Neptune

Amazon Neptune is a fast, reliable, fully-managed graph database service that makes it easy to build and run applications that work with highly connected datasets. The core of Amazon Neptune is a purpose-built, high-performance graph database engine optimized for storing billions of relationships and querying the graph with milliseconds latency.

When to use graph databases

Graph databases, like Amazon Neptune, are purpose-built to store and navigate relationships. They have advantages over relational databases for use cases like social networking, recommendation engines, and fraud detection, where you need to create relationships between data and quickly query these relationships.

There are a number of challenges to building these types of applications using a relational database. You would need multiple tables with multiple foreign keys. SQL queries to navigate this data would require nested queries and complex joins that quickly become unwieldy, and the queries would not perform well as your data size grows over time.

Neptune uses graph structures such as nodes (data entities), edges (relationships), and properties to represent and store data. The relationships are stored as first order citizens of the data model. This allows data in nodes to be directly linked, dramatically improving the performance of queries that navigate relationships in the data. Neptune's interactive performance at scale effectively enables a broad set of graph use cases.

Use cases

Social Networking

Amazon Neptune can quickly and easily process large sets of user profiles and interactions to build social networking applications. Neptune enables highly interactive graph queries with high throughput to bring social features into

your applications. For example, if you are building a social feed into your application, you can use Neptune to provide results that prioritize showing your users the latest updates from their family, from friends whose updates they 'Like,' and from friends who live close to them.
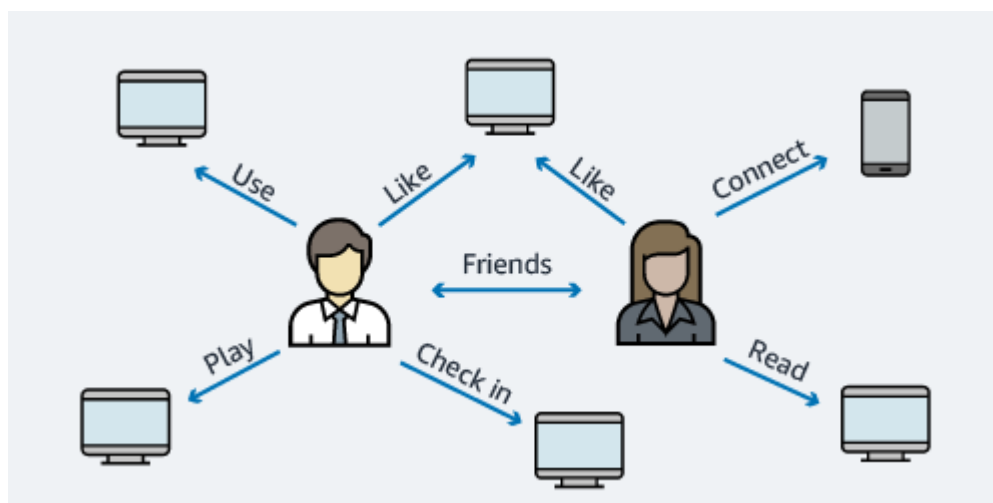
Recommendation Engines

Amazon Neptune allows you to store relationships between information such as customer interests, friends, and purchase history in a graph and quickly query it to make recommendations that are personalized and relevant.

