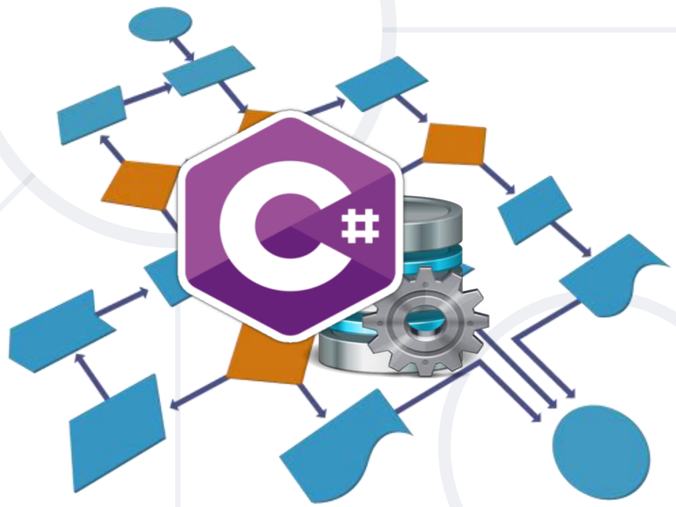
C# Auto Mapping Objects

Manual Mapping

and AutoMapper Library



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Data Transfer Objects

Definition and Usage

What is a Data Transfer Object?

- A **DTO** is an object that **carries data** between processes
  - Used to **aggregate** only the **needed information** in a single call
  - Example: In web applications, between the **server** and **client**
- Doesn't contain any logic – only **stores values**

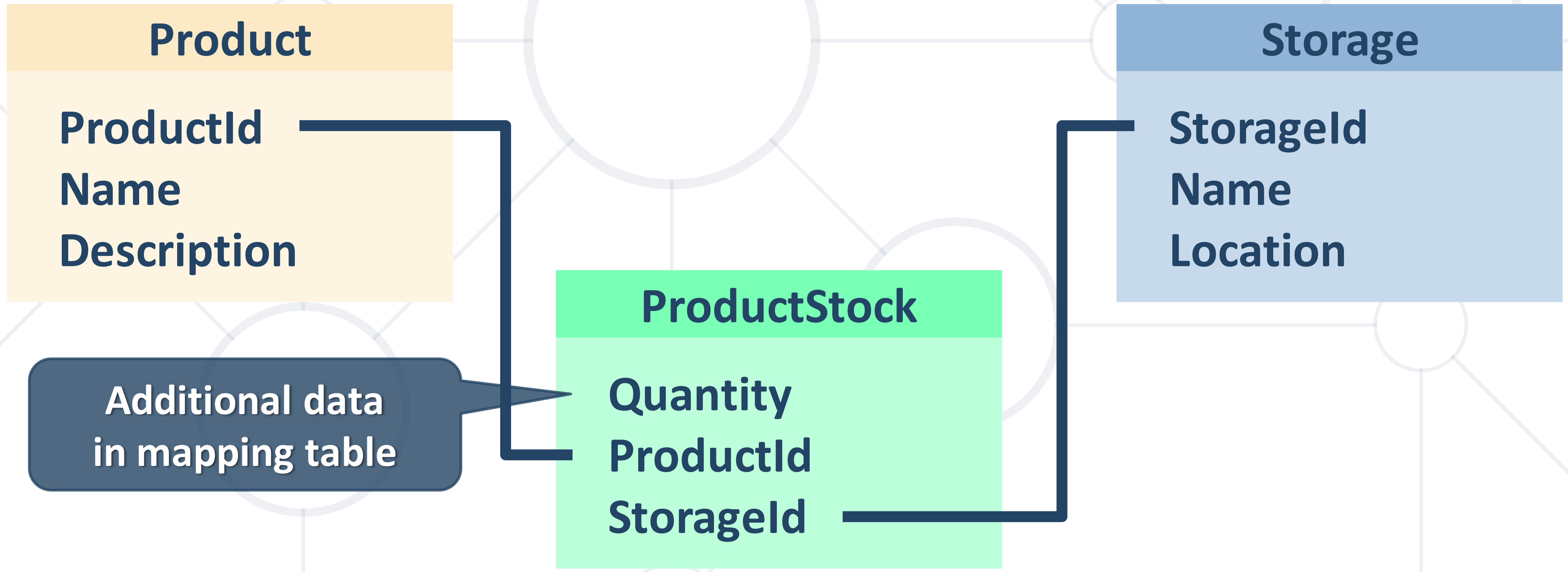
```
public class ProductDTO
{
  public string Name { get; set; }
  public int StockQty { get; set; }
}
```

