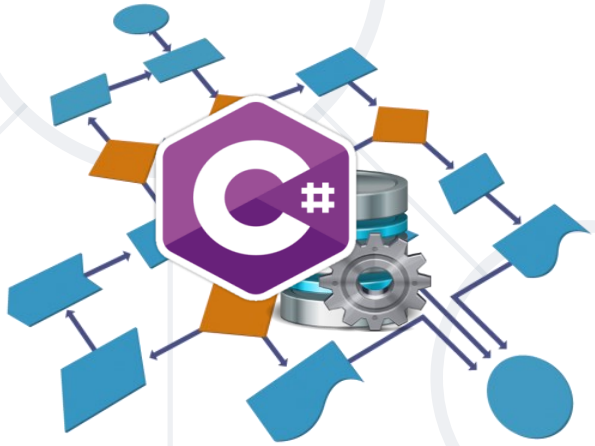
C# Auto Mapping Objects

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**

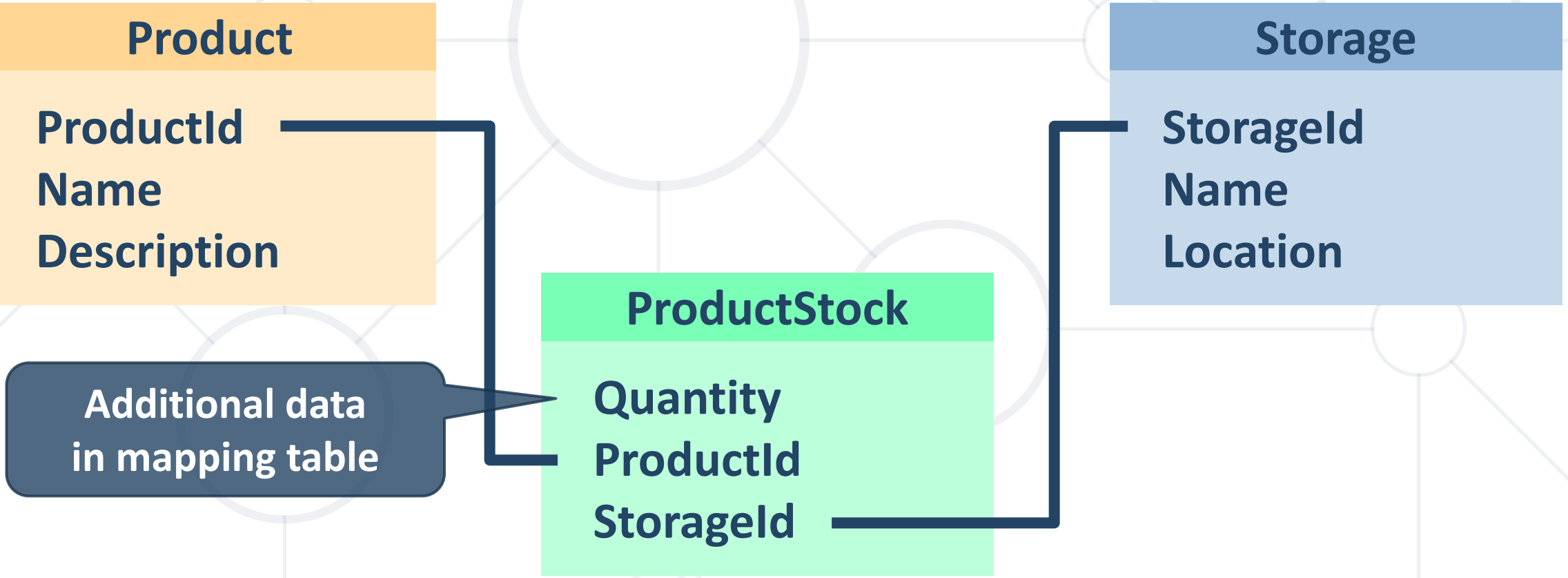

```
public class ProductDTO
{
   public string Name { get; set; }
   public int StockQty { get; set; }
}
```

DTO Usage Scenarios

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

Manual Mapping (1)

- Relationship Diagram



Manual Mapping (2)

