**.NET Core**

# .NET Core and C# 8

**Day-1**

* Introduction to .NET Core
  + .NET Core – Overview

#### Table of contents

* + Characteristics of .NET Core
  + The .NET Core Platform
  + .NET CORE architecture and Advantages
  + Build and run Cross platform apps
  + .NET Core – Environment Setup
  + .NET Core – Code Execution
  + Middleware
  + .NET Core – Modularity
  + .NET Core – Project Files
  + IIS Publishing & different cross platform deployments
  + Microservices using .NET Core
  + .NET Core – Windows Runtime and Extension SDKs.
  + .NET Core – Create .NET Standard Library.
  + What is .NET Framework
  + Comparison between .NET Framework & .NET Core
* Introduction to C#
  + Features of C#
  + C# Compilation and Execution
  + General Structure of a C# Program
* Data Types and Arrays in C#
  + Data Types in C#
  + Value Types and Reference Types
  + Boxing and UnBoxing
  + Single Dimensional, Multi-Dimensional & Jagged arrays
  + Nullable Types
  + Implicitly Typed Local variables
  + Var vs dynamic
  + Is and as operator
  + Ref vs out keywords
  + The ‘object’ base class in .net
  + Equals() vs ==
  + String vs StringBuilder
  + Various String class methods
  + Default parameters, named parameters
  + Parse() vs TryParse() vs Convert Class methods

**Day-2**

* Debugging in C#
  + Various Types of .NET Projects
  + Tracing, Debugging, Build
  + Compile Options
  + Using break points
  + Using break conditions
  + Using watch and output window
  + Creating multiple projects within one solution
  + Customizing Visual Studio Settings – Extensions, NUGet Package, Environmental Settings
* OOP with C#
  + Structures and enums
  + The architecture of a class in C#
  + Instance, Class & Reference variables
  + Access Modifier
  + Abstract Classes
  + Constructors, Destructors, The GC
  + .NET Base class library
  + Inheritance in C#
  + Method Overloading
  + Method Overriding
  + Operator Overloading
  + Method Hiding
  + Access modifiers: private, pubic, protected, internal, protected internal, new

**Day-3**

* + Anonymous types
  + Abstract classes
  + Sealed classes
  + Creating Interfaces
  + Implementing Interface inheritance
  + Declaring properties within Interfaces
  + Namespaces
  + Creating and using Generic classes
  + Indexers & Properties
  + Auto Implemented properties
  + Static Classes
  + Property Accessors
  + Partial types
  + Extension methods
  + Object Initializer

**Day-4**

* Evaluating Regular Expressions in C#
  + RegEx Class
  + Forming Regular Expression
  + Methods for Regular Expression
* Exception Handling
  + Exceptions in C#
  + Exception class hierarchy
  + Try block
  + Multiple catch blocks
  + Finally block
  + Purpose of throw keyword
  + Purpose of inner exception
  + Creating Custom Exception

**Day-5**

* Garbage Collection in C#
  + Role of a Garbage Collector
  + Garbage Collection Algorithm
  + Finalize vs Dispose
* Collections & Generics
  + System.Collections Namespace
  + Collection Interfaces
  + Collection Classes
  + The collection API
  + Working with Generics
  + Creating Generic class, Generic Methods, Interfaces, Delegates
  + Collection Initializers
  + Iterators
  + Constraints

**Day-6**

* Anonymous Types, Delegates, Events & Lambda
  + Extension Methods
  + Anonymous Type
  + Var and Dynamic
  + Introduction to Delegates
  + Events in C#
  + Anonymous Methods
  + Lambda Expression
  + Expression Tree
* File I/O and Serialization
  + Using StreamReader, StreamWritter
  + Using BinaryReader, BinaryWriter
  + Using File, FileInfo, Directory, DirectoryInfo
  + Serialization modes: Binary, SOAP, XML
  + JSON serialization

