Case Study

eBay

eBay Now Tackles E-commerce Delivery Service Routing with Neo4j

INDUSTRY
e-Commerce

CHALLENGE
Support complex routing queries at scale, with fast & consistent performance

STRATEGY
- Develop a new architecture to meet significant performance and scalability challenges

- Use Neo4j to calculate routes and carriers

SOLUTION
- New database with Neo4j to support complex routing

- SOA with services built using jRuby, Sinatra, MongoDB, and Neo4j

RESULT
- High-speed, scalable platform that streamlines the delivery service

- Flexible schema adaptable to a growing business

Even before its acquisition by global e-commerce leader eBay, London-based Shutl was moving at warp speed. Since its inception in 2009, its mission has been to give people the fastest possible delivery of e-commerce purchases.

From toys, to slippers, ties or iPhones, eBay is now using Shutl's next-generation platform to redefine ecommerce, by making delivery of online and mobile orders quick and convenient. In the process, it eliminates the biggest roadblock between retailers and online shoppers: the option to have your item delivered the same day. Shutl's platform now helps power the "eBay Now" local delivery service that is currently available in four U.S. markets, with plans to expand to 25 major cities in the U.S. and UK by the end of 2014.

Shutl's platform coordinates deliveries between stores, couriers and shoppers on a 24/7 schedule. Dispatching from point-of-sale, the service handles logistics for pickup and delivery based on customer preference — usually within two hours, or within a specified one-hour window scheduled by the customer.

The result is an innovative new service that boosts customer service and productivity for retail and delivery partners. Everyone wins — customers now have delivery options, couriers don't wait, and retail stores are able to provide additional service for their online customers. Shutl "saves the high street" in each city, using local merchant and delivery services, helping them stay competitive.

Volker Pacher, a senior developer for eBay, is part of the core service platform team that provides an API for carriers and merchants. When exponential growth slowed API response times, the team worked to revamp Shutl's early SaaS platform. He knew that a graph database could simplify the domain modelling in a way that woudn't affect the existing structure.

Using Neo4j and a schema-less graph structure, they created a database that allows queries to remain localized within the graph, improving performance with expressive ease. As Volker famously likes to say: "We run our business on seven lines of Cypher."

Challenge

Shutl's same-day delivery service grew exponentially, with coverage expanding to 85% of the UK. Its service platform needed a revamp in order to support the explosive growth in data and new features.

The MySQL joins being used created a code base too slow and complex to maintain. The queries used to select the best courier were simply taking too long and Shutl needed a solution to maintain a competitive service.

Pacher and the development team believed that a graph database could be added to the existing SOA and services structure, to solve the performance and scalability challenges.

The team turned to Neo4j as the best solution.

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>
> *– Volker Pacher,*
> *Senior Developer,*
> *eBay*

Solution

Neo4j was selected for its flexibility, speed and ease of use. Its property graph model harmonized with the domain being modeled. The schema-flexible nature of the database allowed easy extensibility, speeding up development. And it overcame the speed and scalability limitations of the previous solution. Says Volker, "Our Neo4j solution is literally thousands of times faster than the prior MySQL solution, with queries that require 10-100 times less code. At the same time, Neo4j allowed us to add functionality that was previously not possible."

Cypher allowed queries to be expressed in a very compact and intuitive form, speeding development. The team was able to take advantage of existing code, using a Ruby library for Neo4j that also supports Cypher.

eBay Now is able to provide same-day delivery services for customers by using Neo4j to support complex routing queries at scale with fast and consistence performance.

Benefits

The new platform using jRuby, Sinatra, MongoDB and Neo4j delivers fast transactions with relatively constant performance, with a data model that allows queries to remain localized to their respective portions of the graph.

Pacher explains, "We achieved constant query performance by using Neo4j to create a graph that is its own index. That's awesome development flexibility." Implementation completed on schedule in just a year. Queries are now easy and fast. The result is a scalable platform that supports expansion of the business, including the growth it is now experiencing as a platform behind "eBay Now".

Neo4j is an internet-scale, native graph database that leverages connected data to help companies build intelligent applications that meet today's evolving challenges including machine learning and artificial intelligence, fraud detection, real-time recommendations and master data. As the #1 platform for connected data, Neo4j has over three million downloads, the world's largest graph developer community, and over thousands of graph-powered applications in production.

The world's most sophisticated organizations worldwide, from enterprises like Walmart, eBay, UBS, Cisco, HP, adidas and Lufthansa to hot startups like Medium, Musimap and Glowbl, use Neo4j to harness the connections in their data.

Questions about Neo4j?

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