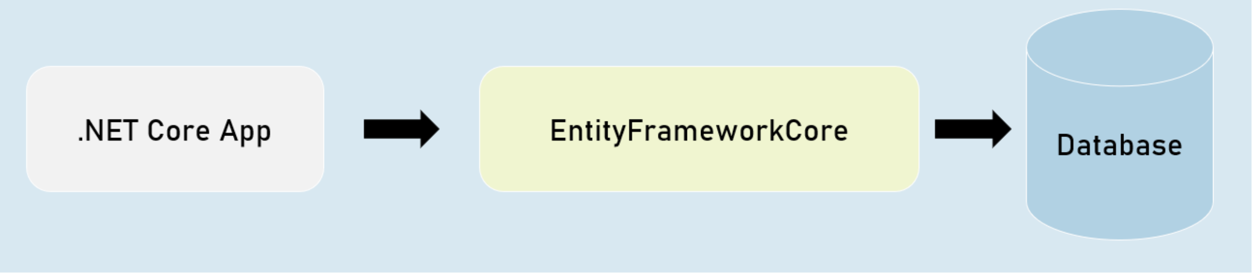
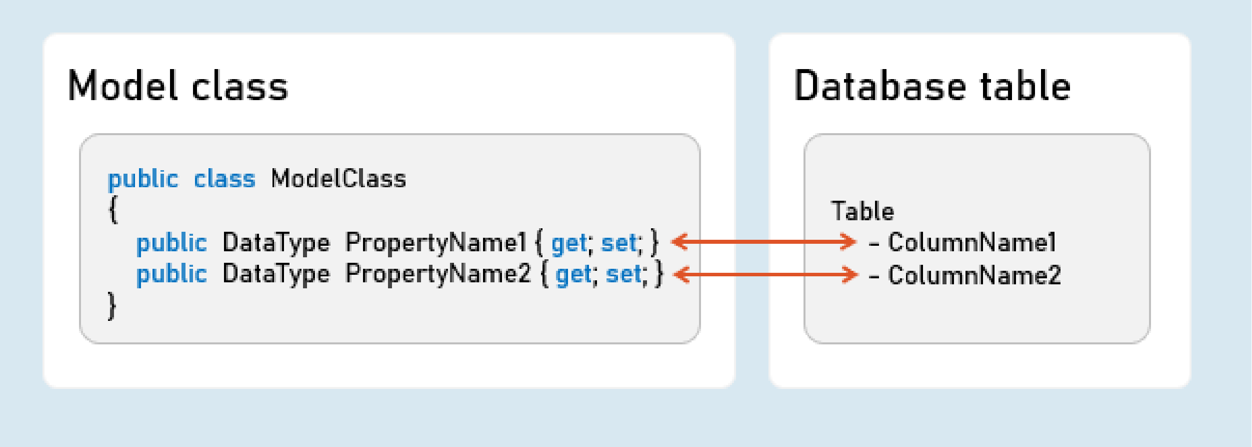
Section Cheat Sheet (PPT)

Introduction to EntityFrameworkCore

> EntityFrameworkCore is light-weight, extensible and cross-platform framework for accessing databases in .NET applications.
> It is the most-used database framework for Asp.Net Core Apps.



EFCore Models



```
public class ModelClass
{
   public DataType PropertyName1 { get; set; }
   public DataType PropertyName2 { get; set; }
}
```

```
Table
 - ColumnName1
 - ColumnName2
```

Pros & Cons of EntityFrameworkCore

Shorter Code

The CRUD operations / calling stored procedures are done with shorter amount of code than ADO.NET.

Performance

EFCore performs slower than ADO.NET.

So ADO.NET or its alternatives (such as Dapper) are recommended for larger & high-traffic applications.