**Day-7**

* Threading, Parallel and Async programming with C#
  + Task Parallel Library
  + Threads Vs. Tasks
  + Task Based Asynchronous Model
  + Async and Await
  + Using Locks
* New Features in C# 8.0
  + [Read-only members](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#readonly-members)
  + [Default interface methods](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#default-interface-methods)
  + [Pattern matching enhancements](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#more-patterns-in-more-places):
  + [Using declarations](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#using-declarations)
  + [Static local functions](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#static-local-functions)
  + [Disposable ref structs](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#disposable-ref-structs)
  + [Nullable reference types](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#nullable-reference-types)
  + [Asynchronous streams](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#asynchronous-streams)
  + [Asynchronous disposable](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#asynchronous-disposable)
  + [Indices and ranges](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#indices-and-ranges)
  + [Null-coalescing assignment](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#null-coalescing-assignment)
  + [Unmanaged constructed types](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#unmanaged-constructed-types)
  + [Stackalloc in nested expressions](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#stackalloc-in-nested-expressions)
  + [Enhancement of interpolated verbatim strings](https://docs.microsoft.com/en-us/dotnet/csharp/whats-new/csharp-8#enhancement-of-interpolated-verbatim-strings)

# RDBMS & SQL Server

#### Table of contents

#### Day-8

* Introduction to RDBMS
  + Introduction to databases
  + Data Models in Database
  + Properties of RDBMS
  + Normalization
  + CODD’s Relational Database Rules
  + Data Integrity
  + T-SQL Language
* Working with Data Types, Tables & Data Integrity covering DDL, DML, DCL statements
  + Working with Data Types (Only Basics of Data Types)
  + Working with Schema
  + Working with Tables
  + Implementing Data Integrity

**Day-9**

* Beginning with Transact-SQL
  + Transact-SQL
  + System Functions
  + Advanced T-SQL Queries`
  + Advanced T-SQL Statements
  + Other T-SQL Statements
  + Set Operators
  + Transact-SQL
  + System Functions
  + Advanced T-SQL Queries
  + Advanced T-SQL Statements
  + Other T-SQL Statements

**Day-10**

* Working with Joins and Subqueries
  + What are Joins?
  + Types of joins
  + Subqueries
* Database Objects: Indexes and Views
  + Introduction to Index in SQL Server
  + Introduction to Views in SQL Server
* Stored Procedures
  + Stored Procedure
  + Implementing Stored Procedure
  + Exception handling using TRY-CATCH

# LINQ and Entity Framework Core

**Day-11**

* Language Integrated Query

#### Table of contents

* + Introduction, LINQ Syntax
  + Query Operators
  + Select, from, Where
  + ofType
  + OrderBy
  + ThenBy
  + GroupBy, into
  + Select
  + SelectMany
  + Take, TakeWhile
  + First
  + FirstOrDefault
  + Single
  + SingleOrDefault
  + Aggregate functions Sum, Min, Max, Average, Count
  + Distinct
  + Intersect
  + Except
  + Join

**Day-12**

* + LINQ projection
  + Deferred execution vs immediate execution
  + Let keyword
  + LINQ to Object
  + LINQ to DataTable
* Entity Framework Core
  + Overview of ORM Products
  + Entity Framework introduction
  + Using Database first Approach

**Day-13**

* + Using Code First approach
  + Implementing Repository Pattern
    - Introduction & Benefits
    - Repository Pattern implementation
    - Setting up Entities in EFCore
  + Using LINQ to Entities to perform CRUD operations

**Day-14**

* + SQL Query Logging
  + Migration & Database Update
  + Eager Loading Vs Explicit Loading Vs Lazy Loading
  + Raw SQL And Stored Procedure

# ASP.NET Core Web API

**Program Duration**: 2 Days.

#### Table of contents

#### Day-15

* Introduction to .Net Core WebAPI
  + Introduction to Web Service
  + Introduction to REST API
  + Introduction to Web API
  + Difference between Web Service, WCF Service and Web API
  + HTTPS Verbs
  + Web API Routing
  + Configuring WebApi
  + ľesting the Web API Project with Postman and Swagger
  + Building fiíst ASP.NEľ Coíe Web API
  + Fluent Validation

**Day-16**

* Woíking with Relational Data using Entity Fíamewoík Coíe
  + Relationships in EF Core
  + HTTP Response Status Codes
  + Try-Catch-Finally block
  + Throwing custom exceptions
  + Global error handling
  + Custom global error handling
  + DML Manipulation using Repository Pattern
* Controller Action Return Types
  + Introduction to Controller Action Return Types
  + Specific Type
  + IActionResult
  + ActionResult<Type>
  + Custom Return Type
* Web API Versioning
* Web API Logging
* Unit Testing in Web API