DTO Usage Scenarios

- **Remove** circular references
- **Hide** particular properties that **clients** are not supposed to view
- **Omit** some properties in order to **reduce** payload **size**
- **Flatten** object graphs that contain nested objects to make them more convenient for clients
- **Decouple** your service layer from your database layer

Manual Mapping

- Relationship Diagram



Manual Mapping (2)

- Get product name and stock quantity in a new DTO object

```
var product =
context.Products.FirstOrDefault();
var productDto = new ProductDTO
{
  Name = product.Name,
  StockQty = product.ProductStocks
    .Sum(ps => ps.Quantity)
};
```

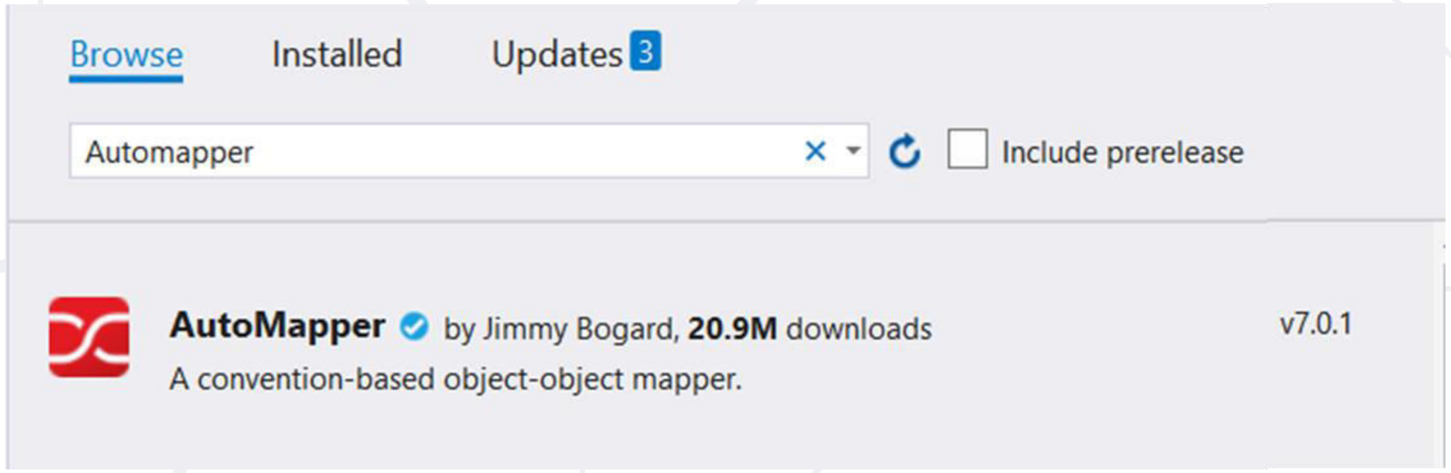
Aggregate information from mapping table

AutoMapper Library

Automatic Translation of Domain Objects

What is AutoMapper?

- Library to eliminate **manual mapping** code
- Available as a **NuGet** Package
- Official **GitHub Page**



Automapper

AutoMapper by Jimmy Bogard, **20.9M** downloads v7.0.1
A convention-based object-object mapper.

```
Install-Package AutoMapper
```

Initialization and Configuration

- AutoMapper offers a **static service** for use and configuration
  - Add mappings between objects and DTOs

Source

```
Mapper.Initialize(cfg => cfg.CreateMap<Product,
ProductDTO>());
```

Target

- Properties will be mapped **by name**

```
var product = context.Products.FirstOrDefault();
ProductDTO dto = Mapper.Map<ProductDTO>(product);
```

Multiple Mappings

- You can configure all mapping configurations at once

```
Mapper.Initialize(cfg =>
{
  cfg.CreateMap<Product, ProductDTO>();
  cfg.CreateMap<Order, OrderDTO>();
  cfg.CreateMap<Client, ClientDTO>();
  cfg.CreateMap<SupportTicket, TicketDTO>();
});
```

Custom Member Mapping

- Map properties that don't match naming convention

```
Mapper.Initialize(cfg =>
   cfg.CreateMap<Product, ProductDTO>()
      .ForMember(dto => dto.StockQty,
                 opt => opt.MapFrom(src =>
                   src.ProductStocks.Sum(p =>
p.Quantity))));
```

Destination property

Source

Flattening Complex Properties

- **AutoMapper** can also be used to flatten complex properties

```
Mapper.Initialize(cfg =>
   cfg.CreateMap<Event, CalendarEventViewModel>()
      .ForMember(dest => dest.Date,
                 opt => opt.MapFrom(src => src.Date.Date))
      .ForMember(dest => dest.Hour,
                 opt => opt.MapFrom(src => src.Date.Hour))
      .ForMember(dest => dest.Minute,
                 opt => opt.MapFrom(src => src.Date.Minute)));
```

