A picture containing text, book, statue, art

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**1 Problems with** **repository pattern**

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[3. System](file:///E:\My\Drive\CQRS\My-CQRS.docx#_bookmark2) with different users and different roles   
on the same bounded context

**2 Advantages of CQRS pattern**

1. Single of responsibility

2. Separation of concern

[3. Independent](file:///E:\My\Drive\CQRS\My-CQRS.docx#_bookmark7) Scalability

4. Efficient Performance for database read operations.

5. Efficient with system that has different users and different roles on the same bounded context.

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**3 Types of CQRS pattern**

1. Single database

1.1 Single Database Single Project

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2.1 Same databases

2.2 different databases

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1. Single Database Single Project

2. Single Database Two Projects

3. Multiple Same Databases

3. Multiple Different databases

**Chapter 1**

**Problems with repository pattern**

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**Repository pattern is one of the most popular pattern that used today to work with the database , there are also some other patterns to work with the database like CQRS pattern.**

**every pattern has its own advantages and disadvantages or in more accurate words every pattern is designed to solve specific problems or used with specific business or technical cases.**

**the architecture and development teams must be aware about this cases , when - why - how to use this pattern ? and also the impact for using this pattern for long term.**

**Overview of the project architecture**

The project follows the clean architecture and domain driven design principles , we will not focus on the clean architecture or domain driven design principles , but focus on the repository pattern and CQRS pattern from the view of clean architecture and domain driven design.

A screenshot of a computer

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The aggregations are live on the Domain.Core

A screenshot of a computer

Description automatically generated

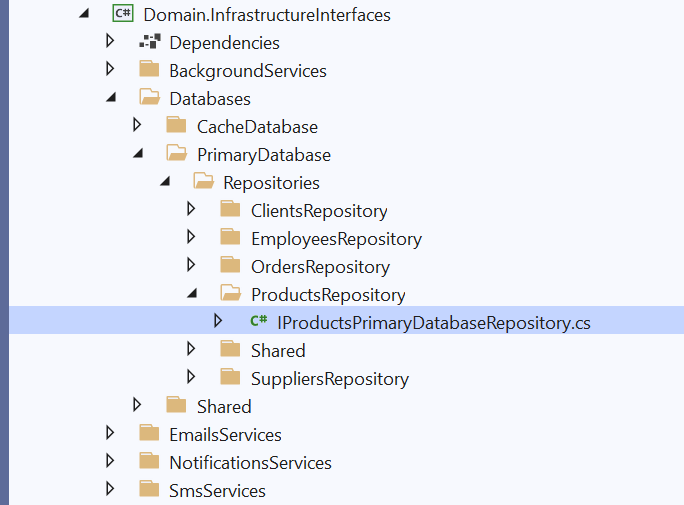
Let's take the product aggregation as example :

A screenshot of a computer

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Product object is the aggregation root which control and manage the whole aggregation and other objects may be entities , value objects , Enums.

The product repository interface is live on :



And here the operations of products repository interface :

