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.NET Tools for Software Development: Tool Selection, Key Benefits of .NET Web Applications

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Aims: This report analysis the top 5 .NET tools that can be used to develop website and software.
Study Design: We have shortlisted the 5 .NET tools that can be used to design and implement website and software.
Methodology: According to Microsoft, .NET is a software-based approach for integrating information, users, technologies, and devices, and it encompasses everything that an organization requires to build and deploy an integrated data architecture: servers used to host services; development tools; and apps that utilize them. We have selected Web essential for Visual studio, Resharper, Ncrunch, NuGet and Elmah tools.
Results: The exposed qualities connect to modern emerging techniques such as components, allocation, software and services, and online redirection. As a result of the available options, .NET is recognized as one of the most extensively used software development platforms. The framework .NET's of devices and technologies as well as their optimal usage in practice, need knowledge with its tool set.
Conclusion: The NET-framework offers a variety of software types, with a focus on producing apps for Windows, mobile devices, and the Internet. Windows applications can be terminal (text-based) or graphical, including drivers, libraries, and services. Applications for mobile devices are created for smartphones and tablets. ASP.NET web services and web applications written for the Internet.

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1. INTRODUCTION

Today's applications often necessitate the combination of XML and relational data together within object-oriented programming language (OOPL). The connection between both the underlying data and the OOPL has traditionally been managed by offering a call-level interface with a particular API for application programming (API) that developer utilizes to facilitate the conversations between both the OOPL and the data using function calls and query string representations. Aside from call-level interfaces, there are numerous object-relational mapping (ORM) techniques, such as the Java Persistence API, that offer a layer of abstraction to combine the OOPL and the relational database [1].

The.NET framework's success has resulted in a significant increase in the amount of third-party solutions. In the.NET environment, there is a treasure mine of free tools, with most developers currently utilizing well-known tools like the Notepad++ editor and open-source code exchange sites like SourceForge.net. These technologies assist Dotnet developers to construct user-friendly apps while increasing productivity. However, choosing the correct tool is more straightforward than it appears. Often, developers must conduct extensive research to determine what would perform effectively for business, which is a time-consuming and tiresome procedure [2].

Microsoft.NET is a software development framework and ecosystem that enables the quick development of desktop and web applications. It is a well-known free platform that is currently used for a variety of applications because it provides the development environment for the most of software development lifecycle. .NET is best suited for organizations that require a wide range of capabilities, such as web applications, desktop applications, and cloud support infrastructure [2].

1.1 History of .NET Framework

In the late 1990s, Microsoft began creating the.NET platform. The objective was to create a platform on programming language, or software that can operate in a runtime. This was necessary in order to increase technical expertise and liberate engineers from having to deal with security processes, active memory usage, and other low-level duties that C/C++ programmers would be required to deal with [3].

1.1.1 The .NET 5 and .NET 6 era

The business confirmed the crucial release that will tie the ecosystem together in May 2019: the.NET 5 development platform, which will encompass all.NET elements. the.NET 5 integrated development platform was eventually deployed in November 2020. The successors to.NET Core 3.1 and.NET Framework 4.8,.NET 5, provides order to the.NET world by offering a wide range of options for developing programs for Linux, Windows, macOS, iOS, Android, watchOS, tvOS, and WebAssembly. The platform includes new APIs, runtime capabilities, and language features. .NET 5 also includes ASP.NET Core, Entity Framework Core, Xamarin, WPF, ML.NET, and WinForms [4].

1.1.2 .NET Core

.NET Core was launched in 2016. It is a.NET Framework re-build that is cross-platform. Engineers may now use the program on Linux and macOS, rather than only Windows, to create apps that aren't necessarily confined to a Windows family. Because certain cloud services, including such Digital Ocean, are Linux-based, the new system wants to dominate the market. In addition to being Core cross-platform, however its various versions may reside on the same device. Net Core includes ASP.NET Core and the Universal Windows Platform [3,4].

1.2 Benefits of .NET

Following are the benefits of .Net framework [5]

Object oriented software development model

- NET is an object-oriented programming framework (OOP).
- NET allows for the reuse of code and components, which saves time and, as a result, the cost of development.

Reliable and simple caching system

- Caching is the technique of storing data in a different location in order for it to be rapidly accessible when needed.
- The.NET caching technology is both strong and easy to utilize. It's also meant to be extendable.

- The Object Cache class allows developers to create custom cache implements that may be used to boost the performance and flexibility of Windows client and server applications.

Visual Studio IDE

- Visual Studio is a Microsoft integrated development environment (IDE) that is used to create, debug, and publish programs for all platforms, including Android and iOS.
- Visual Studio is linked to.NET and offers language-specific environment capabilities.