# React and JavaScript

# Day-17

* Introduction to JavaScript
  + Introduction to Scripting
  + JavaScript Characteristics
  + JavaScript and Common Programming Concepts
  + JavaScript Flavors and Versions
  + Technologies Based on JavaScript
  + Server-Side vs. Client-Side Applications
  + Annotating Your Code with Comments
  + Expanding the Role of JavaScript
* Working with Variables and Data in JavaScript
  + Using JavaScript to Communicate with the User
  + Using Data More Than Once: Variables
  + JavaScript Operators
  + JavaScript Expressions
  + JavaScript Alerts and Prompts
  + Inline Scripting, Simple User Events and Basic Event Handlers
  + JavaScript Keywords and Reserved Words

**Day-18**

* Functions, Methods and Events in JavaScript
  + Introduction to Functions
  + Defining a Function
  + Calling a Function
  + Methods as Functions
  + Types of Functions
  + User Events and JavaScript Event Handlers
* Debugging and Troubleshooting JavaScript
  + What Is Debugging?
  + Tools for Debugging Code
  + Testing Code in Various Browsers
  + Debugging Logic Errors
  + JavaScript and Mobile Devices

**Day-19**

* Controlling Program Flow in JavaScript
  + Controlling Decisional Program Flow
  + The if...else Statement
  + The while Statement
  + The do...while Statement
  + The for Statement
  + The break Statement
  + The continue Statement
  + The switch Statement
* The JavaScript Document Object Model (DOM)

**Day-20**

* Introduction to React
* Building Blocks of Web Application Development
  + Single-page and Multi-page Applications
  + Different Client-side Technologies
  + MVC Architecture
  + Introduction to React
  + Installation of React
  + JSX and its use case
  + DOM
  + Virtual DOM and its working
  + ECMAScript
  + Difference between ES5 and ES6
  + NPM Modules
  + Hands On:
    - Installation of Node.js, React and Visual Studio Code
    - Creating First React Application
* Components and Styling
  + React Elements Render Function Components Class Component
  + Component Constructor Functional Components Multiple Components Props
  + Props with Class based Component Props with Function based Component States
  + Component Lifecycle React Events
  + React Forms
  + Different Form Concepts Styling in React
  + Inline Styling CSS Stylesheet
  + SASS module
  + Styled component
  + Building Music Shop Application using React Components
  + Hands On:
    - Build a Music Store Application using React Components
* Handling Navigation
  + Routing
  + react-router
  + Features of react-router
  + Configuration of routing using react-router Navigation using Links
  + 404-page (Not found Page) URL Parameters
  + Nested Routes
  + Implementing styles using NavLink
  + Application Programming Interface
  + Build a REST API using json-server
  + API consumption in React application using Fetch method
  + Build a dynamic Music Store application using Routing and API connectivity
  + Hands On:
    - Dynamic Store Application with Routing and API connectivity
* State Management with Redux
  + What is Redux?
  + Redux Architecture
  + Redux Action
  + Redux Reducers
  + Redux Store
  + Principles of Redux Pros of Redux
  + NPM Packages required to work with Redux
  + More about react-redux package
  + Hands On:
    - Building an application to list the items using React and Redux
    - Building application using React, Redux, and promise middleware
* React Hooks
  + Caveat of JavaScript classes.
  + Functional components and React hooks
  + What are React hooks?
  + Basic hooks useState() hook
  + How to write useState() hook when state variable is an array of objects
  + useEffect() hook
  + Fetch API data using useEffect() hook
  + useContext() hook
  + useCallback
  + useMemo
  + useRef
  + Rules to write React hooks
  + Additional hooks
  + Custom hooks
  + Hands On:
    - Fetch API data using useEffect() hook
    - Pass multiple Context using useContext() hook Writing custom hooks
    - Building application using React hooks
* React Application Testing and Deployment
  + Define Jest
  + Setup Testing environment
  + Add Snapshot testing
  + Integrate Test Reducers
  + Create Test Components
  + Push Application on Git
  + Deploy App on Heroku
  + Hands On:
    - Testing application using Jest
    - Application Deployment

**TypeScript**

**Program Duration**: 1 Day

* Introducing TypeScript
* TypeScript Syntax
* Programming Editors
* The Type System – Defining Variables
* The Type System – Defining Arrays
* Type in Functions
* Type Inference
* Defining Classes
* Class Methods
* Visibility Control
* Class Constructors
* Class Constructors – Alternate Form
* Interfaces
* Working with ES6 Modules
* var vs let
* Arrow Functions
* Arrow Function Compact Syntax
* Template Strings
* Generics in Class
* Generics in Function