Strongly-Typed

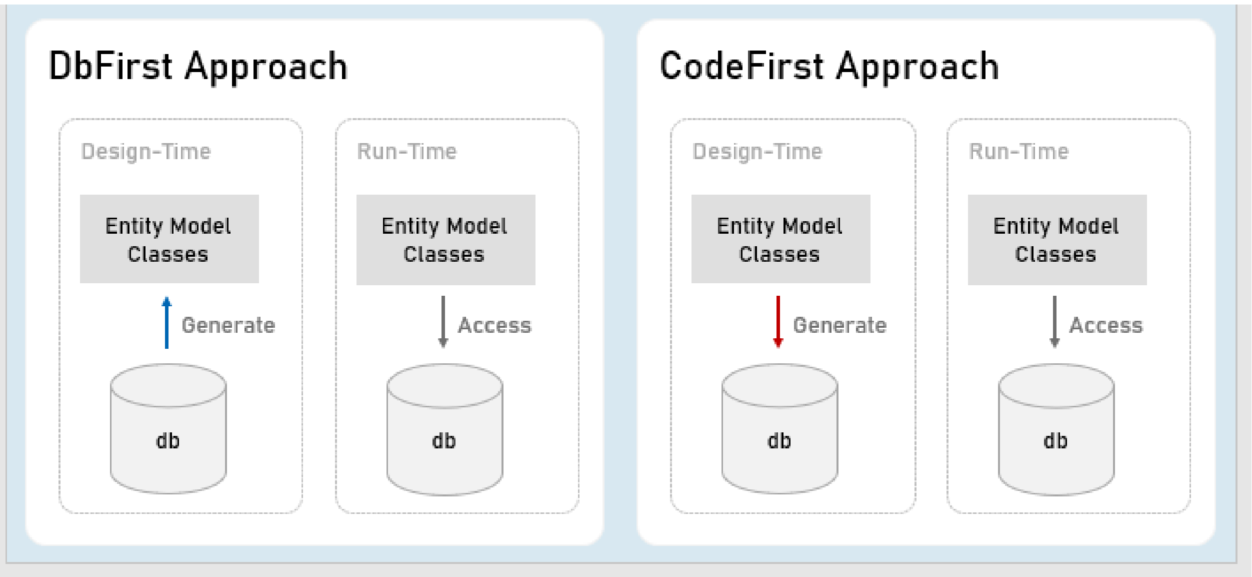
The columns as created as properties in model class.

So the Intellisense offers columns of the table as properties, while writing the code.

Plus, the developer need not convert data types of values; it's automatically done by EFCore itself.

Approaches in Entity Framework Core

EFCore Approaches



Pros and Cons of EFCore Approaches

CodeFirst Approach

Suitable for newer databases.

Manual changes to DB will be most probably lost because your code defines the database.

Stored procedures are to be written as a part of C# code.

Suitable for smaller applications or prototype-level applications only; but not for larger or high data-intense applications.

DbFirst Approach

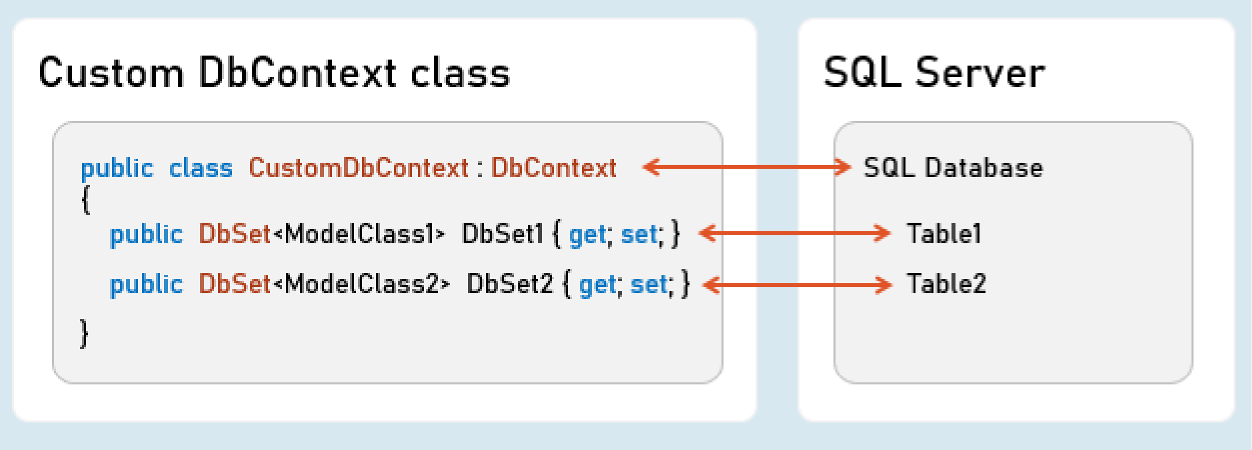
Suitable if you have an existing database or DB designed by DBAs, developed separately.