Automatic monitoring in ASP.NET

- ASP.NET has automatic monitoring, and the Windows Web Server closely monitors the websites and applications that run on it.

1.3 Disadvantage of .NET

. NET is recognized as one of the most powerful programming platforms accessible because to its massive infrastructure and long history of product development, but it is not without restrictions [5].

Limited Object-Relational Support

- The Entity Framework supports data-oriented software application development in the.NET Framework and Core.
- Entity is an object-relational mapper (ORM) that joins object-oriented and relational (SQL) databases in the.NET Framework.
- According to some developers, Entity Framework is just too inflexible and cannot support all database designs.

Licensing cost

- The majority of their dollars will be spent on the Visual Studio IDE and other collaboration and quality control services provided by Microsoft to make your life easier.
- Users can, however, still seek to become a Microsoft Partner in order to get a number of free subscriptions.
- While.NET Core may operate on Mac and Linux devices, it's indeed preferable to use Windows for.NET development, that requires a licensing price.
- If a customer has never used Microsoft products before and has to migrate from, example, the AWS cloud environment to Azure, the barrier will be significantly higher.

The gap between release and stability

- Newly launched products lack adequate description, support, and stability, and are prone to abrupt changes.

2. METHODOLOGY

The first version of Microsoft Visual Studio.NET from 2003, also known as Visual Studio 7.0, was used to construct the Web application utilizing the ASP.NET technology using the development platform Microsoft Visual Studio.NET. A developer can use ASP.NET technologies to create a Web application in this environment. It also allows you to choose between two prominent programming languages, C# and VB, as well as another twenty. Visual Studio now supports adding class files from the Microsoft.NET framework when constructing an application [6].

To manage the data logic, a combination of several sorts of programming languages, particularly the new.NET supported language C#, is employed, as well as a collection of distinct methodologies including server side technology, component based objects for data access and information manipulations. The Web application is also developed using integrated development tools such as Visual Studio and the SQL Server Management Studio [7].

2.1 .NET Platform Architecture

NET is the foundation of Microsoft's future computer systems for both commercial and private users, and it enables the development of computer programs that are extremely powerful Web-based applications. The.NET Framework has a huge library from over 4000 classes arranged into namespaces that perform a number of useful tasks ranging from file output and input to string processing, XML parsing, and Windows Forms control. Each namespace includes program-usable types like as classes, structures, references, inheritance, and so on. They offer extremely useful functional building elements required for the creation of.NET applications [8].

Microsoft's namespaces all begin with System or Microsoft. System is an example of a namespace. Data made up of classes that reflect the ADO.NET architecture (ActiveX Data Object for .NET). Console programs, Windows applications with graphical interfaces, and Client / Server based Web apps are all examples of.NET applications. The Web application may be enhanced with.NET supporting controls of those Web forms for a user-friendly display that works with the majority of browsers. Windows, Nokia, and certain HTC mobile devices use.NET apps. By utilizing.NET Directory interfaces and Lightweight Directory Access Protocol (LDAP), the Net platform is increasingly popular for server-based operating systems and corporate Active Directories (AD) [9].

The most essential aspect of the.NET framework design is its language "Interoperability" choices, which allow other languages, such as TCP / IP, HTTP, and other file formats, to be incorporated into a system. The IL (Intermediate Language) code created by the C # compiler complies with the CTS interface, and the code generated by C# can communicate with code generated by.NET version of Visual Basic, Visual C + +, or any of and over 20 other CTScompliant languages. A standalone executable can have numerous modules developed in various.NET languages such as C# and VB.Net [4]. Even if they are different languages, the modules can still refer to one other and interact as a single entity [9].

2.2 data Collection

We have used the Google search to shortlist the most famous tools that developers are recommending now a days. We will find their strengths and weakness and rate them according to user experiences. For this study we have choose those tools that have rating above 4 out of 5.

.

2.3 NET Tools

The platform.NET supports a wide range of application types, which are enhanced by their dependent scale, application domain, and other characteristics. All of this necessitates the use of the right programming language in each and every scenario. The technologies listed below assist developers in creating effective websites and web services.

