

## Case Study



## Europeanana

## Neo4j Helps Make Millions of European Artworks &amp; Cultural Objects Accessible to All

**INDUSTRY**

Arts &amp; Culture

**USE CASE**

Graph-Based Search

**GOAL**

Provide searchable information about Europe's millions of artworks and cultural objects

**CHALLENGE**

Traditional databases were too unwieldy to store and traverse across such large volumes of connected data

**SOLUTION**

Neo4j presents related data about artefacts that can be quickly and easily explored

**RESULTS**

- Neo4j helps users efficiently search through over 6 million artworks and cultural objects
- Europe's museums, libraries and other institutions are promoted to a global audience

From the Mona Lisa to Mozart's music, information about millions of artworks from across Europe is being showcased online by the Europeanana Foundation. This "connected" data can be readily explored using the Neo4j graph database, helping academics and enthusiasts worldwide to find out more about Europe's rich cultural heritage.

**The Company**

European culture is encapsulated in millions of paintings, books and music recordings that date back centuries – but until recently, the only way to learn about these artifacts was to visit the institution housing them. To remedy this, the European Commission and Europeanana Foundation co-founded Europeanana in 2008 to compile an online database of these works. Since its founding, Europeanana's 60 staff have catalogued more than 53 million cultural objects from museums, libraries, universities and archives from across the European Union, all of which are now available in multiple European languages and searchable globally via a web portal and API.

**The Challenge**

The mission of the Netherlands-based Europeanana Foundation is to "transform the world with culture." To achieve this, the Foundation has encouraged over 3,000 European institutions to provide digital data about all of their artifacts. By gathering this information and making it available online, Europeanana has been able to promote the institutions by making their collections known to enthusiasts and researchers worldwide.

It is art appreciation for the digital age. "We are living in a digitized society," said Europeanana Infrastructure Manager Matt Nader. "Going to a library and reading an old newspaper doesn't happen very often any more. But a digital version, it makes it much closer to you."

Europeanana's team of developers has built databases of structured information for every artifact, which includes the date it was created, by whom, its location and more.

Europeanana also wanted to encourage users to explore the artifacts in-depth by creating connections between related items – like all information about the Mona Lisa, or all works by the same painter or composer. But at this point, the Foundation realized that using traditional databases to house such 'connected' data was impractical.

"Our objective is to make as many connections between the cultural artifacts as possible," said System Architect Yorgos Mamakis. "But we were missing a meaningful way to have a

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– *Yorgos Mamakis*  
System Architect,  
Europeana

'relation' and to go from one object to another via these relations because it was hidden somewhere in the data model. It's so memory-intensive that, considering our number of records, it would result in billions or trillions of triples in a standard semantic repository. And traversing over that or retrieving that sort of information would be extremely slow with standard hardware."

### The Solution

In 2014, Europeana found its answer in Neo4j. "The most obvious solution was Neo4j, a graph database supporting everything we wanted out-of-the-box," said Mamakis. "Neo4j provided the relations traversal and the links we needed in a structured manner."

The database, which was easy to implement – "We did not find it complicated at all to work with Neo4j," Mamakis said – now holds over 6 million (12%) of its 53 million cultural objects and records in Neo4j. Mamakis continued, "We expect that, as the number of artifacts we have increases, more and more will end up in Neo4j so that it becomes one of our core systems."

Through Neo4j, Europeana offers visitors "Similar Items" to encourage them to move between related pieces of information and find out more about artifacts, based on their own interests. For example, searches on Mona Lisa now turn up tens or even hundreds of results. Europeana also offers an "Explore" button and hosts dozens of online "Exhibitions" to encourage further discovery.

Mamakis explained: "Neo4j adds a benefit in the quality of our records and the user experience. It's the fact that the users get another way of browsing through the data. Now you don't just retrieve the object, but also the family of objects that is closely related to that – so you have another entry point to access new objects and potentially find more information about what you are interested in."

### The Results

Europeana is a success: It regularly attracts around 250,000 online visitors and 1 million page views every month. Its Neo4j-based approach to making data easily accessible and searchable was also an instant hit with the institutions providing the information.

Nader said: "I think the advantage of having the Neo4j graph database is a huge step. We can find our objects very fast. Going step-by-step in a traditional relational database, the application would become very heavy, response time would be slow. Neo4j is responding very fast."

Mamakis concluded: "We are really happy that we made the decision to use Neo4j. It most certainly fits our purpose 100%."

Neo Technology is the creator of Neo4j, world's leading graph database. Neo4j is a highly scalable native graph database that leverages data relationships as first-class entities to help companies build intelligent applications that meet today's evolving connected data challenges including fraud detection, real-time recommendations, master data management, network security and IT operations.

Enterprises like Walmart, UBS, Cisco, HP, adidas and Lufthansa and hot startups like Medium, Musimap and Glowbl rely on Neo4j to harness the connections in their data.

Questions about Neo4j?

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