Manual changes to DB can be done independently.

Stored procedures, indexes, triggers etc., can be created with T-SQL independently.

Suitable for larger applications and high data-intense applications.

DbContext and DbSet



```
public class CustomDbContext : DbContext
{
   public DbSet<ModelClass1> DbSet1 { get; set; }
   public DbSet<ModelClass2> DbSet2 { get; set; }
}
```

DbContext

An instance of DbContext is responsible to hold a set of DbSets' and represent a connection with database.

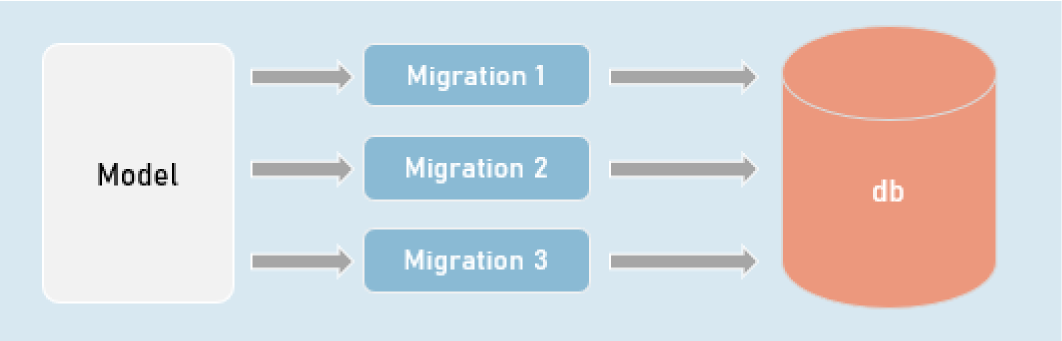
DbSet

Represents a single database table; each column is represented as a model property.

Add DbContext as Service in Program.cs:

```
builder.Services.AddDbContext<DbContextClassName>(
       options => {
 options.UseSqlServer();
}
);
```

Code-First Migrations



Migrations

Creates or updates database based on the changes made in the model.

in **Package Manager Console (PMC):**

```
Add-Migration MigrationName
```

//Adds a migration file that contains C# code to update the database

```
Update-Database -Verbose
```

//Executes the migration; the database will be created or table schema gets updated as a result.

Seed Data

in DbContext:

```
modelBuilder.Entity<ModelClass>().HasData(entityObject);
```

It adds initial data (initial rows) in tables, when the database is newly created.

EF CRUD Operations - Query

SELECT - SQL

```
SELECT Column1, Column2 FROM TableName
 WHERE Column = value
 ORDER BY Column
```

LINQ Query:

```
_dbContext.DbSetName
 .Where(item => item.Property == value)
 .OrderBy(item => item.Property)
 .Select(item => item);

//Specifies condition for where clause
//Specifies condition for 'order by' clause
//Expression to be executed for each row
```

EF CRUD Operations - Insert

INSERT - SQL

```
INSERT INTO TableName(Column1, Column2) VALUES (Value1, Value2)
```

Add:

```
_dbContext.DbSetName.Add(entityObject);
//Adds the given model object (entity object) to the
       DbSet.
```

SaveChanges()

```
_dbContext.SaveChanges();
//Generates the SQL INSERT statement based on the model
       object data and executes the same at database
       server.
```

EF CRUD Operations - Delete

DELETE - SQL

```
DELETE FROM TableName WHERE Condition
```

Remove:

```
_dbContext.DbSetName.Remove(entityObject);
```

```
//Removes the specified model object (entity object) to
       the DbSet.
```

SaveChanges()

```
_dbContext.SaveChanges();
//Generates the SQL DELETE statement based on the model
       object data and executes the same at database
       server.
```

EF CRUD Operations - Update

UPDATE - SQL

```
UPDATE TableName SET Column1 = Value1, Column2 = Value2 WHERE
PrimaryKey = Value
```