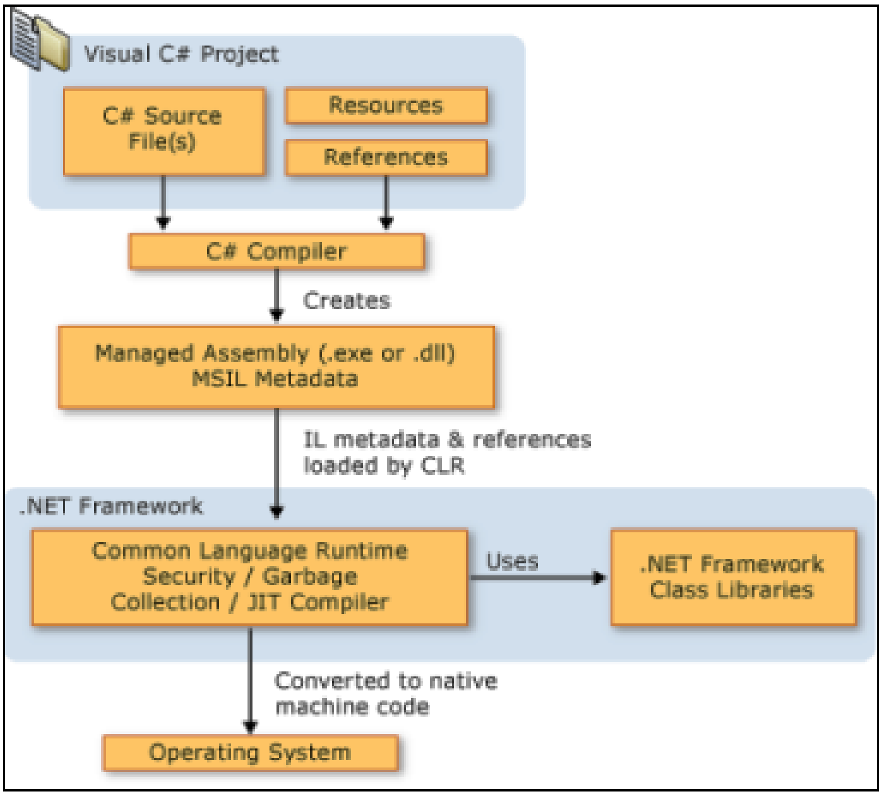

Visual C# Project
C# Source File(s)
Resources
References
C# Compiler
Creates
Managed Assembly (.exe or .dll) MSIL Metadata
IL metadata & references loaded by CLR
.NET Framework
Common Language Runtime Security / Garbage Collection / JIT Compiler
Uses
.NET Framework Class Libraries
Converted to native machine code
Operating System

Fig. 1. .Net architecture [9]

2.3.1 Web essentials for visual studio

Microsoft's Visual Studio, that is unquestionably the most promising tools in use by developers for developing all types of programs, including mobile apps and websites, is at the top of our list. According to recent survey, almost 41 million active websites have used.NET. This plugin outperforms other Dotnet development frameworks in terms of productivity and is a must-have for writing and debugging code with ease.

Microsoft Visual Studio is an integrated development environment from Microsoft (IDE). It can be used to develop console and desktop application interface applications, in addition to Windows Forms software, web sites, web apps, and online services for all Microsoft Windows platforms, including Windows Mobile, Windows CE, the.NET Framework, the.NET Compact Framework, and Microsoft Silverlight [10].

2.3.2 ReSharper

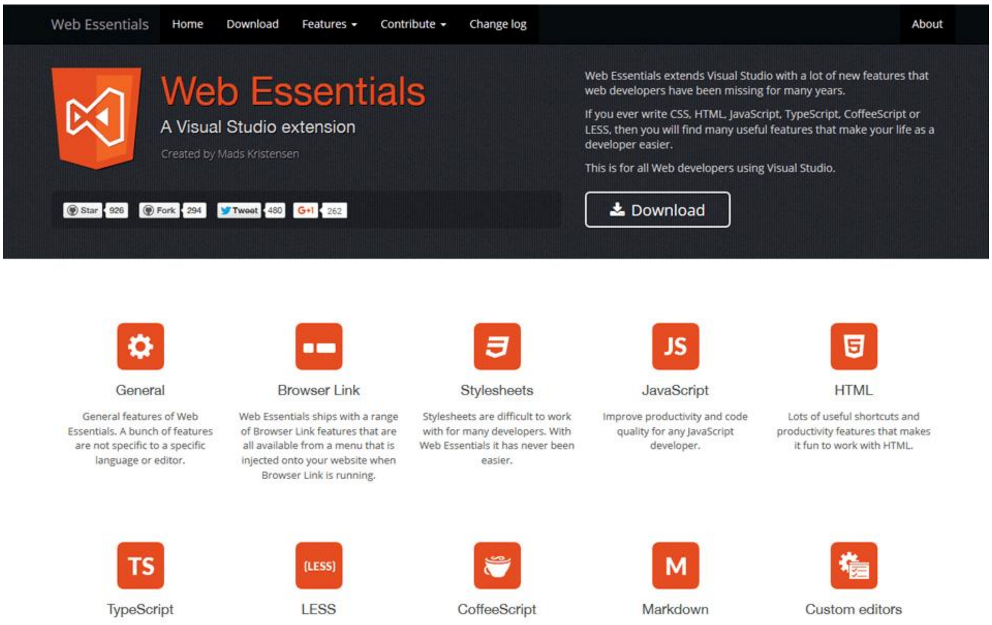
This is an obvious choice. This program not only assists developers in doing on-the-fly code reviews, but also provides several quick-fixes and automatic code reworking. JetBrains' ReSharper has over 60 refactoring and 450+ context operations. It's a useful tool for net developers who want to finish their projects fast, and it's also popular with programmers who are new to.NET.

