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de IT

Introduction to Programming

Curriculum

1. What is Computer Programming?
2. Your First C# Program
3. What is .NET Framework?
4. What is Visual Studio?
5. What is MSDN Library?

What is Computer Programming

Defining: Computer Programming

Computer programming: creating a sequence of instructions to enable the computer to do something

Definition by Google

Programming Phases

- Define a task/problem = Specification
- Plan your solution = Design
  - Find suitable algorithm to solve it
  - Find suitable data structures to use
- Write code = Implementation
- Fix program error (bugs) = Testing & Debugging
- Make your customer happy = Deployment

Your First C# Program

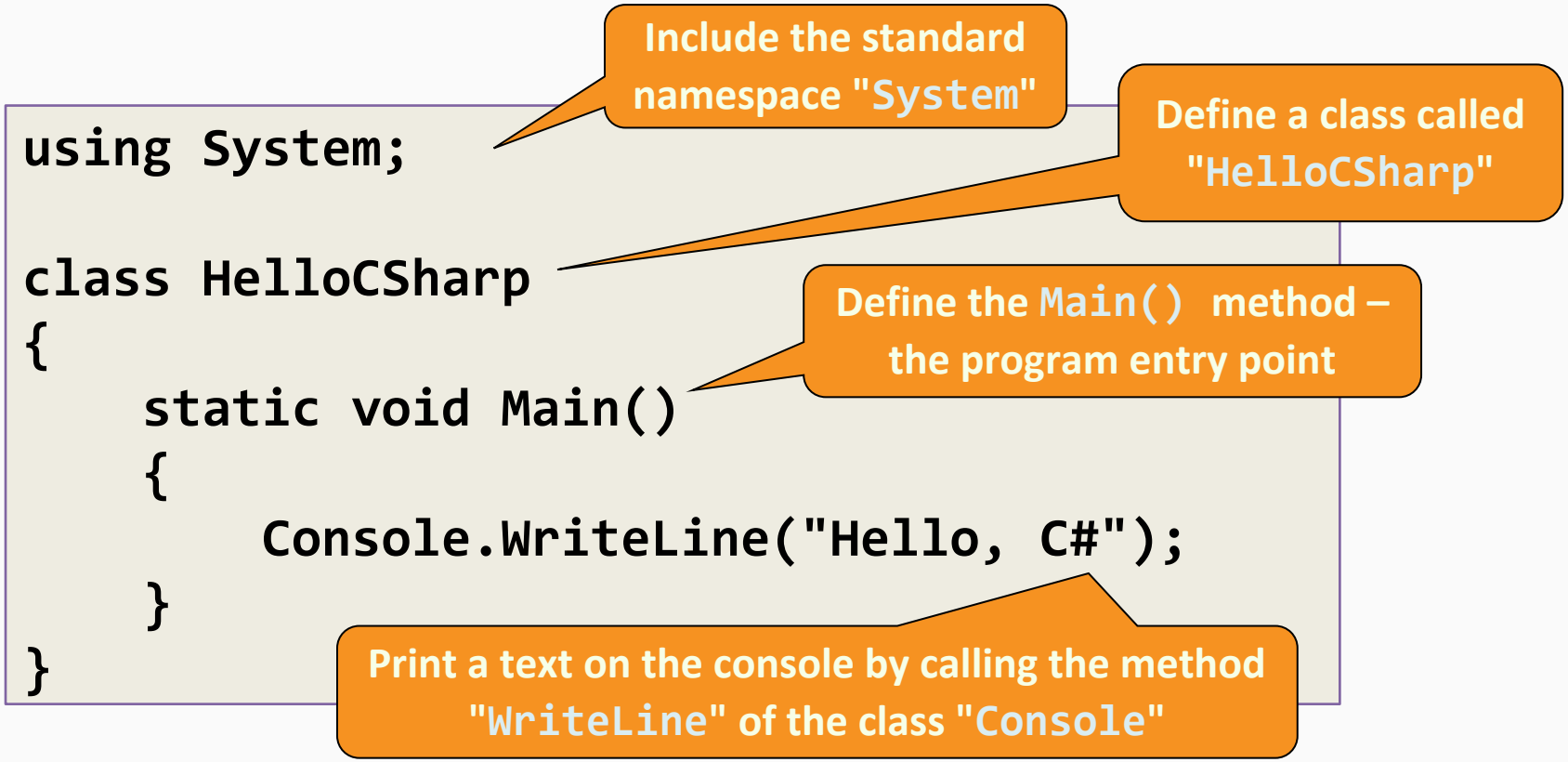
First Look at C#

- **Sample C# program:**

```
using System;

class HelloCSharp
{
    static void Main()
    {
        Console.WriteLine("Hello, C#");
    }
}
```

C# Code - How it works?