Update:

```
entityObject.Property = value;
//Updates the specified value in the specific property of
       the model object (entity object) to the DbSet.
```

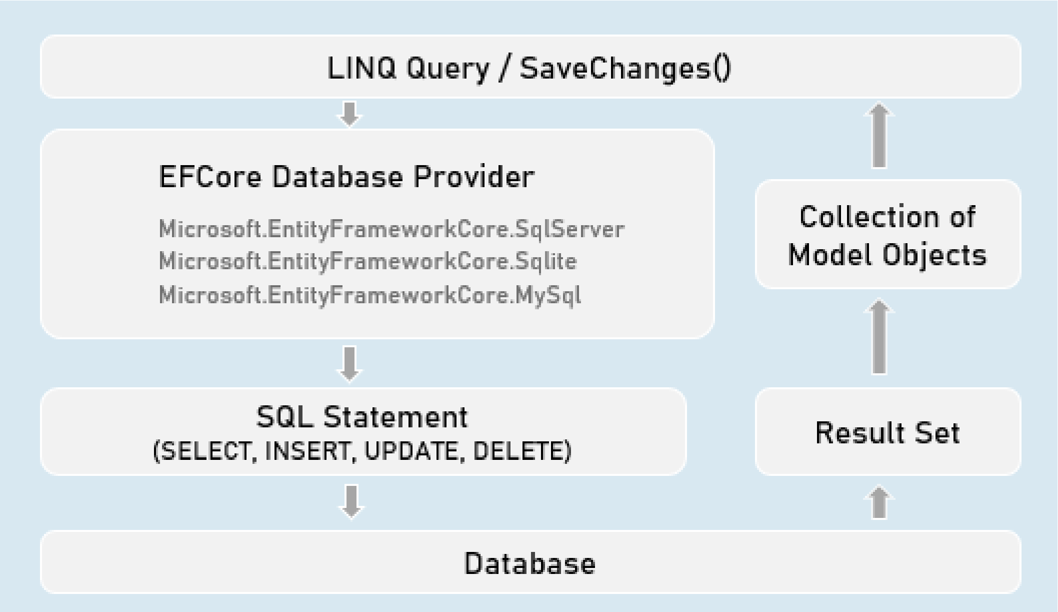
SaveChanges()

```
_dbContext.SaveChanges();
```

```
//Generates the SQL UPDATE statement based on the model
       object data and executes the same at database
       server.
```

How EF Query Works?

Workflow of Query Processing in EF


LINQ Query / SaveChanges()
EFCore Database Provider
Microsoft.EntityFrameworkCore.SqlServer
Microsoft.EntityFrameworkCore.Sqlite
Microsoft.EntityFrameworkCore.MySql
SQL Statement
(SELECT, INSERT, UPDATE, DELETE)
Database
Result Set
Collection of Model Objects

EF - Calling Stored Procedures

Stored Procedure for CUD (INSERT | UPDATE | DELETE):

```
int DbContext.Database.ExecuteSqlRaw(
 string sql,
 params object[] parameters)

//Eg: "EXECUTE [dbo].[StoredProcName] @Param1 @Parm2
//A list of objects of SqlParameter type
```

Stored Procedure for Retrieving (Select):

```
IQueryable<Model> DbSetName.FromSqlRaw(
 string sql,
 paramsobject[] parameters)

//Eg: "EXECUTE [dbo].[StoredProcName] @Param1 @Parm2"
//A list of objects of SqlParameter type
```

Creating Stored Procedure (SQL Server)

```
CREATE PROCEDURE [schema].[procedure_name]
(@parameter_name data_type, @parameter_name data_type)
AS BEGIN
 statements
END
```

Advantages of Stored Procedure

Single database call

You can execute multiple / complex SQL statements with a single database call.

As a result, you'll get:

- Better performance (as you reduce the number of database calls)
- Complex database operations such as using temporary tables / cursors becomes easier.

