



# Visual Design of GraphQL Data

A Practical Introduction with  
Legacy Data and Neo4j

---

Thomas Frisendal

Apress®

# **Visual Design of GraphQL Data**

**A Practical Introduction with  
Legacy Data and Neo4j**

**Thomas Frisendal**

**Apress®**

# ***Visual Design of GraphQL Data: A Practical Introduction with Legacy Data and Neo4j***

Thomas Frisendal  
Copenhagen S, Denmark

ISBN-13 (pbk): 978-1-4842-3903-2

ISBN-13 (electronic): 978-1-4842-3904-9

<https://doi.org/10.1007/978-1-4842-3904-9>

Library of Congress Control Number: 2018956408

Copyright © 2018 by Thomas Frisendal

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

Trademarked names, logos, and images may appear in this book. Rather than use a trademark symbol with every occurrence of a trademarked name, logo, or image we use the names, logos, and images only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Managing Director, Apress Media LLC: Welmoed Spahr

Acquisitions Editor: Steve Anglin

Development Editor: Matthew Moodie

Coordinating Editor: Mark Powers

Cover designed by eStudioCalamar

Cover image designed by Freepik ([www.freepik.com](http://www.freepik.com))

Distributed to the book trade worldwide by Springer Science+Business Media New York, 233 Spring Street, 6th Floor, New York, NY 10013. Phone 1-800-SPRINGER, fax (201) 348-4505, e-mail [orders-ny@springer-sbm.com](mailto:orders-ny@springer-sbm.com), or visit [www.springeronline.com](http://www.springeronline.com). Apress Media, LLC is a California LLC and the sole member (owner) is Springer Science + Business Media Finance Inc (SSBM Finance Inc). SSBM Finance Inc is a **Delaware** corporation.

For information on translations, please e-mail [editorial@apress.com](mailto:editorial@apress.com); for reprint, paperback, or audio rights, please email [bookpermissions@springernature.com](mailto:bookpermissions@springernature.com).

Apress titles may be purchased in bulk for academic, corporate, or promotional use. eBook versions and licenses are also available for most titles. For more information, reference our Print and eBook Bulk Sales web page at <http://www.apress.com/bulk-sales>.

Any source code or other supplementary material referenced by the author in this book is available to readers on GitHub via the book's product page, located at [www.apress.com/9781484239032](http://www.apress.com/9781484239032). For more detailed information, please visit <http://www.apress.com/source-code>.

Printed on acid-free paper

*My wonderful wife, Ellen-Margrethe Soelberg,  
has again experienced a period of having an author  
in the house, yet she has at the same time undertaken  
the proof-reading job in her usual, professional manner.  
Thank You!.*

# Table of Contents

<b>About the Author .....</b>	<b>ix</b>
<b>About the Technical Reviewer .....</b>	<b>xi</b>
<b>Acknowledgments .....</b>	<b>xiii</b>
<b>Introduction .....</b>	<b>xv</b>
 <b>Chapter 1: Visual Design of GraphQL Data .....</b>	 <b>1</b>
What Is GraphQL and Why Is Design Important? .....	1
Issues with Defining Data Structures in GraphQL .....	4
Issues with Data Content in GraphQL .....	5
 <b>Chapter 2: GraphQL Concepts .....</b>	 <b>7</b>
 <b>Chapter 3: Getting Started .....</b>	 <b>13</b>
Which Design Levels? .....	13
Getting an Overview .....	14
 <b>Chapter 4: An Email Example .....</b>	 <b>19</b>
 <b>Chapter 5: Business Meaning .....</b>	 <b>27</b>
Data Names in the API Matter .....	27
Finding Standard Data Structures .....	30
Establishing Identity and Uniqueness .....	31