C# Code Should Be Well Formatted

Class names should use PascalCase and start with a CAPITAL letter.

```
using System;

class HelloCSharp
{
    static void Main()
    {
        Console.WriteLine("Hello, C#");
    }
}
```

Example of Bad Formatting

```
          using
System
                                                    ;


    class          HelloCSharp                      {
        static
void        Main(                  )   {   Console   .
WriteLine    ("Hello, C#"     )  ;Console.
   WriteLine         (                "Hello again"
                     )                        ;}}
```

Such formatting makes the source code unreadable

What is “C#”?

- Programming language
  - A syntax that allow to give instructions to the computer
- C# features:
  - New cutting edge language
  - Extremely powerful
  - Easy to learn
  - Easy to read and understand
  - Object-oriented

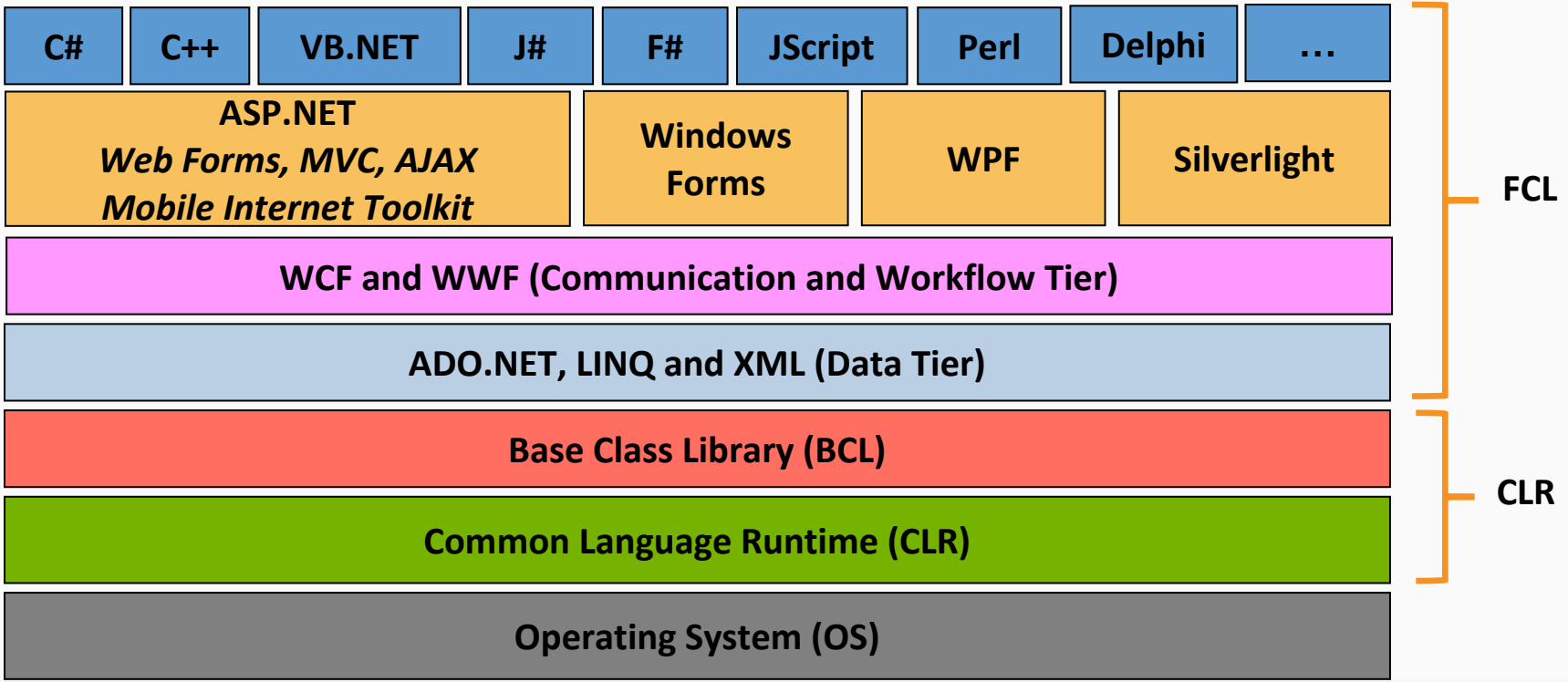
What is .NET Framework?

