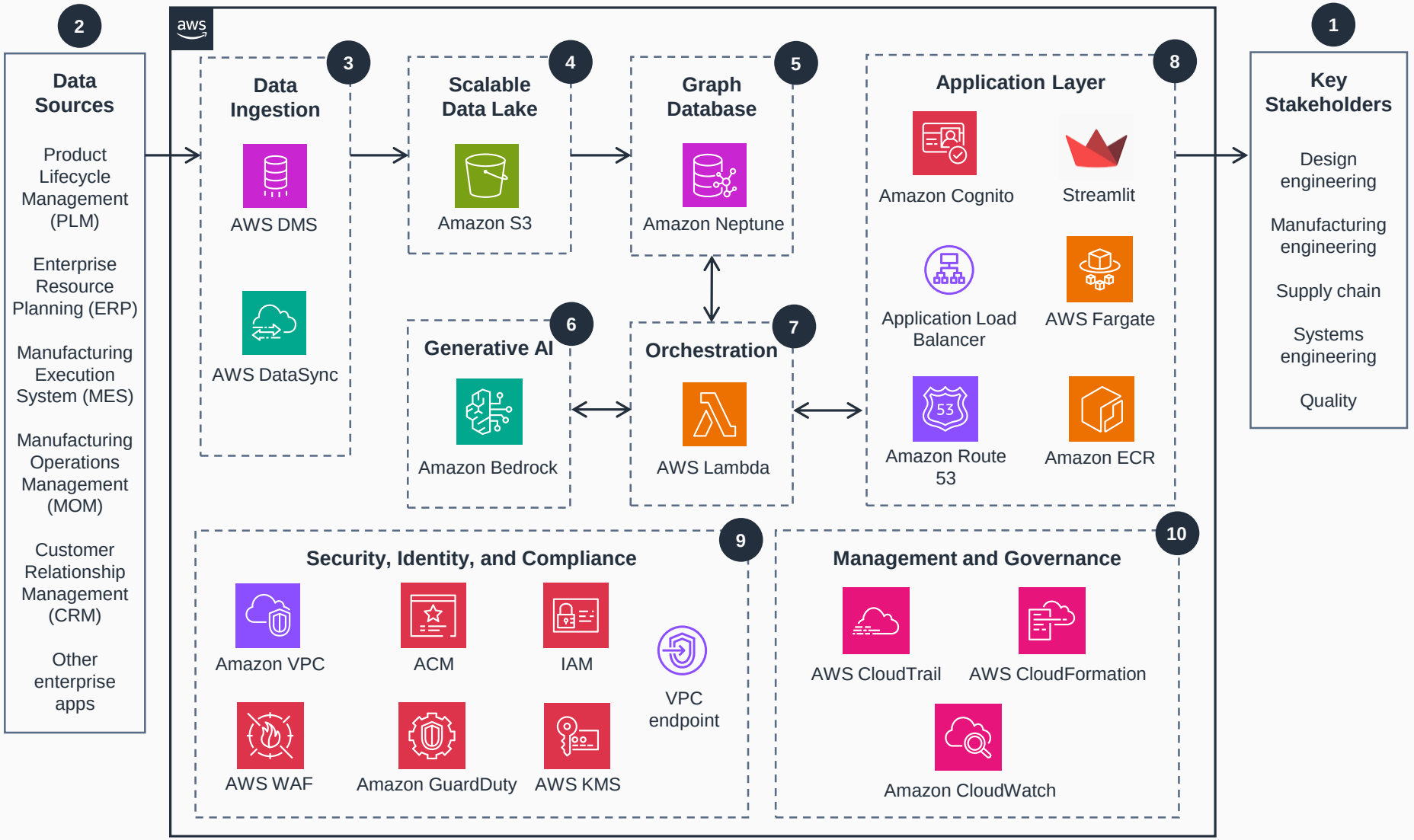
Guidance for Digital Thread Using Graph and Generative AI on AWS

This architecture diagram shows how to use graph and generative AI technology to create a manufacturing digital thread.



1. Identify key stakeholders in the manufacturing organization, and understand the business needs.
2. Identify data sources to build a digital thread using graph and generative AI technologies.
3. Ingest data into AWS using **AWS Database Migration Service (AWS DMS)** for databases and **AWS DataSync** for large datasets.
4. Upload ingested data into **Amazon Simple Storage Service (Amazon S3)** for processing and analysis.
5. Use the **Amazon Neptune Bulk Loader** to ingest the data from **Amazon S3** to **Neptune** graph database.
6. Select a foundation model (FM) from **Amazon Bedrock**, a fully managed service that offers a choice of high-performing FMs from leading AI companies and Amazon through a single API, along with a broad set of capabilities for building generative AI applications.
7. Establish linkage between **Amazon Bedrock** and **Neptune**, and orchestrate the integration with **AWS Lambda** and Langchain. The orchestrator coordinates the process of generating the query from the FM (executing the query against the knowledge graph) and then returns the result in natural language.
8. Create an application layer using Streamlit, **AWS Fargate** for hosting serverless containerized applications, **Amazon Elastic Container Registry (Amazon ECR)** for managing container images, **Elastic Load Balancing (ELB)** for traffic distribution, **Amazon Route 53** for DNS, and **Amazon Cognito** for authentication.
9. Use **Amazon Virtual Private Cloud (Amazon VPC)** to operate the application in a secure, isolated network. **AWS Identity and Access Management (IAM)** enhances access control. **AWS Certificate Manager** manages certificates, and **AWS WAF** supports web application security. **Amazon GuardDuty** monitors for malicious activity. Data at rest is encrypted with **AWS Key Management Service (AWS KMS)** and can be integrated with third-party key management systems.
10. Use **AWS CloudTrail** to track activities, **Amazon CloudWatch** to monitor resources, and **AWS CloudFormation** for automated resource deployment of digital thread application.

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AWS Reference Architecture