Record Types

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Records in C#

Record can be used instead of a class

If the purpose is to represent data

Less code!

Records come with generated code that you normally have to write yourself

Introducing a **Record**

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```
record Customer();
```

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```
record Customer();

record class Customer();
```

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```
record Customer();

record class Customer();

record struct Customer();
```

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```

Reference type

Value type

Records can be defined with a
primary constructor

Record with a Primary Constructor

```
record Customer(string Firstname, string Lastname);
```

Record with a Primary Constructor

```
record Customer(string Firstname, string Lastname);
```

This is a positional syntax that creates
a positional record

Record with a Primary Constructor

```
record Customer(string Firstname, string Lastname);

Customer customer = new("Filip", "Ekberg");
```

Records can have a **body** where you define other **properties**, **methods** and **fields**

Positional Record

```
record Customer(string Firstname, string Lastname);

Customer customer = new("Filip", "Ekberg");

Console.WriteLine($"{customer.Firstname} {customer.Lastname}");
```

Primary Constructor

```
record Customer(string Firstname, string Lastname);

Customer customer = new("Filip", "Ekberg");
```

Primary Constructor

```
record Customer(string Firstname, string Lastname);

Customer customer = new("Filip", "Ekberg");
```

How is this any better than creating a traditional class?

There's lots of code generated!

Records come with **value based** equality!

```cs
record Customer(string Firstname, string Lastname);

Customer customer = new("Filip", "Ekberg");

Console.WriteLine(customer);
```

Record as a String

Deconstructing a Record

```
record Customer(string Firstname, string Lastname);

Customer customer = new("Filip", "Ekberg");

if(customer is (_, "Ekberg"))
{
    ApplyDiscount();
}
```

Record with a List

```
record Customer(string Firstname, string Lastname, IList<Order> Orders);

Customer customer = new("Filip", "Ekberg", new List<Order>());
```

Record with a List

```
record Customer(string Firstname, string Lastname, IList<Order> Orders);

Customer customer = new("Filip", "Ekberg", new List<Order>());

customer.Orders.Add(new());
```

Record with a List

```
record Customer(string Firstname, string Lastname, IList<Order> Orders);

Customer customer = new("Filip", "Ekberg", new List<Order>());

customer.Orders.Add(new());
```

This will work

Record with a List

```
record Customer(string Firstname, string Lastname, IList<Order> Orders);

Customer customer = new("Filip", "Ekberg", new List<Order>());

customer.Orders.Add(new());
```

← This will work

```
customer.Orders = new List<Order>();
```

← This will **not** work

Records let you **focus on the important pieces** and skip all the boilerplate code!

You cannot use records with Entity Framework

When to Use **Records**

When you want to represent data

Not for classes that are meant for business logic

The **primary constructor** is a **concise syntax** to **define** the **least amount** of **data** required

If a **property** uses a **record**
you will get **value based**
equality for that as well

Need business logic?

Use a class instead

This is a **good opportunity** to **validate** the **refactoring** with tests using **unit tests**

Where is the generated deconstruct?

If you do not create a primary constructor that will not be generated!

Record with Optional Parameters

```
public record Order(
        decimal Total = 0,
        ShippingProvider ShippingProvider = default,
        IEnumerable<Item> LineItems = default,
        bool IsReadyForShipment = true)
```

Record with Optional Parameters

```
public record Order(
        decimal Total = 0,
        ShippingProvider ShippingProvider = default,
        IEnumerable<Item> LineItems = default,
        bool IsReadyForShipment = true)

Order order = new()
{
    LineItems = items
};
```

JSON Property Names

```
{
  "total": 101,
  "ready": true,
  "orderNumber": "24bbea6e-edf7-4657-a925-b875677ef27c"
}
```

Record with Attributes

```
public record Order(
        [property: JsonPropertyName("total")]
        decimal Total = 0,