TABLE OF CONTENTS

**Chapter 6: Presenting the Business Flow .....35**

    Presenting the Keys .....35

    Presenting State Changes.....37

    Presenting Versions of Data .....38

**Chapter 7: Content Matters .....39**

    Housekeeping Proper.....39

    Scalar Data Types.....40

    Presenting Dates and Times .....40

    Using Custom Schema Directives .....41

    Design Is Decisions.....43

**Chapter 8: Getting the Structure Right .....45**

    Which Objects and Which Relationships? .....45

    GraphQL Schema Stitching, Making a Patchwork.....46

    Presenting Relationships and Missing References.....48

    Presenting the Right Level of Detail.....50

    Good Relationships .....56

**Chapter 9: From Graph to Trees .....61**

    Structure Design at the API Level .....61

    Positioning the Graph for Generation of Trees.....63

**Chapter 10: Resolving Legacy SQL Data Issues.....69**

    Data Names .....71

    Identity, Uniqueness, and Keys.....72

    States, Versions, and Housekeeping .....74

    Scalar Data Types.....75

    Date and Time.....76

    Naming Relationships .....76

Relationship Types .....	77
One-to-One Relationships .....	77
One/Zero to Zero/Many Relationships .....	77
Self References .....	77
Many-to-Many Relationships .....	78
Missing Information .....	80
Properties on Relationships .....	80
<b>Chapter 11: Using GraphQL with an Existing Graph Database.....</b>	<b>81</b>
The Neo4j GraphQL Plugin .....	82
Generating Your First GraphQL Schema .....	83
Data Names .....	86
Identity, Uniqueness, and Keys.....	86
States, Versions, and Housekeeping .....	86
Scalar Data Types.....	87
Date and Time .....	87
Naming Relationships .....	88
Relationship Types .....	89
Missing Information .....	90
Properties on Relationships .....	91
<b>Chapter 12: Using GraphQL with a New Graph Database.....</b>	<b>93</b>
Design Goals of the Neo4j-GraphQL Integration .....	93
Problem 1: Schema Duplication .....	95
Problem 2: Server/Client Data Mismatch .....	95
Problem 3: Superfluous Database Calls .....	96
Problem 4: Poor Performance.....	97
Problem 5: Boilerplate Overdose .....	98

TABLE OF CONTENTS

Generating Your Neo4j Database from the GraphQL Schema .....99

Neo4j-GraphQL Resources ..... 104

**Afterword: Summary .....107**

**Index.....109**



# About the Author



**Thomas Frisendal** is an experienced database consultant with more than 30 years on the IT vendor side and as an independent consultant. He has worked with databases and data modeling since the late 70s; since 1995 primarily on data warehouse projects. He has a strong urge to visualize everything as graphs - even datamodels! He excels in the art of turning data into information and knowledge.

His approach to information-driven analysis and design is “New Nordic” in the sense that it represents the traditional Nordic values such as superior quality, functionality, reliability and innovation by new ways of communicating the structure and meaning of the business context.

He lives in Copenhagen, Denmark. His firm, TF Informatik, was founded in 1995 and is registered in Denmark (DK66048950). He is on LinkedIn and Twitter [@VizDataModeler](https://twitter.com/VizDataModeler)<sup>1</sup>. Thomas is an active writer and speaker.

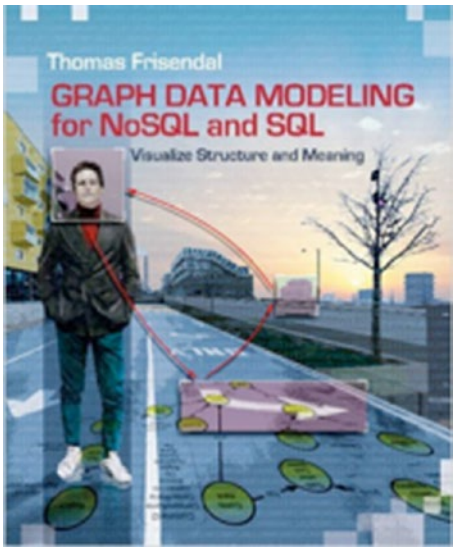
His recent book about [Graph Data Modeling](https://technicspub.com/graph-data-modeling/)<sup>2</sup> has a lot of background and in-depth guidance on most of what has been presented in this book. It proposes property graph modeling as a general modeling paradigm. It has many examples from many contexts.

---

<sup>1</sup><https://twitter.com/VizDataModeler>

<sup>2</sup><https://technicspub.com/graph-data-modeling/>

ABOUT THE AUTHOR



*Figure 1. Graph Data Modeling*

# About the Technical Reviewer

**Ahmed Mohammed** is an experienced full stack Java/Angular Developer. He is skilled in Java, JavaScript, CI/CD, Spring Boot, GraphQL, GraphQL Apollo, Linux, Microservices in Cloud, and Angular 2/5. He has an MSc and BSc of Information Technology focused in Web Technologies.

# Acknowledgments

Named relationships is one of the fundamental recommendations of this book. The importance of this was made originally by Prof. Joseph D. Novak, who was one of the fathers of Concept Mapping in the development of the psychology of learning.

GraphQL is designed by Facebook, Copyright © 2015-2016. It is now an open source project, where the software is available under a BSD 3 license. Refer to [www.graphQL.org](http://www.graphQL.org)<sup>1</sup> for more information.

The GraphQL @relation schema directive originated at Graphcool, refer to [www.graph.cool](http://www.graph.cool)<sup>2</sup> for more information.

The chapter about using GraphQL with a new graph database draws heavily on a blogpost [Five Common GraphQL Problems and How Neo4j-GraphQL Aims To Solve Them](https://blog.grandstack.io/five-common-graphql-problems-and-how-neo4j-graphql-aims-to-solve-them-e9a8999c8d43)<sup>3</sup> written by Will Lyon of Neo4j<sup>4</sup>. I am quoting from it with the author's kind permission. Thank you!

---

<sup>1</sup><http://www.graphQL.org>

<sup>2</sup><http://www.graph.cool>

<sup>3</sup><https://blog.grandstack.io/five-common-graphql-problems-and-how-neo4j-graphql-aims-to-solve-them-e9a8999c8d43>

<sup>4</sup><https://neo4j.com>