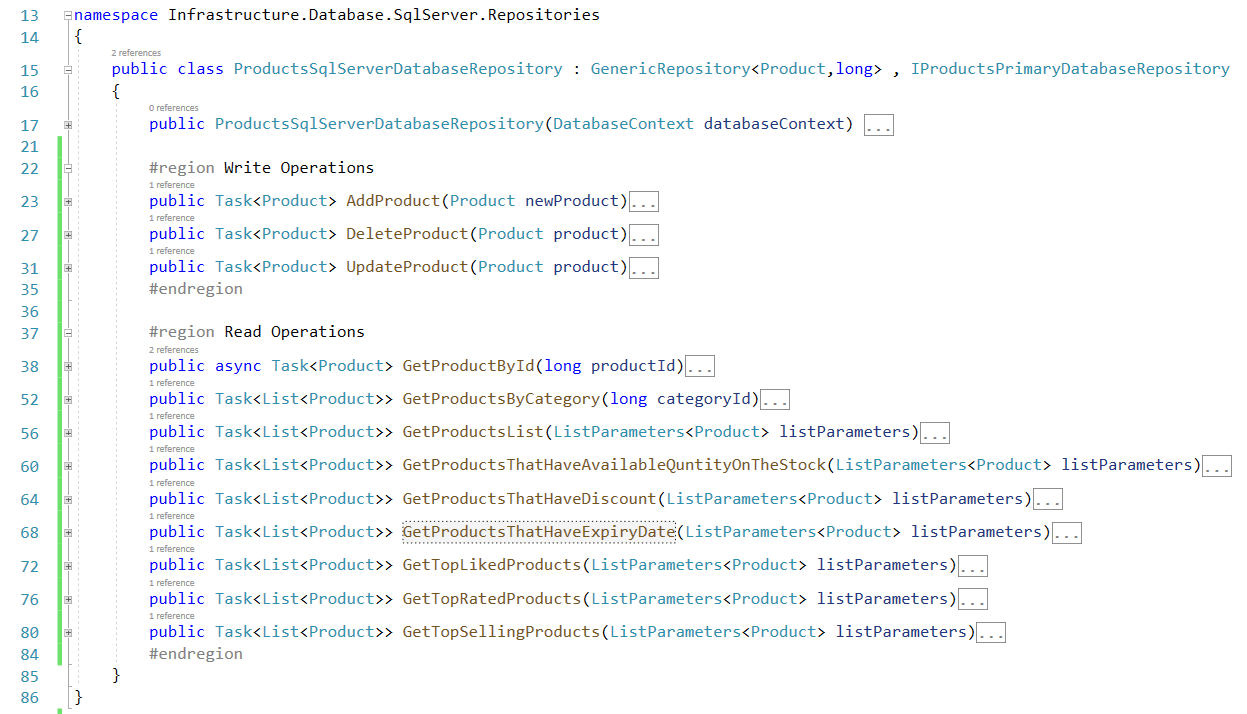
A screenshot of a computer code

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The actual implementation of the repository pattern is live on

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**Repository pattern principles**

From Domain driven design, Repository pattern must apply two main principles:



**First principle**

**Repository pattern should be accessed via the aggregation root only.**

1. This mean repository must always **return or save** one aggregation root or list of aggregation roots ( **Product or list of Products** )
2. Repository pattern can not return normal entities directly in the aggregation like ( ProductAttribute ) , value objects like ( ProductTax ) , enums like ( ProductFileTypeEnum ).
3. Repository pattern can not return dto directly like

( ProductNameAndPriceDto )

A screenshot of a computer

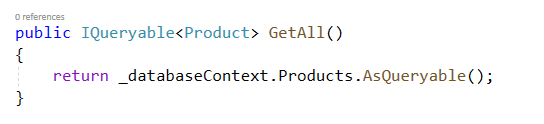
Description automatically generated with low confidence

1. Repository pattern should not return IQueryable , This is one of the most famous mistakes when using Repository pattern , because this break the main goal of repository pattern : abstract and isolate the logic or the implementation of data access layer outside the domain layer , here are example :

To get the products list which of golden category the products must satisfy the acceptance criteria :

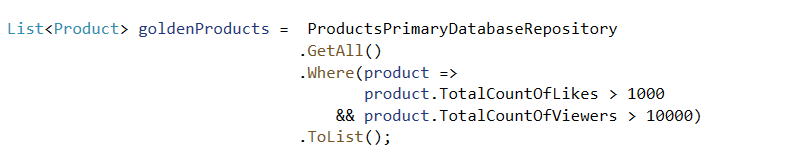
* Total number of likes > 1000
* Total number of viewers > 10,000

