

CASE STUDY



Musimap

Musimap indexes over 50 million music tracks and offer in-depth recommendations in real time

INDUSTRY

Music

USE CASE

Real-Time Recommendations

GOAL

To create the most exhaustive database possible of music tracks

CHALLENGE

To be able to map all the music titles with 55 weighted description criteria per track to allow the most in-depth processing and recommendations possible.

SOLUTION

Use Neo4j on account of its capacity to manage complex databases with unlimited numbers of entries and to offer recommendations in real time.

RESULTS

- Processing and search times reduced more than tenfold
- System availability 24/7

A platform of cognitive technologies applied to music, Musimap offers innovative technology based on Neo4j enabling it to index all music titles in the world catalogue. It offers users a high degree of personalised recommendation and help with creating music, all in real time.

The Company

A Belgian company created in 2014, Musimap has created a database with almost 3 billion information items connecting 50 million titles composed by more than 5 million artists in a "musical neural network". Its architecture, based on Neo4j, provides any company that has music in its offering (streamers, radios, connected objects, labels, editors, AV professionals, etc.) with a humanised algorithm in the form of an in-depth, real-time personalised search and recommendation engine to create playlists adapted to the company's needs and those of its clients.

The Challenge

The man behind the project, Dr Pierre Lebecque, a sociology and musicology researcher, was convinced that you could only compose music if you had first listened to it, and that musical culture was the result of relations interweaving different musical references. On this basis, he decided to create a database that acted as a census of all the titles in the world catalogue (published songs). For each of these entries, Musimap allocates 55 weighted description criteria, which then enable it to carry out in-depth searches and to recommend titles depending on complex searches.

On its initial attempt to build a solution based on standard SQL databases, the Musimap team ran into performance problems once the database had reached over a million titles. They also needed to be able to depict the entire catalogue in the form of graphs.

It is therefore only natural that Musimap got interested in graph databases in general and in Neo4j in particular.

The Strategy

Pierre Lebecque's original idea was that each artist and each track would be linked in an equation and in a relationship of influence.

Pierre Lebecque explains: "If we take James Brown, for example, we can identify that his influences were gospel, the sermons of a preacher, soul, a binary African rhythm...and all these influences have produced a movement: funk. As the range of rhythms or emotions is limited, it is therefore perfectly possible to mathematically formalise each title, and from this, to map any musical production within a network of interwoven influences."

What makes the Musimap project so intelligent is particularly its capacity to create a musical lexicology and to be able to weight that lexicology – enabling each descriptor to be defined in relation to other chosen words. Therefore we can qualify certain tracks as "rock with a touch of reggae".

The aim was for Musimap to decode the DNA of music in order to be as exhaustive as possible in its description of titles and then enable complex searches with a real-time processing time.

The Solution

In 2013, having quickly ruled out MySQL or PHP/Flash databases for reasons of performance, Musimap discovered graph databases, and in particular Neo4j, as being the only options that were capable of responding to the company's requirements.

By using Neo4j, the Musimap team quickly grasped the wide range of possibilities offered by the solution (ease of use and configuration, reduced processing time and time to respond to queries, etc.). It took advantage of being able to import its database to totally personalise it, and transform it into a very specific database with added search criteria. Musimap also used this phase to create a new API that enabled it to quickly and easily transfer its data.

CASE STUDY



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– Pierre Lebecque,
Musicology researcher and the creator
of the Musimap project

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– Frédéric Notet,
Co-founder and Chief Technical Officer
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Frédéric Notet, co-founder and chief technical officer of Musimap, is happy with the choice of Neo4j: "When it came to importing our database, Neo4j perfectly met our requirements. We created a script on SQL which called up the Neo4j API. And then Neo4j did the rest, by integrating the whole of our database."

Having started out with Neo4j version 2.2, Musimap then migrated to 2.3 in order to carry out even more in-depth searches than before.

With its technology now ready for market, Musimap opted for a business model following two areas of work with this basis:

- **The creation of a recommendation algorithm:** used by companies to create playlists ad hoc and to categorise their catalogues
- **Assistance with creating film music:** aimed at AV professionals, particularly music supervisors, Musimap enables them to select the track that perfectly illustrate the film they are working on.

Thanks to Neo4j and its flexibility of use and configuration, Musimap was able to define an advanced search mode based on all the criteria (rhythm, instrumentation, 400 complex moods, 100 listening contexts, etc.) and a mode based on recommendations controlling the nuances of emotions, relationships and influences, allowing users to be able to search for a title that resembles Michael Jackson's Thriller, but is happier, for example.

The Results

The initial improvements provided by Neo4j can be measured in terms of processing time.

Indeed, with the previous SQL version, not only was the database limited to one million titles, but the processing times were extremely long too. With Neo4j, Musimap no longer has any limits placed on the size of its database, while search times are getting closer to real time. There is no longer any need to synchronise tables; with Neo4j the solution crosses from node to node, producing a result that is ten times faster than the previous system, even for complex searches. Similarly, when Musimap wishes to add new tracks or to modify certain tracks, Neo4j enables it to reduce the time previously required by ten.

Another, no less important, advantage is the high availability of the solution. The database is designed in such a way that Musimap does not just have the one write master as it is the case in a model based on SQL. The Neo4j architecture is developed in Java and also contains a master. However, in the event of unavailability, it can be replaced by re-electing a master from among the "slaves". Thus if ever one of the slaves fails, the others can automatically take over. The application is therefore available all the time.

Frédéric Notet concludes: "Finally, the teams at Neo4j are totally open and it is really pleasant to find that our new development ideas are always well received. I can't think of another relationship that is as fluid with the development teams."

Neo4j is the leader in graph database technology. As the world's most widely deployed graph database, we help global brands – including [Comcast](#), [NASA](#), [UBS](#), and [Volvo Cars](#) – to reveal and predict how people, processes and systems are interrelated.

Using this relationships-first approach, applications built with Neo4j tackle connected data challenges such as [analytics and artificial intelligence](#), [fraud detection](#), [real-time recommendations](#), and [knowledge graphs](#). Find out more at [neo4j.com](#).

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