Flattening Complex Objects

- **Flattening** of related objects is automatically supported

```
public class OrderDTO
{
  public string ClientName { get; set; }
  public decimal Total { get; set; }
}
```

- **AutoMapper** understands ClientName is the **Name** of a **Client**

```
Mapper.Initialize(cfg => cfg.CreateMap<Order, OrderDTO>());
OrderDTO dto = Mapper.Map<Order, OrderDTO>(order);
```

Unflattening Complex Objects

- **Unflattening** of related objects is automatically supported

```
public class OrderDTO
{
  public string ClientName { get; set; }
  public decimal Total { get; set; }
}
```

- **AutoMapper** understands ClientName is the **Name** of a **Client,** but to unflatten it, it needs **ReverseMap**

```
Mapper
    .Initialize(cfg => cfg.CreateMap<Order, OrderDTO>()
    .ReverseMap());
```

Mapping Collections

- EF Core uses **IQueryable<T>** for all DB operations
  - AutoMapper can work with IQueryable<T> to map classes
- Using AutoMapper to map an entire DB collection:

```
var posts = context.Posts
  .Where(p => p.Author.Username == "gosho")
  .ProjectTo<PostDto>()
  .ToArray();
```

IQueryable<Post>

IQueryable<PostDto>

- Works like an automatic **.Select()**
  - EF Core generates **optimized SQL** (like with an **anonymous object**)

AutoMapper.Collection

- Adds ability to map collections to existing collections **without re-creating** the collection object
- Will **Add/Update/Delete** items from a preexisting collection object based on user defined equivalency between the collection's generic item type from the source collection and the destination collection

```
Mapper
    .Initialize(cfg => cfg.AddCollectionMappers());
```

AutoMapper.Collection.EntityFrameworkCore

- **Automapper.Collection.EntityFrameworkCore** will help you mapping of EntityFrameowrk Core DbContext-object

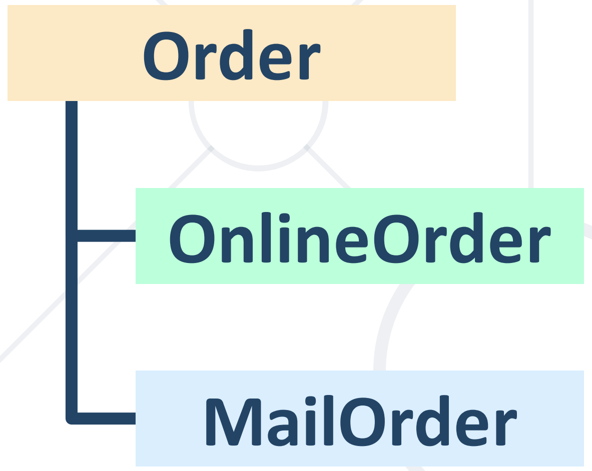
```
Mapper.Initialize(cfg =>
{
     cfg.AddCollectionMappers();
     cfg.SetGeneratePropertyMaps
       <GenerateEntityFrameworkCorePrimaryKeyPropertyMaps<Context>>();
     // Configuration code
});
```

- Comparing to a single existing Entity for updating

```
dbContext.Orders.Persist().InsertOrUpdate<OrderDTO>(newOrderDto);
dbContext.Orders.Persist().InsertOrUpdate<OrderDTO>(existingOrderDto);
dbContext.Orders.Persist().Remove<OrderDTO>(deletedOrderDto);
dbContext.SubmitChanges();
```

Inheritance Mapping

- Inheritance chains are defined via Include()
- AutoMapper chooses the most appropriate child class



Register with parent

```
Mapper.Initialize(cfg => {
   cfg.CreateMap<Order, OrderDto>()
      .Include<OnlineOrder, OnlineOrderDto>()
      .Include<MailOrder, MailOrderDto>();
   cfg.CreateMap<OnlineOrder, OnlineOrderDto>();
   cfg.CreateMap<MailOrder, MailOrderDto>();
});
```

Child mapping

Mapping Profiles

- We can extract our configuration to a class (called a **profile**)

```
public class ForumProfile : Profile
{
  public ForumProfile()
  {
    CreateMap<Post, PostDto>();
    CreateMap<Category, CategoryDto>();
  }
}
```

using AutoMapper;

- Using our configuration class:

```
Mapper.Initialize(cfg => cfg.AddProfile<ForumProfile>());
```

Summary

- To reduce round-trip latency and payload size, data is transformed into a **DTO**
- **AutoMapper** is a library that automates this process and reduces boilerplate code
- Complex objects can be **flattened** to fractions of their sizes

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