Defining and Using One-to-One Relationships

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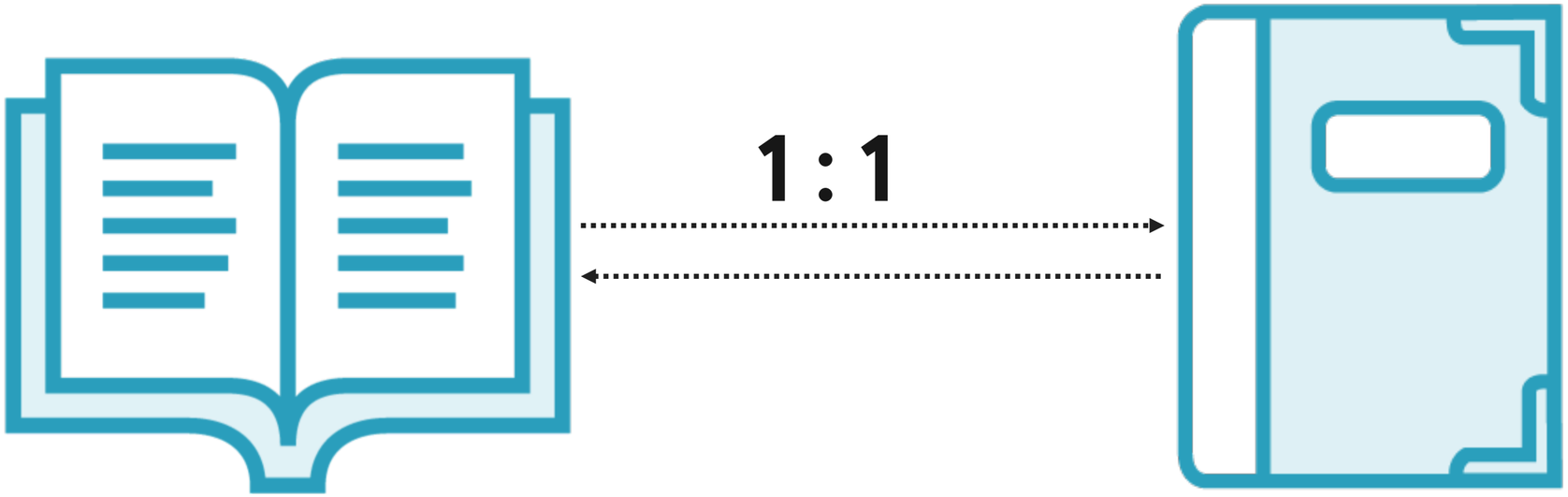
Overview

- Understand how EF Core sees 1:1
- Add 1:1 between book and cover
- Migrate and fix seed data in database
- Explore querying
- Traverse our bigger picture graph
- Adding, updating, deleting
- Understand possible side effects of default FK constraints

