TigerGraph

Customer Success Story

Jaguar Land Rover (JLR)

FOUNDED IN: 2008

LOCATION: UNITED KINGDOM

EMPLOYEES: 40,000+

AREA OF FOCUS: AUTOMOTIVE

Introduction

The automotive supply chain for manufacturing cars is one of the most complex and global in the world, with the average car being made up of around 4,500 parts from a supply base of 30,000 individual parts. Changes in manufacturing processes, consumer demand, economic factors, and new, disruptive trends all impact the vehicle supply chain network for raw materials, parts and finished automobiles. Jaguar Land Rover (JLR) is a global automotive manufacturer and leading technology company with vehicle assembly plants around the world, producing and selling over half a million vehicles in 127 countries.

JLR Production Planning Optimisation for Highly Complex Supply Chains

ACCELERATES SUPPLY CHAIN PLANNING FROM THREE WEEKS TO 45 MINUTES

The Challenge

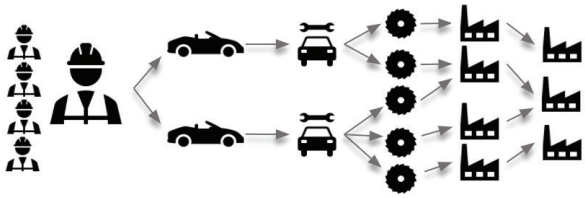
Sales forecasts are typically made years in advance so suppliers can prepare and tool-up highly specialised production lines. From these forecasts, minimum buy volumes of parts are committed with penalties for not meeting the agreed upon volume. Actual demand can vary widely and quickly from the initial forecast due to changes in consumer preferences and market conditions resulting in significant impact to production and margins. JLR needed to perform a timely analysis of the impact of changes to the forecast orders to their supply chain, to reduce supplier charges and disruption.

The data necessary to gain transparency across the manufacturing process is distributed across numerous complex data sources from multiple departments, including forecast and supply chain data, parts data from a PLM system, and car configuration data output by a combination of the car-configuration and build-simulation systems. These systems span a diverse array of technology from dedicated mainframe all the way through to dedicated ERP/MRP platforms and custom distributed car-simulation applications. This diverse combination of data meant it was impossible to query across the data in a timely manner. The COVID-19 Pandemic disrupted the supply chain for the entire automotive industry, further emphasising the need for fast supply chain replanning and optimisation in days or even hours as opposed to weeks.

"With TigerGraph we can join sources of data together and make connections within the data that previously we couldn't. We can now answer questions that, for the last 20 years, we didn't think were possible to ask."

Harry Powell | Director of Data & Analytics **Jaguar Land Rover**

GRAPH ANALYTICS OPPORTUNITIES IN AUTOMOTIVE



Sales Orders	Marketing Feature	Engineering Feature	Parts	Suppliers
Actual or Synthetic	Car configurator maps the complex relationship between features	Master feature dictionary	Map features to versioned parts	Map parts to their local suppliers and upstream to supplier network

BUSINESS VALUE DELIVERED BY GRAPH ANALYTICS WITH TIGERGRAPH

Sales Order Book (SOB) and Build Planning

***Benefit** – Increase Average Profit per Unit and Minimize Aged Inventory*

- **What is the impact** of part shortage on customer orders?
- **How much** can we switch production of one model for another within constraints?
- **What would** be the optimal sales order mix in order to minimize cost and disruption to supply chain and manufacturing?

Parts Supply

***Benefit** – Reduce Emergency Logistics Costs and Overhead*

- **Which parts** are most at risk of shortage after the latest change to the SOB?
- What other sourcing options are available for parts with a predicted shortage?
- Which parts should have their ordering levers (re-order quantities) changed on the basis of SOB scenarios?

Manufacturing Efficiency

***Benefit** – Reduce Line & Role changes, Cost Per Unit & Network Cost*

- **What lines** will be most impacted by the latest change to the SOB?
- **What change** to the schedule would decrease the changes without impacting customer promise-dates ?
- **What optimum** production level should be proposed to enable SOB optimisation?

Supplier Risk

***Benefit** – Reduce Supplier Fines and Disruption*

- **Which orders** are impacted by at-risk/constrained Suppliers?
- **Which high risk** suppliers are critical for production and are not currently prioritised for support?
- **What minimum** and maximum order levels should be set in the contract based on SOB scenarios?

Short-term	Medium-term	Long-term
Answering historic blind spots	Identifying tactical opportunities	Optimisation

"We used the graph to re-sequence how our vehicle orders were to be built in our factory in response to a supplier failure. A process which in the past might have taken days was both modelled and evaluated in less time than it took to write the PowerPoint slide to present the idea."

