Lockheed Martin Bill of Materials Explorer

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Business Need & Project Motivations

1. **Bills of Materials (BOMs)** are foundational to Lockheed Martin's operations—everything from the F-35 to software systems relies on them.
2. **Current BOM storage** in relational databases is rigid, slow, and often unmanageable for deep analysis.
3. There's an **urgent need for advanced analytics** and data science capabilities built on BOM data.
4. The market lacks **mature tools** that leverage graph databases for scalable, intuitive BOM analysis.

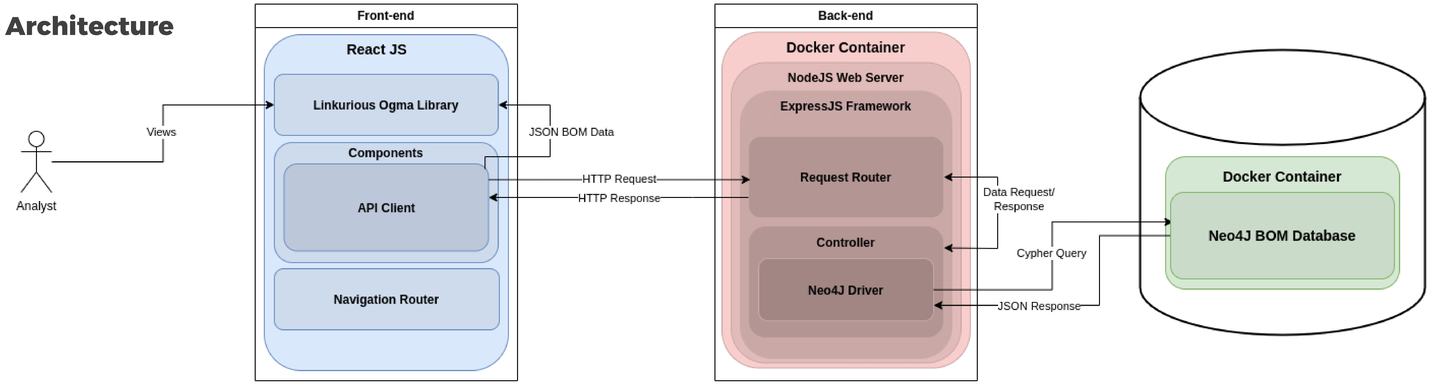
Solution Provided

- Performant, responsive webapp built in React enabling intuitive exploration, comparison, and querying of complex Bill of Materials (BOMs) using graph-based logic. Includes interactive visualization, smart search, and data export features.
- End-to-end ETL pipeline developed to extract relational BOM data from Oracle DBMS, transform it into its parent-child graph relationships, per model batch and load it into Neo4J. Supports scalable ingestion and ensures data integrity for graph analytics.

Next Steps

- Integrate authentication and role-based access control (RBAC) for secure user management using Deadbolt and Traefik.
- Expand ETL support to additional BOM formats such as Software BOMs and other aircraft models.
- Refactor comparison endpoints into a standardized, documented REST API for programmatic access to analytics features.
- Add version control and change-tracking for BOM evolution.
- Deploy Helm chart to OpenShift for enterprise-scale production.

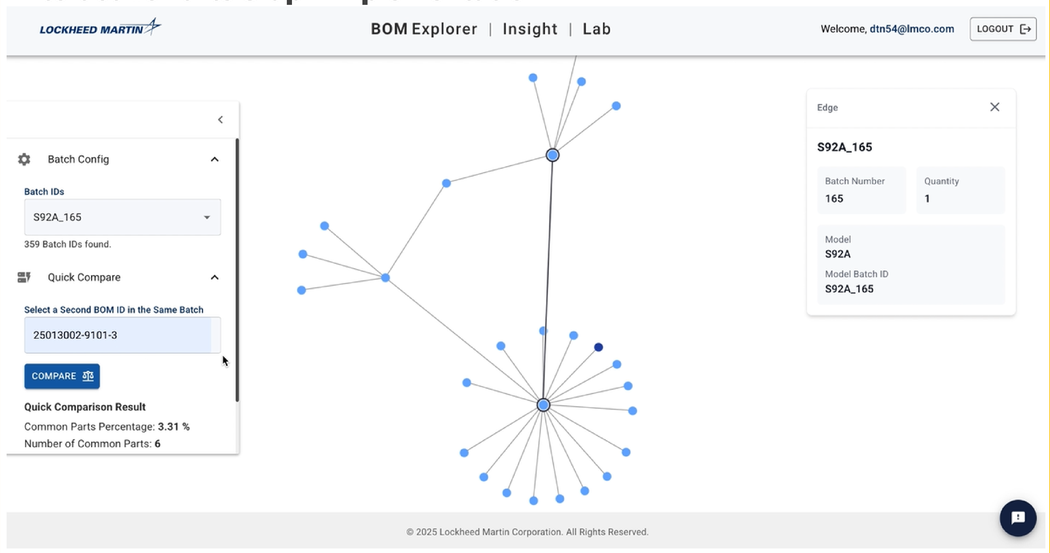
App Architecture



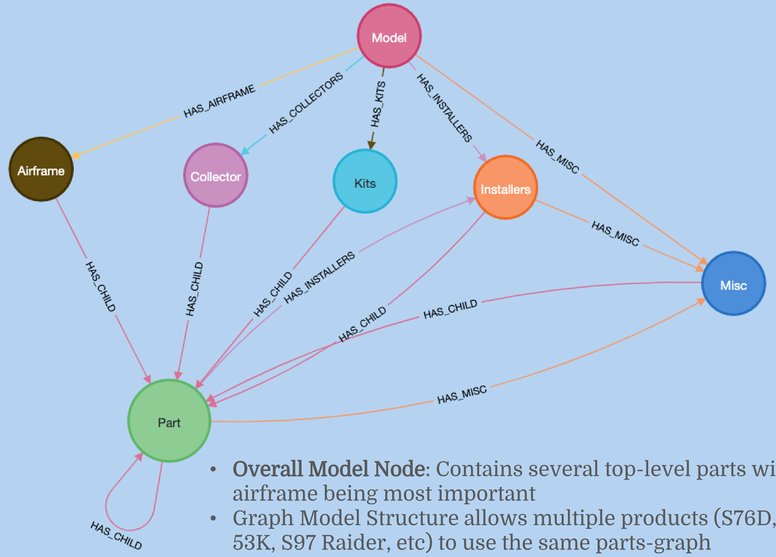
Technology Stack

- Docker
- Express on Node JS
- Neo4J Graph Database
- Linkurious Ogma
- React 18
- Vite
- TypeScript

Interactive Parts Graph Implementation



Neo4J Graph Database Model



- **Overall Model Node**: Contains several top-level parts with airframe being most important
- Graph Model Structure allows multiple products (S76D, CH-53K, S97 Raider, etc) to use the same parts-graph
- All relationships relevant to each model batch are captured in the graph edges along side model dependent data
- All Parts exist as singular node regardless of duplicity in a single or multiple bills of material

Acknowledgements

A special thank you for our stakeholder: Robert King and our project advisor: Hegler Tissot. Without them this product would not be here.