        [property: JsonIgnore]
        ShippingProvider ShippingProvider = default,

        [property: JsonIgnore]
        IEnumerable<Item> LineItems = default,
        bool IsReadyForShipment = true);
```

Which methods do you normally want to change?

ToString or PrintMembers!

Implementing **PrintMembers**

```
protected virtual bool PrintMembers(StringBuilder builder)
{
    builder.Append("A custom implementation");

    return true;
}
```

This can be **overriden** in a **record** that **inherits** from it!

Different Types of **Records**

```
record Customer(string firstname, string lastname);

record struct Customer(string firstname, string lastname);
```

Different Types of **Records**

```
record Customer(string firstname, string lastname);

record struct Customer(string firstname, string lastname);

readonly record struct Customer(string firstname, string lastname);
```

Record as a **Reference Type**

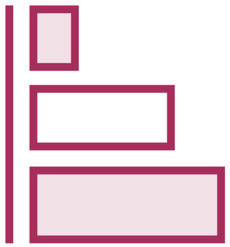
```
record class   Customer(string firstname, string lastname);
```

```
record         Customer(string firstname, string lastname);
```

Creating a **Record**

Use a primary constructor

```
record Customer(string firstname, string lastname)
```



Also known as a positional record

All the properties generate read-only fields

This an immutable type

Record as a String

```
record Customer(string Firstname, string Lastname);

var customer = new Customer("Filip", "Ekberg");
```

Record as a String

```
record Customer(string Firstname, string Lastname);

var customer = new Customer("Filip", "Ekberg");

customer.ToString()
```

```
Customer { Firstname = Filip, Lastname = Ekberg }
```

Value Based Equality

```
record Customer(string Firstname, string Lastname);

var first  = new Customer("Filip", "Ekberg");
var second = new Customer("Filip", "Ekberg");

first == second
```

Values of each instance is **compared** and this equality comparison returns true

Record with a Body

```
record Customer(string Firstname, string Lastname)
{
    public string Fullname => $"{Firstname} {Lastname}";
}
```

Records are suitable for representing data!

Do not use it for business logic

Business Logic Should Use Classes

```
class OrderProcessor
{
    public void Process(IEnumerable<Order> orders) { }
}
```

Combine Classes and Records

```
class OrderProcessor
{
    public void Process(IEnumerable<Order> orders) { }
}

record Order(Guid id, IEnumerable<Item> items);

record Item(Guid id, int quantity, decimal price);
```

Use **init-only** properties for immutability in classes

Record Inheritance

```
record Order(Guid id, IEnumerable<Item> items)



record CancelledOrder(Guid id, IEnumerable<Item> items)
        : Order(id, items)
```

Record Inheritance

```
record Order(Guid id, IEnumerable<Item> items)
{
    protected virtual bool PrintMembers(StringBuilder builder) { ... }
}

record CancelledOrder(Guid id, IEnumerable<Item> items)
        : Order(id, items)
{
    protected override bool PrintMembers(StringBuilder builder)
    {
        return base.PrintMembers(builder);
    }
}
```

Records Come with **Deconstruction**

```
record Customer(string Firstname, string Lastname);
```

```
    public void Deconstruct(out string Firstname, out string Lastname)
    {
        Firstname = this.Firstname;
        Lastname = this.Lastname;
    }
```

Records Come with **Deconstruction**

```
record Customer(string Firstname, string Lastname);

var customer = new Customer("Filip", "Ekberg");

if(customer is (_, "Ekberg"))
{ }
```

Add **optional parameters**
instead of multiple
constructors

Record with Attributes

```
public record Order(
        [property: JsonPropertyName("total")]
        decimal Total = 0,

        [property: JsonIgnore]
        ShippingProvider ShippingProvider = default,

        [property: JsonIgnore]
        IEnumerable<Item> LineItems = default,
        bool IsReadyForShipment = true);
```

Get use to records

You will use them a lot!

Next: **Nullable Reference Types**