Harry Powell | Director of Data & Analytics | **Jaguar Land Rover**

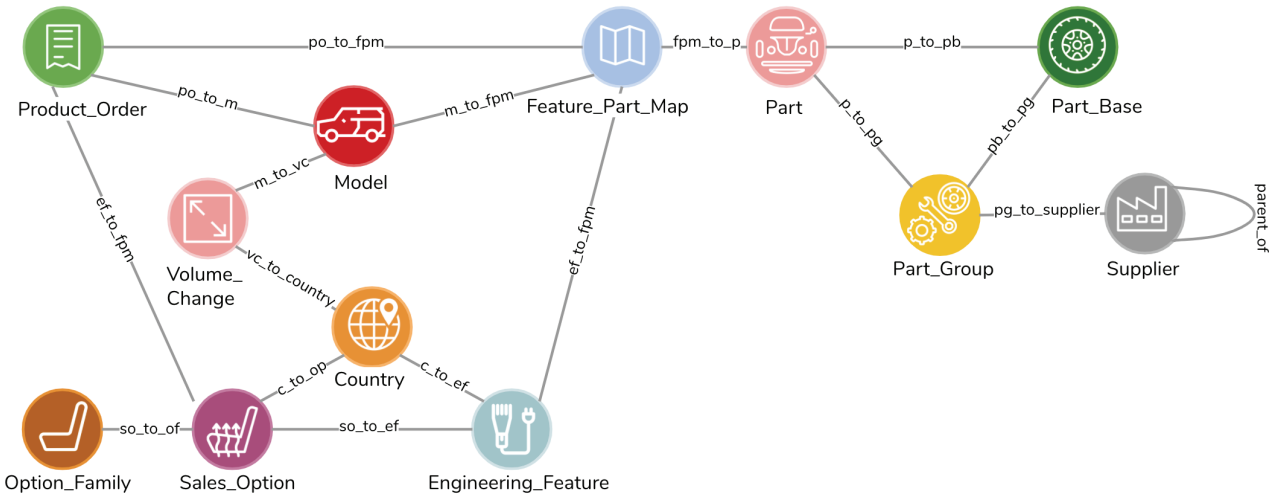
The Solution

Using TigerGraph, JLR was able to combine 12 separate data sources in a graph equivalent to 23 relational tables, spanning the parts supplied by hundreds of suppliers, through the particular model and configurations' bill of materials to the manufacturing build sequencing and order forecast for those cars. Designs to the schema are easily made allowing additional datasets to be added at any time. Data import jobs are generated so the data ETL can be repeated as needed. Graph post-processing adds links between the orders and parts for any build-date, allowing the query that previously never completed [on a cloud data warehouse] to give outputs across JLRs entire order-book in a few minutes. Flexibility of the TigerGraph solution enables JLR to quickly reflect changes in their immediate graph requirements as well as allowing for future expansion.

"We were really impressed with the speed and ease at which TigerGraph was deployed," says Martin Brett, Senior Data Architect, JLR. "Also being reasonably schema-loose allows design changes to be made fairly last minute and provides a highly flexible option that also offers extensibility to add additional datasets as the needs of the graph change over time."

TigerGraph is installed from the **Google Cloud Marketplace**, and directly feeds the output of the queries back into the enterprise data-warehouse powered by **Google BigQuery** so the impact information can be integrated with their existing reporting infrastructure with **Tableau**, producing meaningful, repeatable and sustainable results in a matter of days.

BUILDING A BETTER SUPPLY CHAIN WITH GRAPH ANALYTICS



"TigerGraph was the only solution that was able to execute our highly complex use case at scale. Other solutions we tried could do queries on use cases with quite limited interconnectivity but as soon as that was scaled up, the solution no longer worked."

Martin Brett | Senior Data Architect | **Jaguar Land Rover**

The Results

With TigerGraph, JLR is able to easily and quickly model and evaluate complex processes. Queries across the supply chain model now take around 45 minutes where before they would take weeks, if they were even possible at all. This allows them to benefit from a timely impact analysis of changes in their forecast to their supply chain, minimising and potentially avoiding millions of pounds in charges from their suppliers. Having up-to-date and highly qualified information allows JLR to answer historic blind spots, identify tactical opportunities and optimise their systems and processes.

By identifying a common language to speak to both business and data analytics professionals simultaneously, and constructing a connected view of the business from demand to supply, JLR was able to resolve several key business questions. They reaped the following benefits - see diagram :

- Increased business value from decreasing inventory costs, lower working capital, and greater profitability in two vehicle lines.
- Lower business decision latency due to rapid information discovery and solution delivery amid sudden shifts in demand in the North American market.
- Reduced supplier risk as the supply chain embraced graph data and analytics solutions.