Maintainability

The SQL statements can be changed easily WITHOUT modifying anything in the application source code (as long as inputs and outputs doesn't change)

[Column] Attribute

Model class

```
public class ModelClass
```

```
{
  [Column("ColumnName", TypeName = "datatype")]
  public DataType PropertyName { get; set; }

  [Column("ColumnName", TypeName = "datatype")]
  publicDataTypePropertyName { get; set; }
}
```

Specifies column name and data type of SQL Server table.

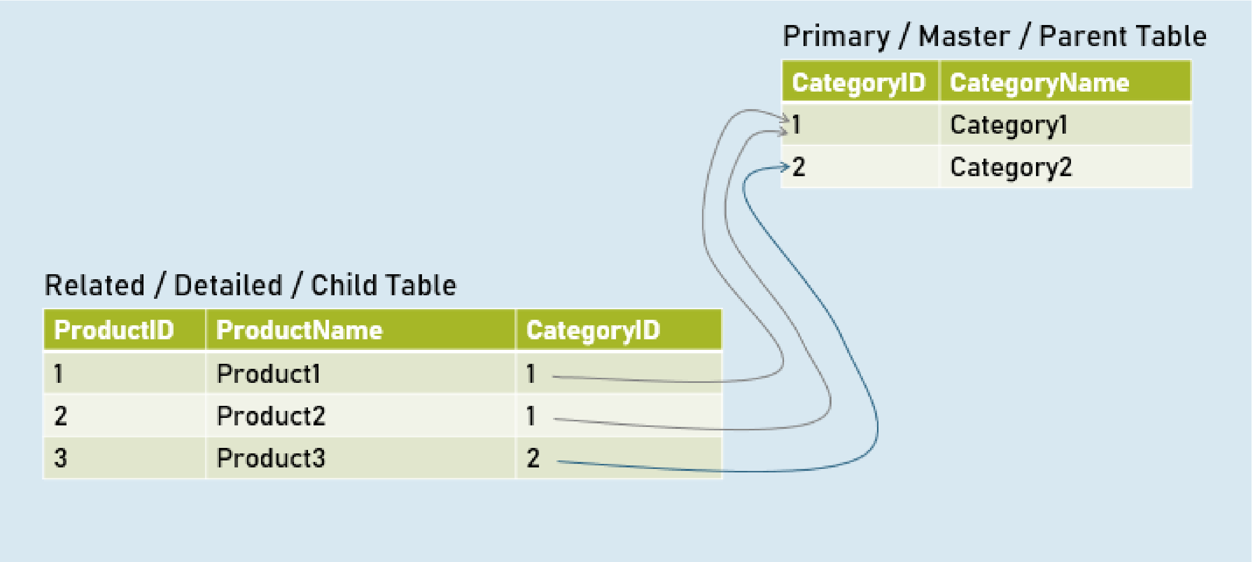
EF - Fluent API

DbContext class

```
public class CustomDbContext : DbContext
{
  protected override void OnModelCreating(ModelBuilder
      modelBuilder)
  {
    //Specify table name (and schema name optionally) to
      be mapped to the model class
    modelBuilder.Entity<ModelClass>(
      ).ToTable("table_name", schema: "schema_name");

    //Specify view name (and schema name optionally) to
      be mapped to the model class
    modelBuilder.Entity<ModelClass>(
      ).ToView("view_name", schema: "schema_name");

    //Specify default schema name applicable for all
      tables in the DbContext
    modelBuilder.HasDefaultSchema("schema_name");
  }
}



public class CustomDbContext : DbContext
{
  protected override void OnModelCreating(ModelBuilder modelBuilder)
  {
    modelBuilder.Entity<ModelClass>( ).Property(temp => temp.PropertyName)
      .HasColumnName("column_name") //Specifies column name in table
      .HasColumnType("data_type") //Specifies column data type in table
      .HasDefaultValue("default_value") //Specifies default value of the column
  }
}



public class CustomDbContext : DbContext
{
  protected override void OnModelCreating(ModelBuilder modelBuilder)
  {
    //Adds database index for the specified column for faster searches
    modelBuilder.Entity<ModelClass>( ).HasIndex("column_name").IsUnique();

    //Adds check constraint for the specified column - that executes for insert & update
    modelBuilder.Entity<ModelClass>( ).HasCheckConstraint("constraint_name", "condition");
    }
  }
```