ProductsRepository.cs



You need to get golden products in two different services

Application Service 1



Application Service 2

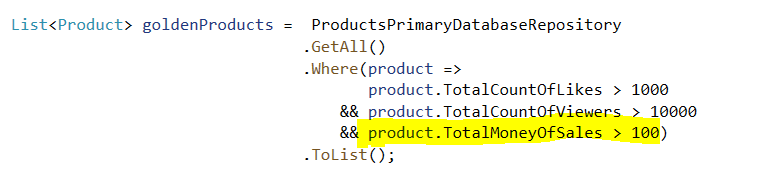
A screen shot of a computer code

Description automatically generated with low confidence

When new acceptance criteria is added or any change is occur , you must loop on all application services that get the golden products and apply this change , for example if new acceptance criteria is added to the golden product :

Total money of sales > 100

Application Service 1

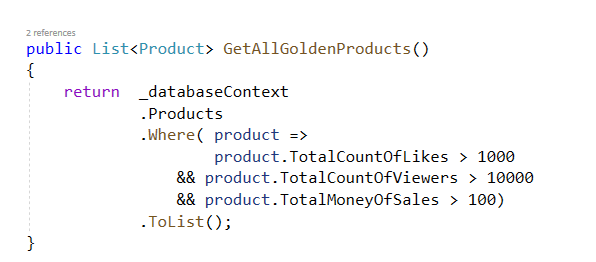


Application Service 2A picture containing text, screenshot, font, line

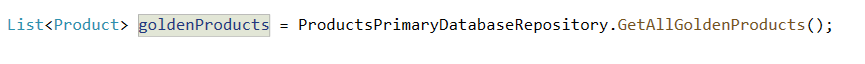
Description automatically generated

When repository pattern return IQueryable this cause a lot of duplications inside the application services , so repository pattern should not never return IQueryable , but return single or list of aggregation roots directly and put the logic or the implementation of database access inside the repository itself , so any change on the requirements will occur in single place in the repository and then will be reflected on the all application services directly.

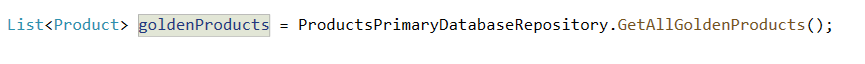
ProductsRepository.cs



Application Service 1



Application Service 2



1. Repository pattern can return native or primitive data types like numbers , Boolean

A screenshot of a computer code

Description automatically generated with low confidence

Important Note :

It usually prefers to use async/await with all operations of repository pattern or any network call , the previous examples are synchronous for just simplify.



**Second Principle :   
Repository pattern should load or save the whole aggregation together.**

From domain driven design view :

the aggregation is a group of objects that :

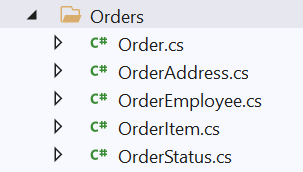
1. Logically and physically related, can product attribute exist without the product itself exist ? can product barcode , product file or any other object in the aggregation exist without the product ?

the answer is of course no.

A screenshot of a computer

Description automatically generated with low confidence

1. affect on each other , for example on order aggregation :



when user add new order item , the total price property in the order is recalculated to add the new order item price to the previous total price.

Order.cs

A screen shot of a computer code

Description automatically generated with low confidence

From the code above :

* Order aggregation root is needed to load all order items to check some business rule like prevent duplications of order items.
* Any change on the order items list ( add – update – delete ) has an effect on total price on order.

So the whole aggregation objects is work as a single transaction.

This mean the repository must load the whole aggregation.

ProductsRepository.cs

A picture containing text, screenshot, font, letter

Description automatically generatedNote :

Product Tax is not loaded because it is value object and mapped to loaded automatically with the product.

Product Expression is not business entity but contain static methods only that return some conditions and expressions. And repository pattern can not load part only from the aggregation.

A screenshot of a computer program

Description automatically generated with low confidence

But in a lot of the real life and business stories , we do not need the whole aggregation , for example :

User story :

As Client ,

I want to see the product details when click on the product card on home page , so I can see product name , price , attributes , images and this help me to buy the product.

A picture containing toy, cartoon, art, design

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