For example, with Neptune you can use a highly available graph database to make product recommendations to a user based on which products are purchased by others who follow the same sport and have similar purchase history. Or, you can identify people that have a friend in common, but don't yet know each other, and make a friendship recommendation.
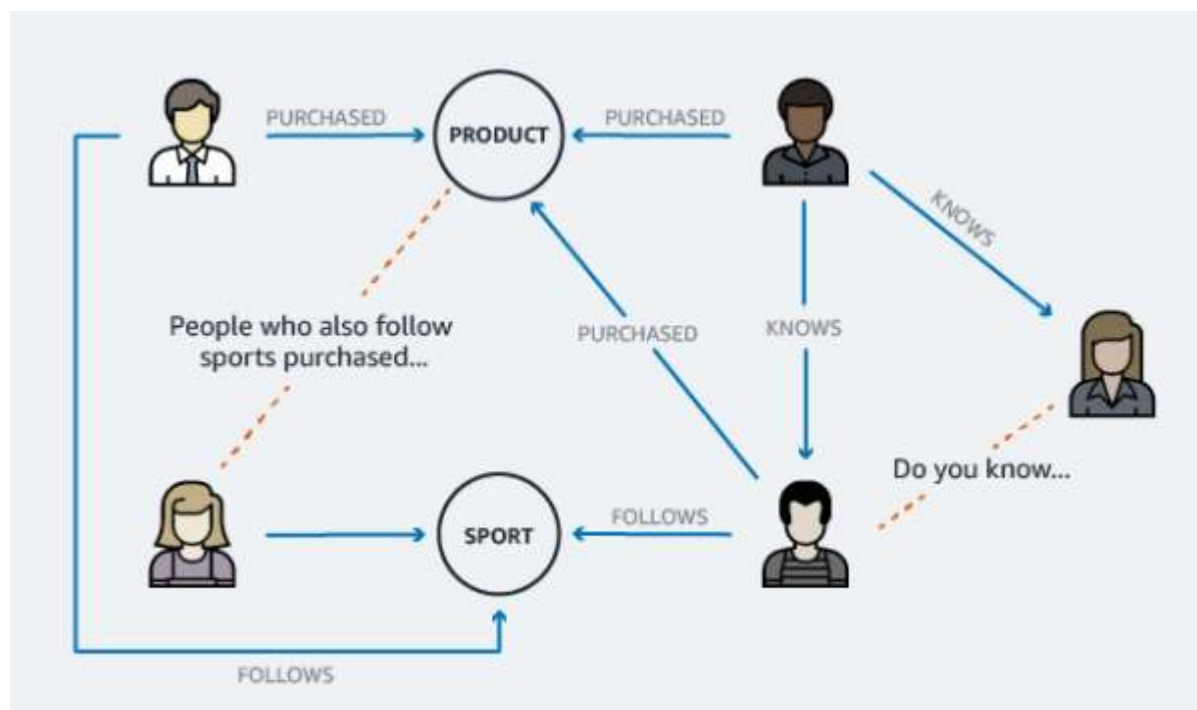
Fraud Detection

With Amazon Neptune, you can use relationships to process financial and purchase transactions in near real time to easily detect fraud patterns. Neptune provides a fully managed service to execute fast graph queries to detect that a potential purchaser is using the same email address and credit card as a known fraud case.

If you are building a retail fraud detection application, Neptune can help you build graph queries to easily detect relationship patterns like multiple people associated with a personal email address, or multiple people sharing the same IP address but residing in different physical addresses.
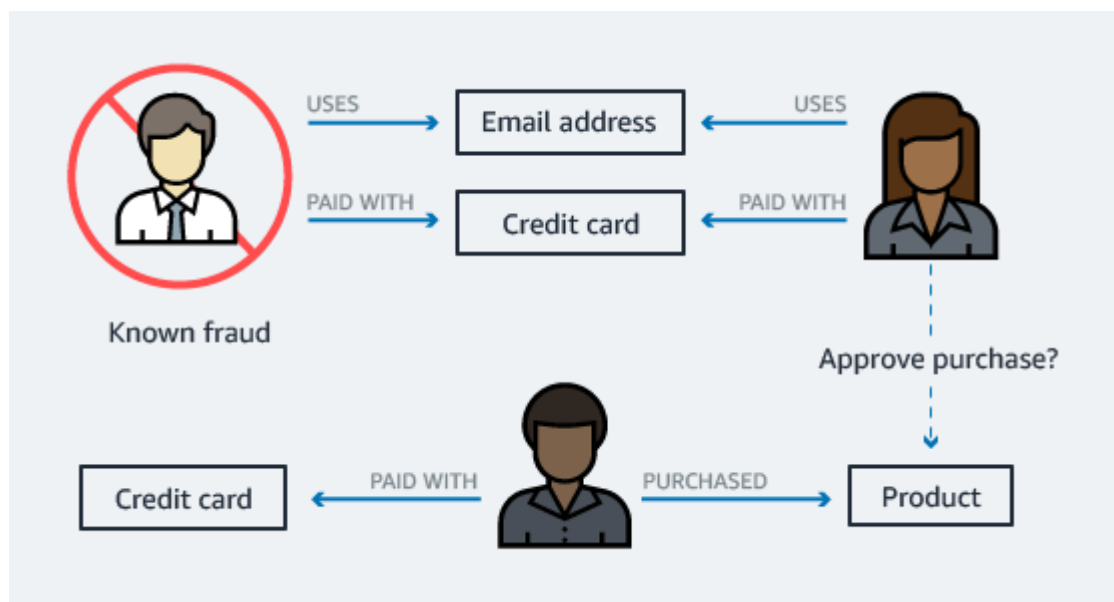