Understanding How EF Core Discovers One-to-One Relationships

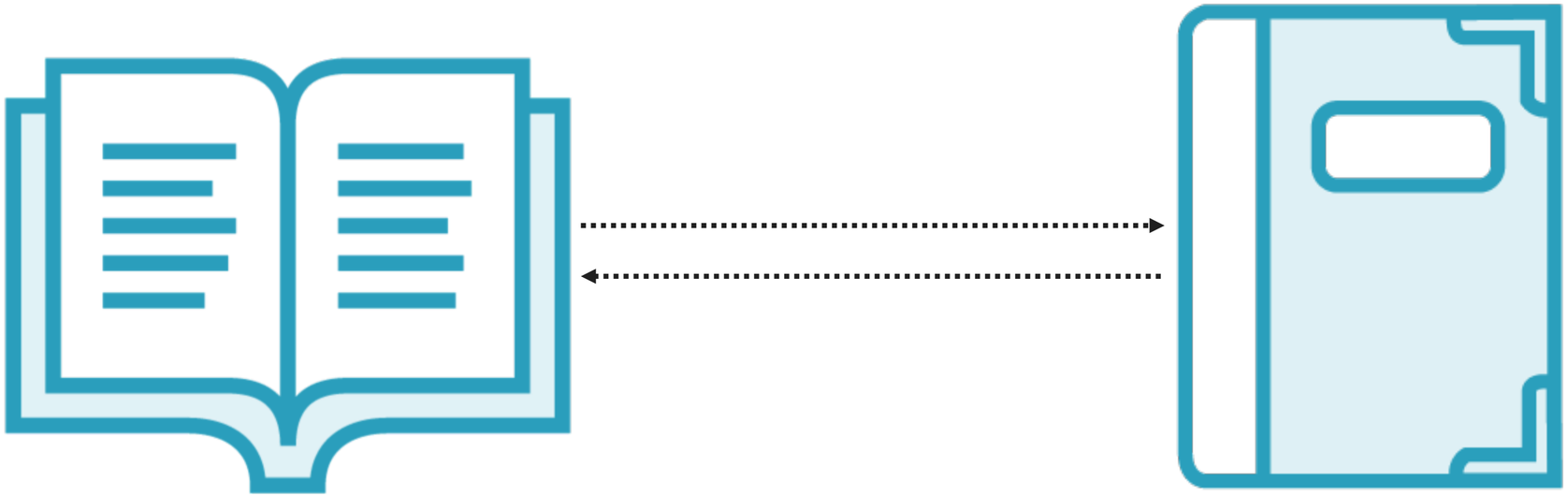
Books Have Covers



We Need to Bind Them

DbContext must be able to identify a principal (“parent”) and a dependent (“child”)

Which is the Principal?



Which is the Principal?

For human resources, the desk is an attribute of the employee.

For the inventory keepers, the employee is an attribute of the desk.

EF Core can correctly identify some one-to-one mappings. But this has not always been the case.

Common Ways EF Core Identifies One-to-One

Navigations on both ends with FK independent

Navigation on one end, FK on the other

Navigations on both ends

EF Core will recognize one-to-one and identify the dependent

EF Core requires a mapping to define principal/dependent

Tying Book and Cover Together

Book
• BookId • Title • PublishDate • Author • AuthorId • Cover

Cover
• CoverId • DesignIdeas • DigitalOnly • Artists (List<Artist>) • Book • BookId

1 : 1

Defining one-to-one with existing data can cause conflicts with DB constraints

Dependents Are Optional by Default

By default, the cover is optional

The database constraint will allow books to be inserted without a cover.

Your business logic allows a book's cover to be created at a later date

Configure it to be required

Map the cover property as IsRequired

This causes the database constraint to require a cover

EF Core will not enforce the rule; the database will throw an error

This is a business rule to be applied in your business logic.

Principals Are Required By Default

A cover can’t exist without a book

Your business logic is responsible for following this rule

Updating the Model and Database with the New Relationship

A Cavalcade of Cascade Deletes

Author ····· Books ····· Covers ·····▸ Relationships to Artist

You can edit migrations files that have not yet been applied to the database.

Order of Operations for the Migration

1. **Adds new BookId column**
2. **Updates the BookId column values**
3. **Applies Index**
4. **Adds foreign key constraint**

Remember that this change to existing data was easy because there was minimal data.

Querying One-to-One Relationships

Means to Get Related Data from the Database

Same patterns for many-to-many
...and for one-to-one

Eager Loading

Include related objects in query

Query Projections

Define the shape of query results

Explicit Loading

Explicitly request related data for objects in memory

Lazy Loading

On-the-fly retrieval of data related to objects in memory

```
_context.Books.Include(b => b.Cover)
 .ToList();
```

- Get all books with their covers even if there is no cover

```
_context.Books.Include(b => b.Cover)
 .Where(b=>b.Cover!=null)
 .ToList();
```

- Get books that have a cover (Cover != null) Include the cover.

```
_context.Books.Where(b=>b.Cover==null)
 .ToList();
```

- Get books who don't have a cover yet. (Cover == null)

```
_context.Books.Where(b=>b.Cover!=null)
 .Select(b=>new {b.Title,
                 b.Cover.DesignIdeas })
 .ToList();
```

- Project an anonymous type of Title and DesignIdeas for books who have a cover (Cover != Null)
  Notice that the Select is after the Where. Where returns books, select doesn't.

Multi-Level Query

Using multiple includes and ThenInclude to query more deeply into a graph

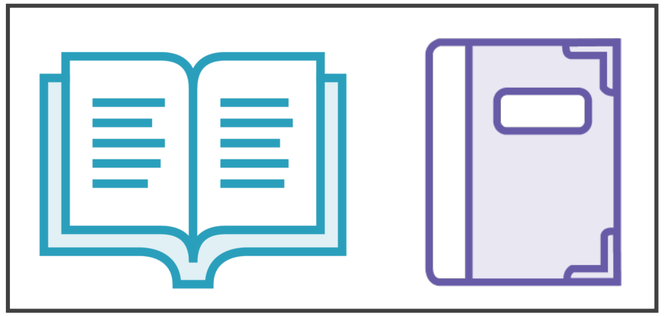
```
_context.Covers.Include(c=>c.Book)
  .ThenInclude(b=>b.Author)
  .ToList();
```

You Can Always Query from the Dependent

Combining Objects in One-to-One Relationships

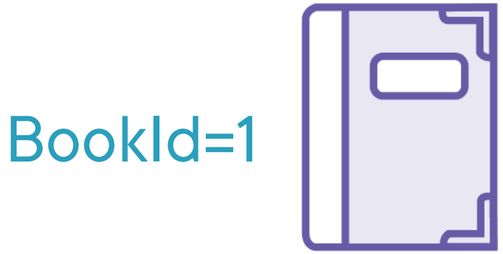
What Is Your Path to Adding One-to-One?