EF - Table Relations with Fluent API

Table Relations



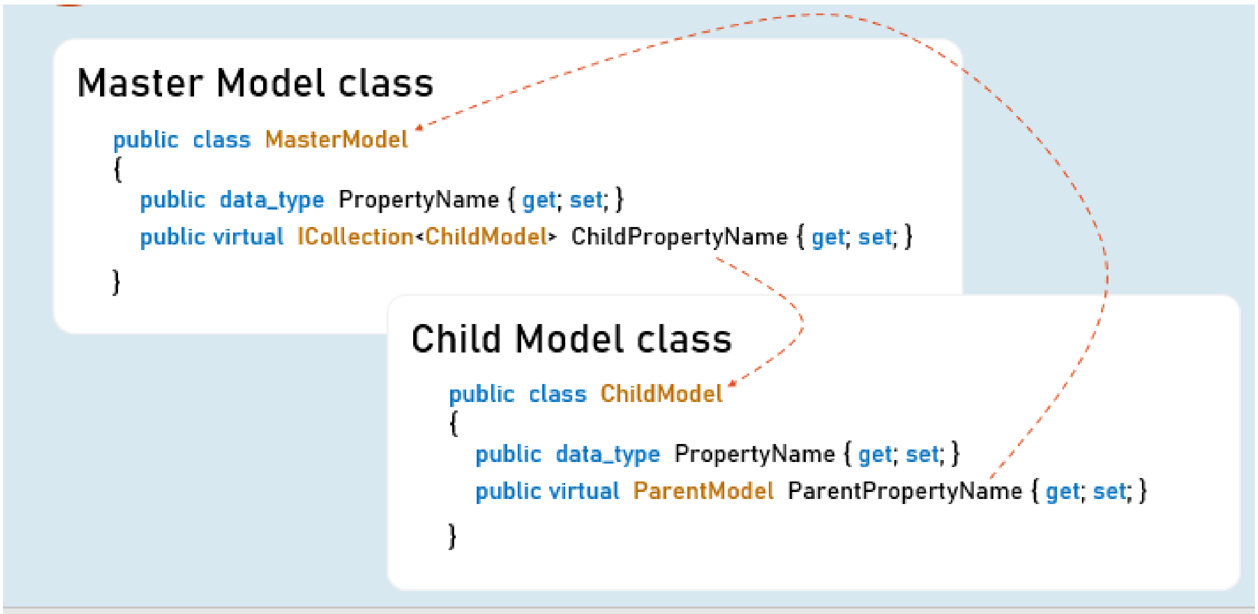
Primary / Master / Parent Table

CategoryID	CategoryName
1	Category1
2	Category2

Related / Detailed / Child Table

ProductID	ProductName	CategoryID
1	Product1	1
2	Product2	1
3	Product3	2

EF - Table Relations with Navigation Properties



Master Model class

```
public class MasterModel
{
   public data_type PropertyName { get; set; }
   public virtual ICollection<ChildModel> ChildPropertyName { get; set; }
}
```

Child Model class

```
public class ChildModel
{
   public data_type PropertyName { get; set; }
   public virtual ParentModel ParentPropertyName { get; set; }
}
```

EF - Table Relations with Fluent API

DbContext class

```
public class CustomDbContext : DbContext
{
  protected override void OnModelCreating(ModelBuilder
        modelBuilder)
  {
    //Specifies relation between primary key and foreign
        key among two tables
    modelBuilder.Entity<ChildModel>( )
     .HasOne<ParentModel>(parent =>
        parent.ParentReferencePropertyInChildModel)
     .WithMany(child =>
        child.ChildReferencePropertyInParentModel)
        //optional
     .HasForeignKey(child =>
        child.ForeignKeyPropertyInChildModel)
  }
}
```

EF - Async Operations

async

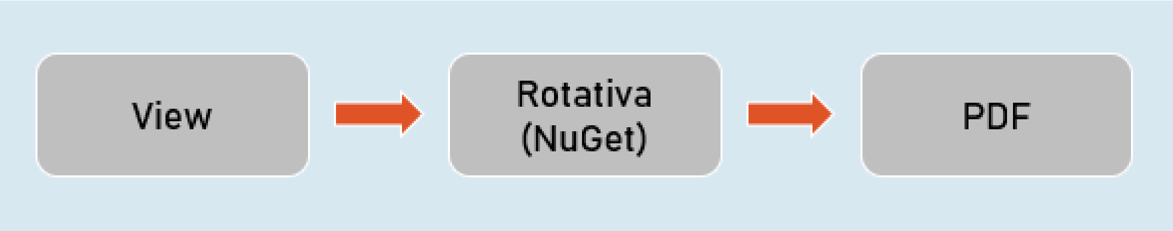
- The method is awaitable.