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

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

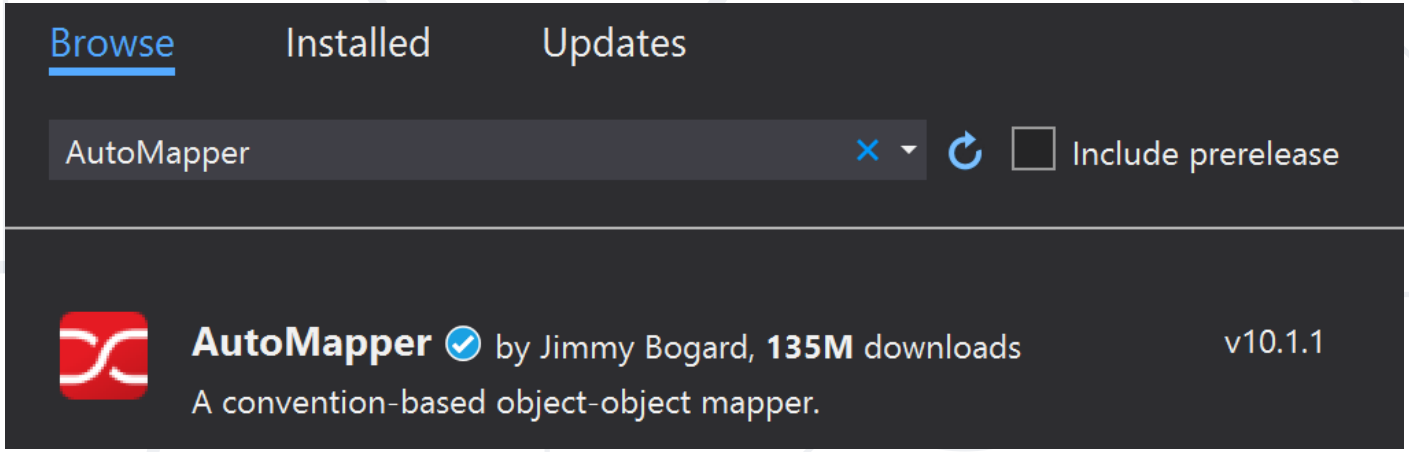
Aggregate information from mapping table

AutoMapper Library

Automatic Translation of Domain Objects

What is AutoMapper?

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




```
Install-Package AutoMapper
```

Initialization and Configuration

- AutoMapper offers an **instance service** for use and configuration
  - Add mappings between objects and DTOs

```
var config = new MapperConfiguration(cfg =>
    cfg.CreateMap<Product, ProductDTO>());
var mapper = config.CreateMapper();
```

Source

Target

- Properties will be mapped **by name**

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

Mapped Properties by Name

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

```
public class Product
{
  public int Id { get; set; }
  public string Name { get; set; }
  public ProductStocks ProductStocks { get; set; }
}
```

Multiple Mappings

- You can **configure all mapping** configurations at once

```
var config = new MapperConfiguration(cfg =>
{
    cfg.CreateMap<Product, ProductDTO>();
    cfg.CreateMap<Order, OrderDTO>();
    cfg.CreateMap<Client, ClientDTO>();
    cfg.CreateMap<SupportTicket, TicketDTO>();
});
var mapper = config.CreateMapper();
```

Mapping ICollection and IQueryable

- 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 == "Nikolay.IT")
  .ProjectTo<PostDto>(config)
  .ToList();
```

IQueryable<Post>

IQueryable<PostDto>

- Works like an automatic **.Select()**
  - AutoMapper helps EF to generate **optimized SELECT SQL query** (like projection with an **anonymous object**)

Custom Member Mapping

- Map **properties that don't match** naming convention

```
var config = new MapperConfiguration(cfg =>
{
  cfg.CreateMap<Product, ProductDTO>()
     .ForMember(dto => dto.StockQty,
         opt => opt.MapFrom(src =>
             src.ProductStocks.Sum(p => p.Quantity))));
});
```

Destination property

Source

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**

```
var config = new MapperConfiguration(cfg =>
   cfg.CreateMap<Order, OrderDTO>());
var mapper = config.CreateMapper();
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()**

```
var config = new MapperConfiguration(cfg =>
   cfg.CreateMap<Order, OrderDTO>().ReverseMap());
var mapper = config.CreateMapper();
Order order = mapper.Map<OrderDTO, Order>(dto);
```

Mapping Profiles

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- 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:

```
var config = new MapperConfiguration(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

Questions?

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