SOURCE: ADAPTED FROM JAGUAR LAND ROVER

Source: Gartner Case Study - Answering Critical Business Questions with Graph Analytics (Jaguar Land Rover), October 28, 2020, Gartner ID G00733557

Resources

- Graph + AI World conference keynote address about accelerating supply chain planning at JLR from 3 weeks to 45 minutes with Graph
- Graph + AI World conference executive roundtable explaining how JLR is adapting to the unprecedented business challenges brought on by Covid-19 by leveraging graph, artificial intelligence and machine learning
- Read the Gartner case study detailing how TigerGraph has delivered 3x business value, reduced supplier risk by 35% and increased decision speed 120x: Answering Critical Business Questions with Graph Analytics (Jaguar Land Rover), October 28, 2020, Gartner ID G00733557 (Link for Gartner subscribers)

Some of Our Customers

- Real-time fraud detection at 7 out of the world's top 10 global banks
- Care path recommendations for 50 million patients
- Personalized offers for 300 million consumers
- Energy infrastructure optimization for 1 billion people

"Once we have everything built in graph, we can react to changes in real-time. Graph is at the centre of everything we do."

Dr. Jay Yu
Distinguished Engineer and Architect,
Intuit

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Harry Powell | Director of Data & Analytics
Jaguar Land Rover

About TigerGraph
TigerGraph is the only scalable graph database for the enterprise. TigerGraph's proven technology connects data silos for deeper, wider and operational analytics at scale. Seven out of the top ten global banks use TigerGraph for real-time fraud detection. Over 50 million patients receive care path recommendations to assist them on their wellness journey. 300 million consumers receive personalized offers with recommendation engines powered by TigerGraph. The energy infrastructure for 1 billion people is optimized by TigerGraph for reducing power outages. TigerGraph's proven technology supports applications such as fraud detection, customer 360, MDM, IoT, AI, and machine learning.

For more information visit www.tigergraph.com and follow us at: Facebook Twitter LinkedIn

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Get Started for Free at Tigergraph.com/Cloud

TigerGraph Cloud graph database as a service is built for agile teams who'd rather be building innovative applications to deliver new insights than managing databases.

Cloud Starter Kits

TigerGraph Cloud Starter Kits are built with sample graph data schema, dataset, and queries focused on specific use cases such as fraud detection, recommendation engine, supply chain analysis and/ or a specific industry such as healthcare, pharmaceutical or financial services.

STARTER KIT	OVERVIEW
COVID-19 ANALYSIS	Detect hubs of infection and track the movements of potential spreaders
CUSTOMER 360-ATTRIBUTION & ENGAGEMENT GRAPH	Create a real-time 360 view of the customer journey for attribution and engagement insights.
CYBERSECURITY THREAT DETECTION-IT	Block cybersecurity threats by detecting interconnected events, devices and people
ENTERPRISE KNOWLEDGE GRAPH (CORPORATE DATA)	Analysis of corporate data including investors and key stakeholders.
ENTERPRISE KNOWLEDGE GRAPH (CRUNCHBASE)	Knowledge graph examples featuring crunchbase data with startups, founders and companies.
ENTITY RESOLUTION (MDM)	Identify, link and merge entities such as customers with analysis of attributes and relationships.
FRAUD & MONEY LAUNDERING DETECTION	Multiple types of fraud and money laundering patterns.
GSQL 101	Introduction to TigerGraphs powerful graph query language.
HEALTHCARE GRAPH (DRUG INTERACTION/ FAERS)	Healthcare example focused on public (FAERS) and private data for pharmaceutical drugs.
HEALTHCARE–REFERRAL NETWORKS, HUB (PAGERANK) & COMMUNITY DETECTION	Analyze member claims to establish referral networks, identify most influential prescriber's and discover the connected prescriber communities.
MACHINE LEARNING & REAL-TIME FRAUD DETECTION	Mobile industry example for detecting fraud in real-time and generating graph-based features for training the machine learning solution.
NETWORK & IT RESOURCE OPTIMIZATION	Network and IT resource graph for modeling and analyzing the impact of the hardware outage on workloads.
RECOMMENDATION ENGINE (MOVIE RECOMMENDATION)	Graph-based movie recommendation engine built with public data.
SOCIAL NETWORK ANALYSIS	Social network example for understanding and analyzing relationships.
SUPPLY CHAIN ANALYSIS	Example covering inventory and impact analysis.