What is .NET Framework?

- Environment for execution of .NET programs
- Powerful library of classes
- Programming model
- Common execution engine for many programming languages
  - C#
  - Visual Basic .NET
  - Managed C++
  - ... and many others

Inside .NET Framework

- Building blocks of .NET Framework



CLR - The Heart of .NET Framework

- Common Language Runtime (CLR)
  - Managed execution environment
    - Executes .NET applications
    - Controls the execution process
  - Automatic memory management (garbage collection)
  - Programming languages integration
  - Multiple versions support for assemblies
  - Integrated type safety and security

Framework Class Library

- Framework Class Library (FCL)
  - Provides basic functionality to developers:
    - Console applications
    - WPF and Silverlight rich-media applications
    - Windows Forms GUI applications
    - Web applications (dynamic Web sites)
    - Web services, communication and workflow
    - Server & desktop applications
    - Applications for mobile devices

What is Visual Studio?

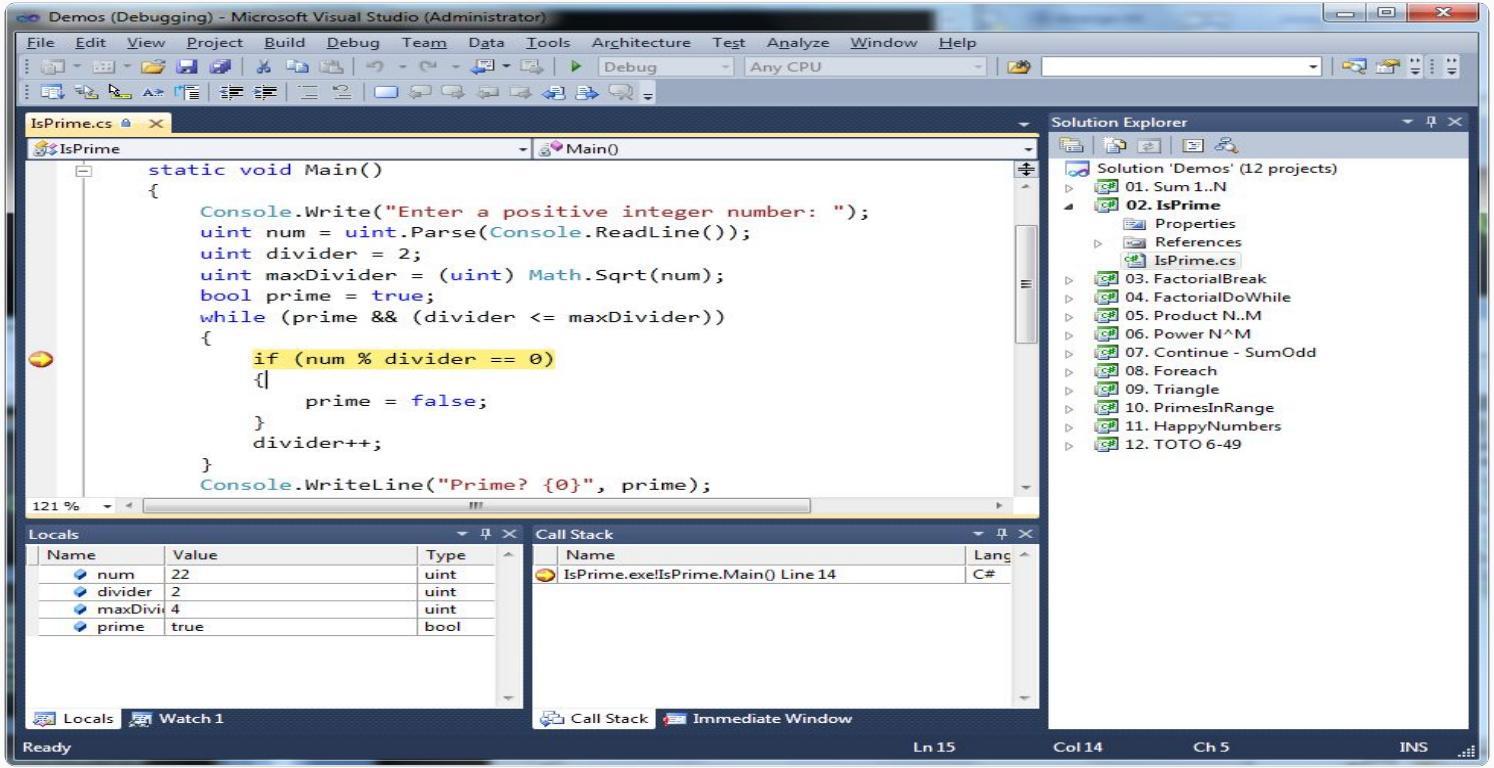
Visual Studio

- Visual Studio – Integrated Development Environment (IDE)
- Development tool that helps us to:
  - Write code
  - Design user interface
  - Compile code
  - Execute / test / debug applications
  - Browse the help
  - Manage project's files

Benefits of Visual Studio

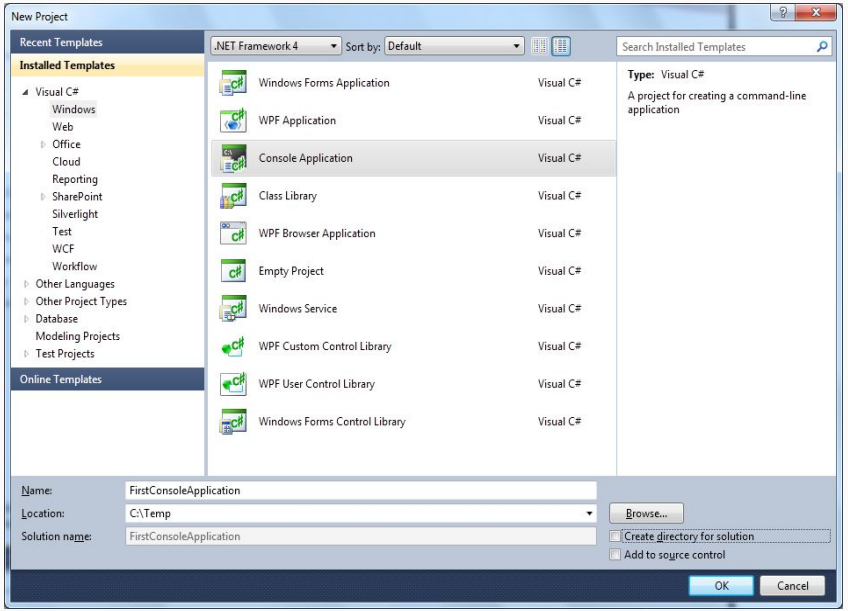
- Single tool for:
  - Writing code in many languages (C#, F#, …)
  - Using different technologies (Web, console, mobile, WPF …)
  - For different platforms (x86, x64, ARM, Windows, Linux, macOS)
- Full integration of most development activities (coding, compiling, testing, debugging, deployment, version control, ...)
- Very easy to use!

