.NET Developer Contents

Workshop Details:

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| --- | --- |
| Duration: | 34 Days |
| Description: | Full stack .NET Developer course contents |
| Objectives: | This course helps participants to become a fullstack .NET developer. |
| Participants’ Entry Profile: | Participants attending this course must have development experience on:   * Basic knowledge of HTML and JavaScript |
| Training Methodology: | The workshop will follow Synergetics methodology of   * Concept Visualization * Active Experimentation * Application Development   The workshop will be 100% Hands-On with each participant having access to system during the session |

Setup Requirements:

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| --- | --- |
| Hardware and Software Requirements: | Participant’s as well as Trainer’s Machine are required to have:  Hardware   * Intel Pentium 4 [2+ GHz recommended] * 8 GB RAM * 50 GB HDD space * LAN connectivity * Good Internet connectivity and bandwidth   Software [Installed]   * Windows 10 * Visual Studio 2019 Community * .NET Framework 4.7 or later * .NET Core 5 * SQL Server 2016 * SQL Server Management Studio 2016 * NodeJS 14.x * Postman REST client * Visual Studio Code * Chrome, Firefox and Internet Explorer |
| Training Lab Requirements: | Whiteboard 6 feet by 4 feet (minimum)  Whiteboard markers – Red, Blue, Green, Black  Video Projector (1024 X 768 resolutions) |
| Virtual Lab Requirements:  [Optional] | Virtual labs can be provided for participants, that provides completely configured platform to work with. |

Course Contents:

Day 1

Programming with C# 8.0

* Features of C#
* C# Compilation and Execution
* Assemblies – EXE and DLL
* Creating and Using a DLL
* Global Assembly Cache
* Private and Shared Assemblies
* Signing Assemblies
* Single file and multifile assemblies
* 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 and dynamic declarations

Day 2

Object Oriented Programming with C#

* Classes and Objects
* Constructors
  + Static and non-static constructors
* Object initialization in C#
* Access modifiers
* Properties and Indexers
* Method Parameters (out, ref and params)
* Const and read-only declarations
* Optional Parameters and Named Arguments
* Checked and unchecked statements
* Static and non-static members
* Anonymous class objects

Inheritance

* Inheriting from base class
* Abstract base class
* Abstract methods and virtual methods
* Defining methods with new keyword
* Overriding methods
* Interfaces
  + Implementing interfaces
  + Explicitly implement interface.
  + Defining types in interfaces

Day 3

Classes and methods

* Static classes
* Partial Classes
* Sealed classes
* Nested classes
* Structures Vs Classes
* Method overloading
  + Operator overloading
  + Function overloading
  + Constructor overloading

Delegates, Events and Lambdas

* Concept of Delegates
* Singlecast and Multicast Delegates
* Understanding C# Events
* Anonymous Method Explained
* Lambda Expressions
* Anonymous Types
* Extension Methods

Day 4

Collections & Generics

* System.Collections Namespace
* Collection Interfaces
* Collection Classes
  + List and Dictionary
  + Set and Property classes
* Working with Generics
* Generic Methods, Interfaces, Delegates
* Collection Initializers
* Iterator and IEnumerable
* Creating custom collection classes

Exception Handling in C#

* Exception Handling in C#
* The System.Exception class
* Try..catch statement
* Multiple Catch statements
* User Defined Exception

Day 5

IO & Serialization

* System.IO namespace
* File, Directory, FileInfo and DirectoryInfo classes
* StreamWriter and StreamReader
* BinaryWriter and binaryReader
* Reading and writing using FileReader
* DataContract Serializer
* Json Serialization

Task Parallel Library

* Task Parallelism and Data Parallelism
* Task and Parallel classes
* TaskFactory and Task.Run
* Creating continues tasks
* Cancelling long running tasks
* Async and await keywords

Day 6

Introduction to LINQ

* LINQ Architecture and Components
* Basic query operations with LINQ
* Linq to Objects
* Linq query vs Linq methods

LINQ Methods

* LINQ Query and functions
* Selecting data
* Filtering using Where
* Ordering data
* Single, SingleOrDefault
* First and FirstOrDefault
* Take and Skip
* Group and joins

Day 7

Introduction to Windows forms

* Console vs Windows Application
* Challenges for Windows Applications
* Windows Forms
  + Border types and other properties
  + Form Events
* Common controls
* Event Handling in forms

Forms and Controls

* ToolStrip Control
* Anchor Styles
* Docking Styles
* Using Layout to design the Window
* FlowLayout Panel
* TableLayout Panel
* Visual inheritance
* Set the Tab Order for Controls
* Anchor a Control in Windows Forms
* Dock a Control in Windows Forms
* Dialog Boxes