Knowledge Graphs

Amazon Neptune helps you build knowledge graph applications. A knowledge graph allows you to store information in a graph model and use graph queries to enable your users to easily navigate highly connected datasets. Neptune supports open source and open standard APIs to allow you to quickly leverage existing information resources to build your knowledge graphs and host them on a fully managed service.

For example, if a user is interested in The Mona Lisa, you can also help them discover other works of art by Leonardo da Vinci, or other works of art located in The Louvre. Using a knowledge graph, you can add topical information to product catalogs, build and query complex models of

regulatory rules, or model general information.
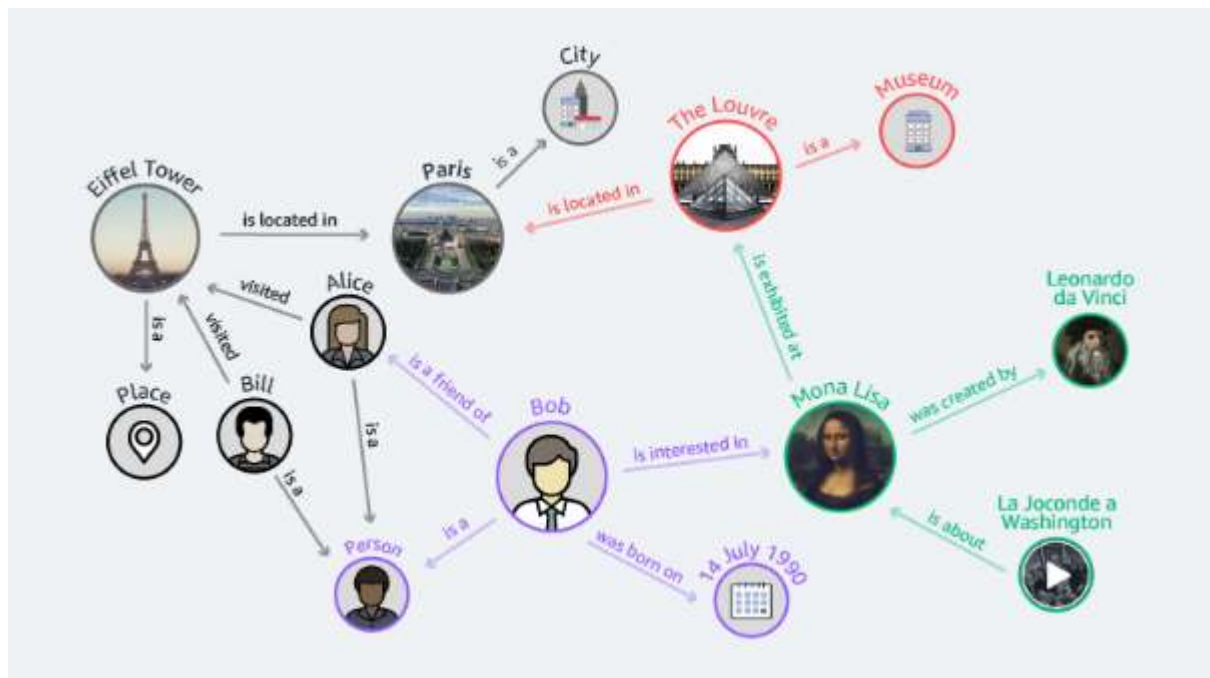
Life Sciences