Visual Studio - Example



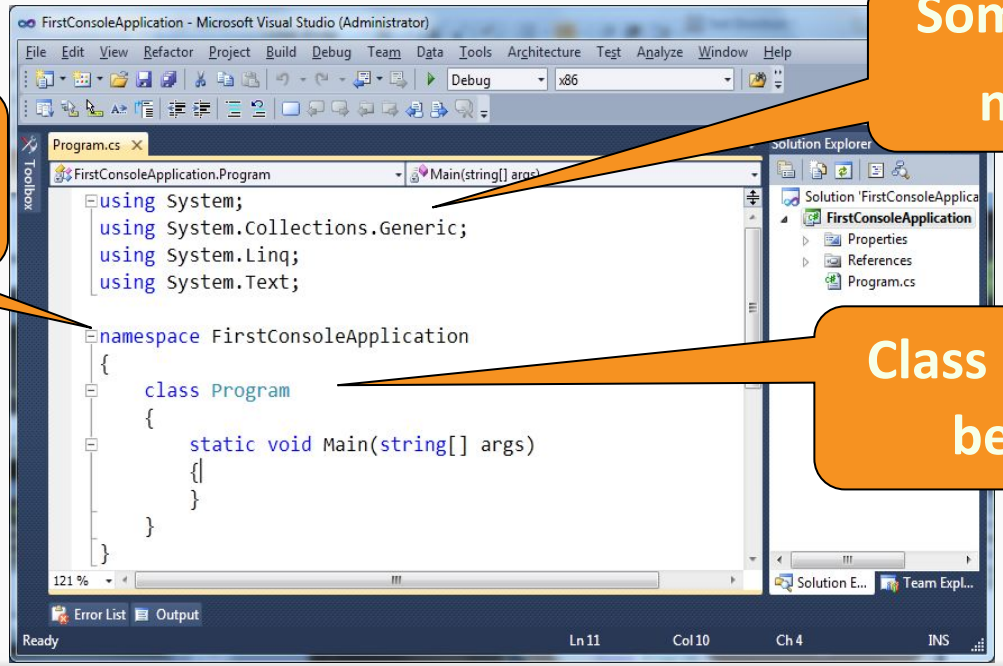
Creating a New Console Application

1. File → New → Project ...
2. Choose C# console application
3. Choose project directory and name



Creating a New Console Application (2)

4. Visual Studio creates some source code for you



Namespace not required

Some imports are not required

Class name should be changed

Compiling Source Code

- The process of compiling includes:
  - Syntactic checks
  - Type safety checks
  - Translation of the source code to lower level language (MSIL)
  - Creating of executable files (assemblies)
- You can start compilation by
  - Using Build->Build Solution/Project
  - Pressing [F6] or [Shift+Ctrl+B]

Running Programs

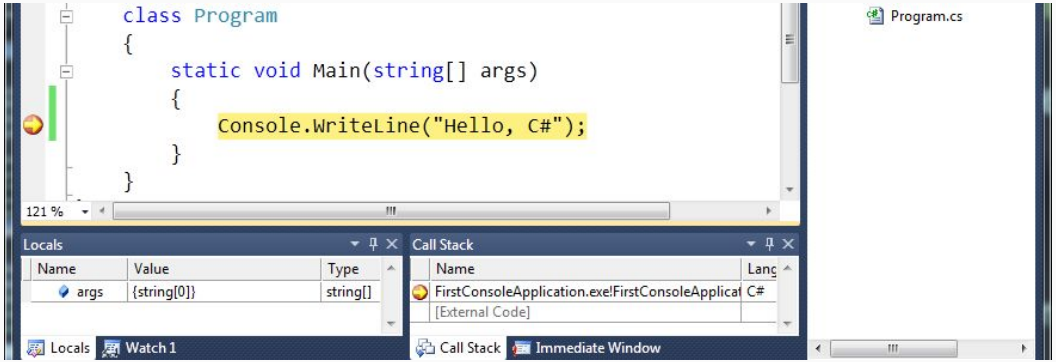
- The process of running application includes:
  - Compiling (if project not compiled)
  - Starting the application
- You can run application by:
  - Using Debug->Start menu
  - By pressing [F5] or [Ctrl+F5]
  - * NOTE: Not all types of projects are able to be started!