Day 8

Working with MDI Forms

* SDI vs. MDI Applications
* Creating MDI Applications
* Creating MDI Child Forms

Working with Menus

* How to Create a Menu
* How to Create a ToolStrip
* How to Create a Context Menu
* How to Create a Status Bar

Day 9

Introduction to ASP.NET

* Understanding the HTTP based request processing model
* Event driven application development with ASP.NET

ASP.NET architecture

* HTTP handlers and modules
* Page lifecycle
* ASP.Net webforms
* Introducing server side controls
* Code behind model
* Posting and cross page posting

Day 10

Server side controls

* Basic controls like textbox, button, linkbutton etc
* Validation controls
* Data bound controls e.g. gridview, repeater etc

State management

* Server side state management
* Client side state management
* In process and out of process state storage

Providing uniform content

* Master and child pages
* User controls

Using Ajax

* Introducing Ajax Control Toolkit
* Update panel and scriptmanager
* Basic Ajax controls

Day 11

Authentication

* Windows authentication
* Forms authentication

Configuring an asp.net application

* Introduction to web and machine config files
* Sections and section handlers in web.config files
* ASP.NET application file (global.asax)

Application Hosting

* IIS

Day 12

Introduction to ADO.NET

* Getting Started with ADO.NET 4.5
* Connected and Disconnected Architecture
* System.Data namespace
* ADO.NET Generic Classes

Working with Connected Architecture

* Creating SqlConnection
* Use of Command object
* Reading data using SqlDataReader
* Commands to Manipulate Data
* Multiple Active ResultSets

Working with Disconnected Architecture

* Using SqlDataAdapter
* Creating and Using DataSet to retrieve Data
* Manipulating Database using DataSet
* Managing Data Integrity and Concurrency

Day 13

Advanced Database concepts

* Typed and untyped datasets
* Creating DataSet
  + Named and unnamed datatables
  + DataRow, DataColumn
* Setting constraints on a DataTable
  + Primary Key
  + Unique
  + Foreign Key
* SqlCommandBuilder class
  + Insert, Delete and Update commands
* Binding Form controls using DataSets
* Creating Relations in DataSet
* DataView and DataViewManager

XML support in ADO.Net

* Reading and Writing to XML files
* Integrating XML and Relational Data

Day 14

Introduction to Entity Framework

* What is ORM?
* What is Entity framework?
* Entity Data Model
  + Code First Approach
  + Database First Approach
  + Model First Approach

Building a Model using Code-First approach

* Code First with a New Database
* Code First with an Existing Database
* Enabling Migrations
* Creating DbContext
* DbSet<T>
* Data models and Data annotations
* Setting primary key and Identity column
* Creating Relationships
* Adding a New Class
* Modifying an Existing Class
* Deleting an Existing Class
* Recovering from Mistakes
* Downgrading a Database
* Seeding Database

Day 15

Building models using Database First approach

* Setting up Database
* Working with EDMX Designer
* Uncovering the EDMX
* Connection Strings for EF
* Dealing with Database Changes
* Importing Stored Procedures
* Function Imports
* Working with Enums

Data annotations and Fluent API on Code First approach

* Overriding Conventions using Data Annotations
* Fluent API: Basics
* Fluent API: Relationships
* Fluent API (Advanced Configurations)
* Organizing Fluent API Configurations

Day 16

Querying Data using LINQ

* LINQ in Action
* LINQ Extension Methods
* Deferred Execution
* IQueryable Explained
* Lazy Loading
* Eager Loading
* Explicit Loading
* Implementing the Repository Pattern

CRUD operations using Entity Framework

* Retrieving table values
  + Filtering and ordering data
  + Selecting columns
* Adding table entries
* Updating and deleting records

Day 17

Fundamentals of ASP.NET MVC

* ASP.NET MVC Architecture
* ASP.NET Web Forms vs. ASP.NET MVC
* Page Controller and Front Controller
* Structure of an ASP.NET MVC application

ASP.NET MVC 5 project structure

* Working with Visual Studio MVC 5 Projects templates
* ASP.NET MVC Project folder- Model, Views, Controller
* MVC Framework and Application Structure
* MVC Application Execution Process
* ASP.NET MVC Application using Areas