NEW



Add new book and cover together

Add cover to existing book that's in memory

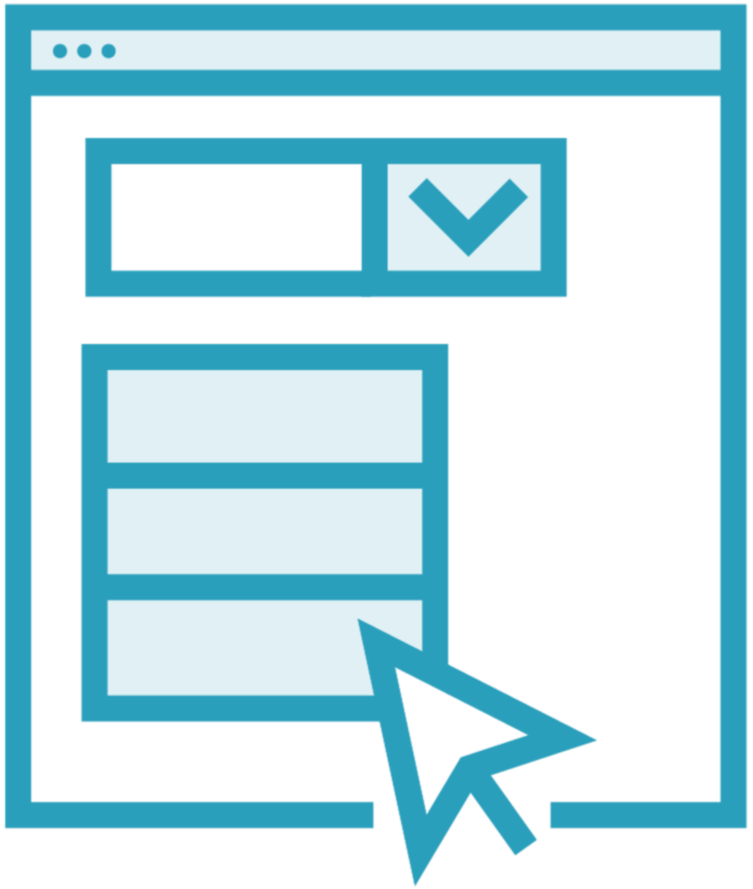


Add cover to existing book that is in DB but not in memory

Unique FK Constraint

Watch out for accidentally deleting dependents or causing an error in the database.