Amazon Neptune helps you build applications that store and navigate information in the life sciences, and process sensitive data easily using encryption at rest. For example, you can use Neptune to store models of disease and gene interactions, and search for graph patterns within protein pathways to find other genes that may be associated with a disease.

You can model chemical compounds as a graph and query for patterns in molecular structures. Neptune also helps you integrate information to tackle challenges in healthcare and life sciences research. You can use Neptune to create and store data across different systems and topically organize research publications to quickly find relevant information.
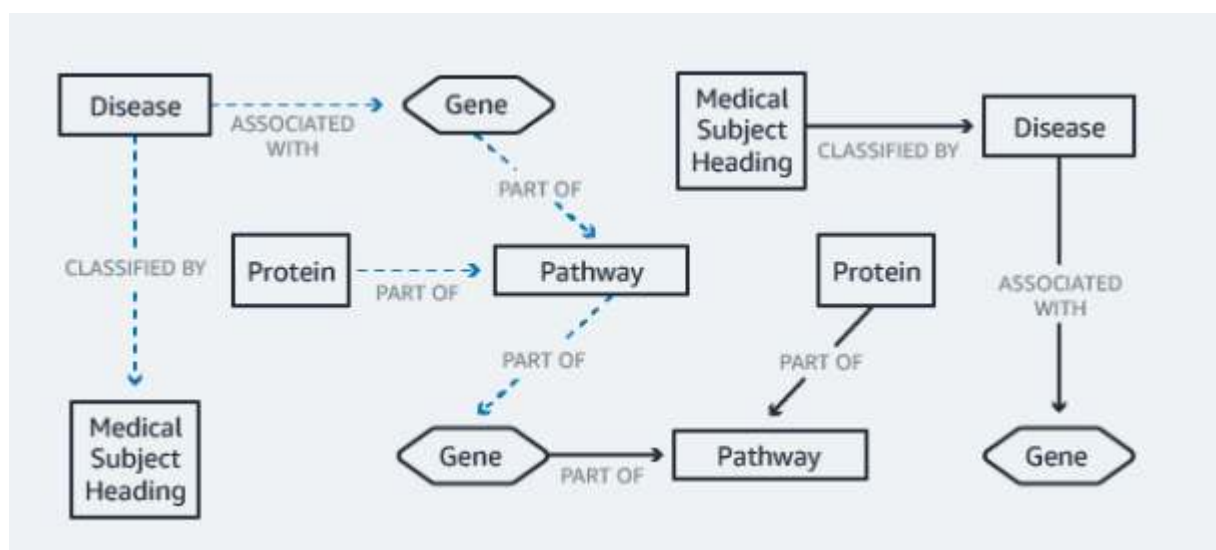
Network / IT Operations

You can use Amazon Neptune to store a graph of your network and use graph queries to answer questions like how many hosts are running a specific application.

Neptune can store and process billions of events to manage and secure your network. If you detect an event that is an anomaly, you can use Neptune to quickly understand how it might affect your network by querying for a graph pattern using the attributes of the event.

You can query Neptune to find other hosts or devices that may be compromised. For example, if you detect a malicious file on a host, Neptune can help you to find the connections between the hosts that spread the malicious file, and enable you to trace it to the original host that downloaded it.