Overview of Models, Views, and Controllers

* Controllers and Action Methods
* Views and UI Rendering
* Models

URL routing in ASP.NET MVC

* Introduction to Routes
* URL Patterns
* RouteConfig files
* Default Values for URL Parameters
* Handling Segments in a URL Pattern
* Adding Constraints to Routes
* Creating URLs from Routes
* URL Parameters in a Routed Page
* MVC 5 Attribute routing
  + HttpGet and HttpPost
  + Route and RoutePrefix

Controllers

* Controllers in MVC
* Actions – GET and POST
  + AntiForgeryToken
* Type of ActionResult
* ViewBag, ViewData or TempData
* Asynchronous Controller

Day 18

Views

* Razor's Goals
* Layout Views
* Expressions and Scrips in Views
* ViewBag, ViewData and TempData
* HTML Helpers
* Custom HTML Helpers
  + Local custom helpers
  + Global custom helpers
* Partial Views
  + Html.Partial and Html.RenderPartial
* Html.Action and Html.RenderAction

Filters

* Filtering action methods
* Global action filters
* Custom Action Filters
* Handling errors
* Authentication Filters

Model Validations

* Model Validation
* Data Annotations
* Custom Validation
* Self-validating models
* Client validation
* Remote validation

Day 19

Connecting DB using Entity Framework

* Code First: Convention over Configuration
* Code first migrations
* Data Access Layer with Entity Framework
* Validating Data
* Validating using Data Annotations
* Displaying Validation Errors

Dependency Injection

* Dependency Resolution
* Benefits of DI
* IoC Containers
* Controller Injection
* Controller Factories

Day 20

Introduction to RESTful Services

* What is REST?
* RESTful services vs Web Services
* Benefits of using REST services
* Why Web API2?
* REST services using Web API2 and WCF
* Upgrading from Web API 1
* HTTP Status Codes
* HttpResponseMessage
* Http Request and Response
* Http Headers

Developing RESTful Services

* Web APIConfig
  + Configuring routes
  + Attribute Routing
* MVC Controller and Web API Controller
* RouteData, Query string and Body
* Models
  + Validations
  + Annotations
* IHttpActionResult vs HttpResponseMessage

CRUD operations in Web API 2

* Inserting data using HTTP POST
* Querying collections
* Querying single records
* Sorting, Paging and Filtering
* URL parameters
  + Constraints
* Updating data using HTTP PUT
* Deleting data using HTTP DELETE

Day 21

Consuming Web API

* Enabling CORS policy
* Testing services using POSTMAN
* Consuming services from jQuery
* Consuming services using C#
  + HttpClient

Securing Web API2 services

* Authentication and Authorization
* Authorize attribute
* Role based Access control
* Token based authentication
* Preventing CSRF
* Enabling SSL

Day 22

Exception Handling

* HttpResponseException
* Exception Filters
* Registering Exception filters
* HttpError

Advanced features on Web API2

* Dependency Injection
* Caching
* Content negotiation
* Media formatters
* Custom media formatters

Day 23

Elements of WCF Communication

* Introduction to WCF
* Benefits of WCF
* ABC of WCF
  + Address
  + Binding
  + Contract

Overview of Bindings

* BasicHttpBinding
* WsHttpBinding
* NetTcpBinding
* DualHttpBinding

Overview of Contract Types

* Service Contracts
* Data Contracts
* Fault Contracts
* Message Contracts
* Duplex Contracts

Creating and Invoking a WCF Service

* Retrieving endpoint definitions
* Using SvcUtil.exe
* Using Service References
* Programming channels
* Specifying client endpoints
* Channel lifecycle
* Using the proxy class
* Configuring client channels
* Exceptions and faults
* Invoking services asynchronously

Day 24

Runtime Execution

* WCF runtime behaviors
* Instancing
* InstanceContextMode.PerCall
* InstanceContextMode.Single
* InstanceContextMode.PerSession
* Sessionful bindings
* Managing session lifetime
* Durable services

WCF Threading

* ConcurrencyMode.Single
* ConcurrencyMode.Reentrant
* ConcurrencyMode.Multiple
* UseSynchronizationContext

Day 25

Introduction to .NET 5

* What is .NET 5 framework?
* New features of .NET 5
* CLI based development
* C# Language improvements
* .NET 5 framework Architecture
* .NET Framework vs .NET Core vs .NET 5

Developing with ASP.NET 5

* ASP.NET 5 Project structure
* Installing packages
* Update on meta package reference
* Working with .NET CLI
* Project templates and options

Hosting environment

* Self-Host vs Web Server
* Using Kestral server
* Using Kestral with ReverseProxy
* Configuring Host
  + Generic Host vs WebHost
  + Default Host configurations