Write code that is smart enough to protect you from expected behaviors

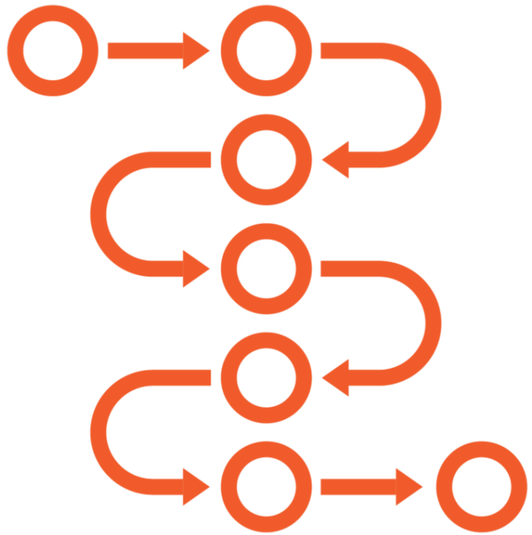


Inform the user of the conflict

Present them with options to resolve it

You're Here to Learn About EF Core

Architectural Decisions for Application



Understand EF Core's Behavior

Replacing or Removing One-to-One Relationships

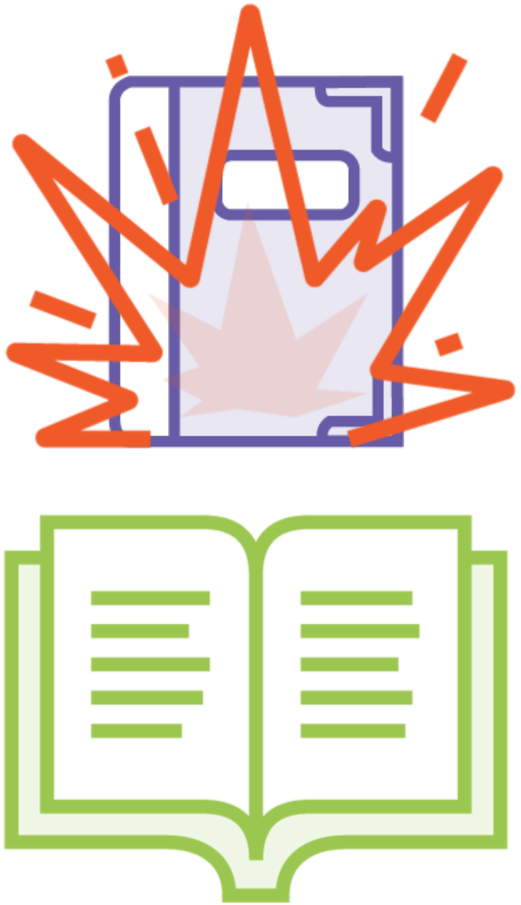
Reassigning a Cover to a Different Book

Cover originally assigned to a blue book

Reassigning it to a green book

Foreign Key Conflicts!

Cover originally assigned to a blue book



Green book already has a purple cover

```
greenCover.BookId=3
```

- Change the foreign key value

```
greenCover.Book=greenBookObject
```

- Change the navigation property in the dependent object

```
greenCover=blueBook.Cover;
greenBook.Cover= greenCover ;
```

- Change the navigation property of the principal

```
UPDATE covers SET bookid=3
WHERE coverid=5
```

- Resulting SQL on SaveChanges for all three variations

Foreign Key Conflict Outcomes

```
greenCover=blueBook.Cover;
greenBookWithPurpleCover.Cover=
  greenCover ;
```

- Blue Book with Green Cover is tracked, Green Book with Purple Cover is tracked
- EF Core will DELETE Purple Cover and change green cover's BookId

```
greenCover.BookId=3;
```

- Change tracker is only aware of Green Cover In the database, purple cover has BookId=3
- EF Core sends an Update command to change the cover's bookId to 3
- Database returns an error: two covers cannot have the same bookId

Removing One-to-One Deletes the Dependent!

```
_context.Covers.Remove(greenCover);
```

- Just delete the row in your code
- EF Core sends a DELETE to the database for that cover row

```
bookWithCoverGraph.Cover=null;
```

- Change tracker is aware of book and cover
- EF Core sends a DELETE to the database for that cover row

There are even more paths to affecting the relationships

Some Factors that Affect Relationship Behavior

Is the dependent required?

Is the child object in memory?

Are parent or child object being tracked?

Test the behaviors to learn cause and effect!

Review

EF Core needs to be able to ID principal and child

Simplest (our path) is navigation props in both ends with FK in dependent

Default: child is optional, parent is required, cascade delete

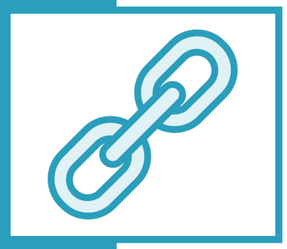
Same query patterns as other relationships

Watch out for FK constraints when joining or changing related ends

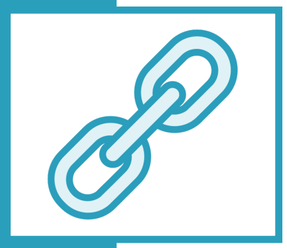
Know the behaviors and design your app to protect you from side effects

Up Next: Working with Views and Stored Procedures and Raw SQL

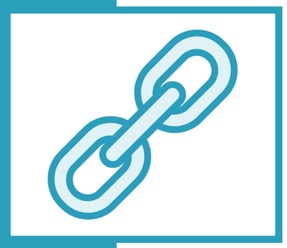
Resources



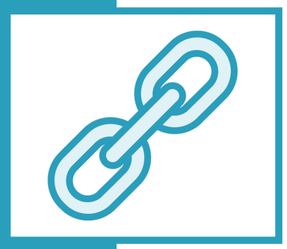
Entity Framework Core on GitHub github.com/dotnet/efcore



EF Core Relationship Documentation bit.ly/EFCoreRelation



EF Core Power Tools on GitHub
github.com/ErikEJ/EFCorePowerTools/wiki



C# Conditional Operator Docs bit.ly/3s4nSql