Debugging The Code

- The process of debugging application includes:
  - Spotting an error
  - Finding the lines of code that cause the error
  - Fixing the code
  - Testing to check if the error is gone and no errors are introduced
- Iterative and continuous process

Debugging in Visual Studio

- Visual Studio has built-in debugger
- It provides:
  - Breakpoints
  - Ability to trace the code execution
  - Ability to inspect variables at runtime

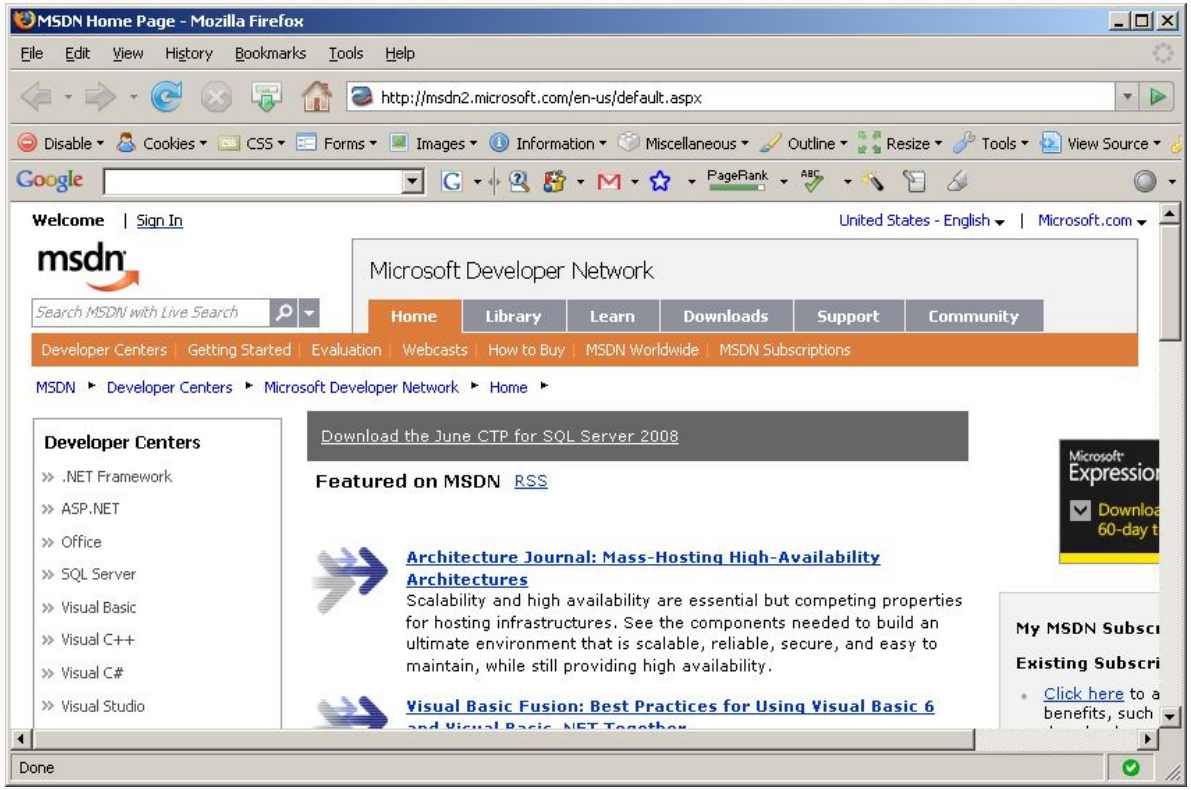


What is MSDN Library?

What is MSDN Library?

- Complete documentation of all classes and their functionality
  - With descriptions of all methods, properties, events, etc.
  - With code examples
- Related articles
- Library of samples
- Use local copy or the Web version at http://msdn.microsoft.com/
  - Visual Studio 2017 Community Edition is FREE for academic use

MSDN Library



How to use MSDN Library?

- Offline version
  - Use the table of contents
  - Use the alphabetical index
  - Search for phrase or keyword
  - Filter by technology
  - Browse your favorite articles
- Online version
  - Use the built-in search