Middleware in ASP.NET

* Introduction to Middleware
* Application startup class
  + Configure and ConfigureServices methods
* New Http Request Pipeline
* Creating and ordering middleware
  + Use, Run, Map, MapWhen
* Configuring Services
  + Controller and View
* Built-in middleware
  + Routing
    - End Point based routing
    - MVC based routing
  + Static File Server
  + Default file handler
  + Directory browser
  + File Server
  + Developer Exception Page
  + Exception handler
  + Configuring status code pages

Day 26

Dependency Injection

* Understanding DI system
* Constructor injection
* Service lifetime
  + Singleton
  + Transient
  + Scoped
* Register custom services
* RequestServices collection
* Need for Third party DI engines
  + Configuring AutoFac IoC container

Configuration in ASP.NET 5

* Configuring configuration Providers
  + Command-line arguments
  + Environment variables
  + In-memory provider
  + JSON, XML, INI file providers
  + Key Per File
* Reading Configuration values
  + GetValue() method
  + GetSetion() method
  + Binding to class Object
* Creating configuration using ConfigurationBuilder

Day 27

ASP.NET 5 MVC

* Creating controllers and actions
  + IActionResult return type
* Creating TagHelpers
* Html Helpers vs TagHelpers
* Working with Tag Helpers
  + Writing tag helpers
  + Tag helpers in forms
  + Map attributes to variables
  + Binding model variables using ModelExpression

Routing in ASP.NET 5

* Understanding routing feature
* Configuring Routing middleware
* Multiple routes
* Attribute routing
* Route constraints
* Generating URLs by action name and route
* Defining areas

Configuring Caching

* Configuring In-memory caching
* Configuring Distributed Caching
  + In-Memory Distributed Caching
  + SqlServer distributed caching
  + Redis Distributed Caching

Day 28

State management in .NET 5

* State management techniques
* What’ different from MVC 5
  + Session Service and Middleware
  + Cookies
  + Configuring TempData provider
    - Session Based
    - Cookie based
* What is HttpContext.Items?
* Dependency Injection

Working with EF

* EF NuGet packages
* Register Context with DI
* Configuring DBContext and model classes.
* Perform database migration using command
* CRUD operations using EF
* Paging, Sorting, Filtering, grouping
* Validations on models
* Perform code migrations on Application startup

Day 29

Security on .NET 5 MVC

* Prevent Cross-site scripting
* Configuring Identity services in MVC
  + Google
  + Facebook
  + Microsoft
* Configure Cookie Policy (GDPR)
* Enable HTTPS

RESTful Services using .NET Web API

* Creating API controller
  + ControllerBase vs Controller
* Why to use ApiController Attribute
* Configuring Route prefix for controller
* Configuring routes and constraints
* CRUD operations using Web API

Exception Handling

* Developer exception page
* Custom exception handling page
* Server exception handling
* Exception filters
* Handling model state errors

Day 30

Documenting Web APIs

* What is Open API Specification
* NuGet Packages
* Configuring swagger Middleware
* Creating Help Pages using Swagger
* Swagger UI
* Testing Swagger

Formatting Responses

* Format-Specific Action Results
* Content negotiation
* XML and JSON serialization
* Custom formatters

Security on .NET

* JWT Token based authentication
* Enabling Cross-Origin Requests (CORS)
* Enable HTTPS

Day 31

Razor pages fundamentals

* Why to use Razor pages apps?
* Razor pages application architecture
* Lunchsettings and appsettings
* Razor pages and Pages folder
* TagHelpers
* ActionResults
* Configuring middleware

Routing and Page Handlers

* Adding code block in pages
* Passing parameters in URL
* Working with Layouts
* Create Get Handler and Razor Page
* Create Post Handler and Validations
* Model validation and submit data

Day 32

Configuring Advanced features

* SQL Injection
* Cross-site Scripting
* Open Redirect Attacks
* Cross-Site Request Forgery
* Dependency Injection

Day 33

Creating Blazor applications

* What is Blazor?
* Client-side rendering and Server-side rendering
* Blazor Server – How Blazor apps works?
* Blazor project structure and files
* Components in Blazor applications
  + Razor pages
  + Importing namespaces
* Lifecycle methods
* Defining layout for components
* Dependency Injection

Routing in Blazor apps

* Endpoint routing integration
* Route templates
* Custom content for NotFound result
* Defining routes
* Defining route parameters and constraints

Day 34

Forms in Blazor components

* Creating forms
* Forms with models
* Form validation
* Event handling
* Calling a Web API