- Can execute I/O bound code or CPU-bound code

await

- Waits for the I/O bound or CPU-bound code execution gets completed.
- After completion, it returns the return value.

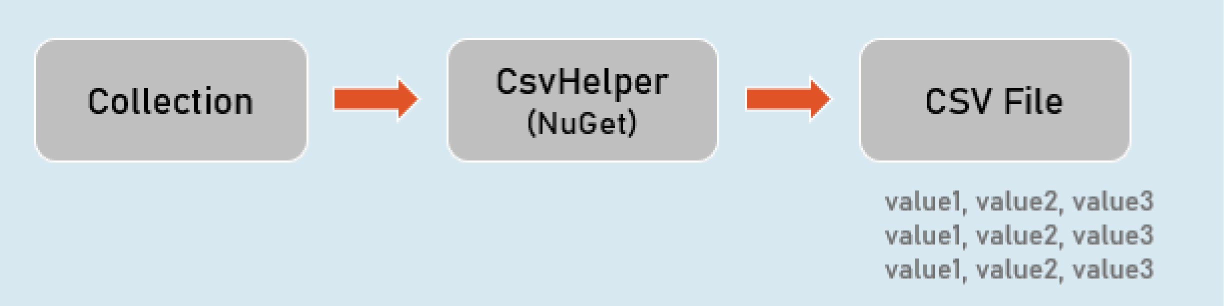
Generate PDF Files



Rotativa.AspNetCore:

```
using Rotativa.AspNetCore;
using Rotativa.AspNetCore.Options;

return new ViewAsPdf("ViewName", ModelObject, ViewData)
{
  PageMargins = new Margins() { Top = 1, Right = 2,
       Bottom = 3, Left = 4 },
        PageOrientation = Orientation.Landscape
    }
```

Generate CSV Files (CSVHelper)



CsvWriter:

WriteRecords(records)

Writes all objects in the given collection.

Eg:

```
1,abc
2,def
```

WriteHeader<ModelClass>( )

Writes all property names as headings.

Eg:

```
Id, Name
```

WriteRecord(record)

Writes the given object as a row.

Eg:

```
1, abc
```

WriteField(value)

Writes given value.

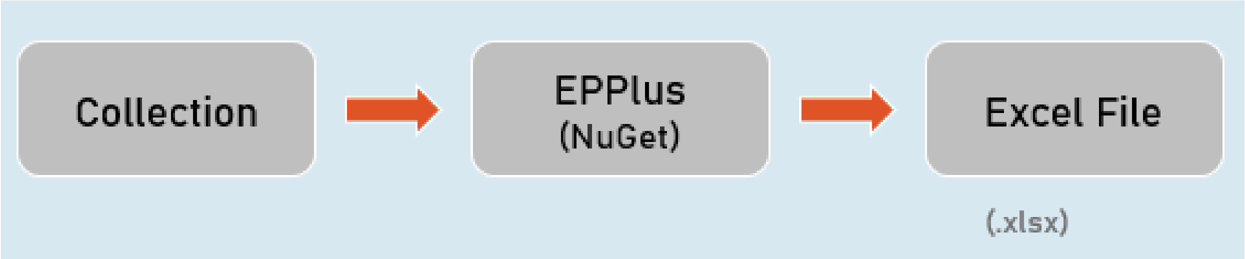
NextRecord( )

Moves to the next line.

Flush( )

Writes the current data to the stream.

Generate Excel Files (EPPlus)



ExcelWorksheet

`["cell_address"].Value`

Sets or gets value at the specified cell.

`["cell_address"].Style`

Sets or gets formatting style of the specific cell.