ReSharper is the most popular productivity tool for.NET developers, and it works seamlessly with Visual Studio. It increases the productivity of thousands of.NET developers worldwide by delivering code inspections, automatic refactoring's, lightning-fast navigation, and coding guidance.

Anyone who wants to become more effective when building C# code must get their hands on this tool quickly as feasible. Resharper Ultimate subscription includes: the package includes ReSharper (a code productivity tool) [12]

- dtTrace (a .NET Performance Profiler to optimize the code for performance)
- dottedMemory (a.NET Memory Profiler for avoiding memory leaks)
- dotCover (a unit test runner and code coverage tool for.NET) (a .NET decompiler and assembly browser, which is free by itself).

ReSharper's tools were commonly utilized by developers. ReSharper's expensive price, many of its capabilities require a significant number of system resource and slow down the IDE. The automatic refactorings recommended by ReSharper are mostly superficial, and the patterns created by refactoring necessitate additional consideration and human study [11].



Web Essentials extends Visual Studio with a lot of new features that web developers have been missing for many years.

If you ever write CSS, HTML, JavaScript, TypeScript, CoffeeScript or LESS, then you will find many useful features that make your life as a developer easier.

This is for all Web developers using Visual Studio.

General features of Web Essentials. A bunch of features are not specific to a specific language or editor.

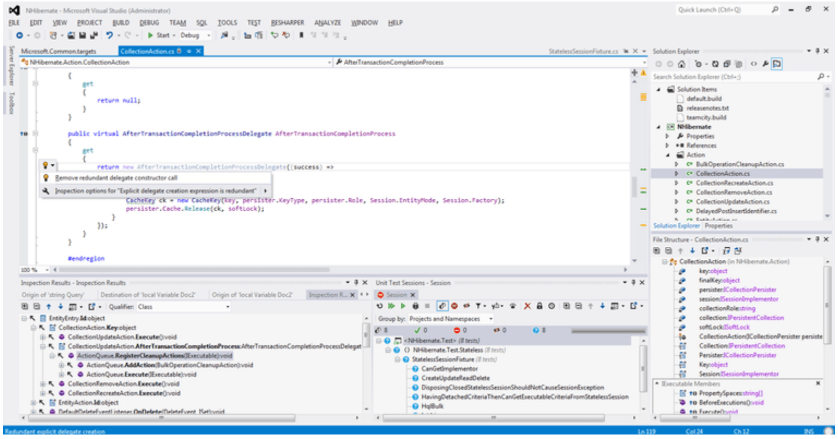
Web Essentials ships with a range of Browser Link features that are all available from a menu that is injected onto your website when Browser Link is running.

Stylesheets are difficult to work with for many developers. With Web Essentials it has never been easier.

Improve productivity and code quality for any JavaScript developer.

Lots of useful shortcuts and productivity features that makes it fun to work with HTML.

Fig. 2. Web essential homepage [11]



```
        {
            get
            {
                return null;
            }
        }

        public virtual AfterTransactionCompletionProcessDelegate AfterTransactionCompletionProcess
        {
            get
            {
                return new AfterTransactionCompletionProcessDelegate((success) =>
                        CacheKey ck = new CacheKey(key, persister.KeyType, persister.Role, Session.EntityMode, Session.Factory);
                        persister.Cache.Release(ck, softLock);
                    }
                });
            }
        }

        #endregion
```

Remove redundant delegate constructor call

Inspection options for "Explicit delegate creation expression is redundant"

Fig. 3. ReSharper programming interface [13]

2.3.3 Ncrunch

Developers may use this tool to run tests while they write code. It's a testing tool which provides for the. Net developers must fulfill quality standards when developing code. Ncrunch extracts the necessary data from the tested code, allowing developers to enhance code quality at the same time.

Command-line arguments are used to control the tool. Simply run the program with no parameters supplied to see a complete list of potential choices.

It is critical to remember that each server that uses the tool should have loaded any SDKs and modules that are generally necessary to develop a solution and execute its tests. In terms of the software needs, the NCrunch desktop tools is subjected to the same limits as any collaborative build server. Depending on the type of the solution, users might or might not have to install Visual Basic or the Windows SDK.

The NCrunch configuration files contained inside codebase will be used by the tool to acquire solutions and project level configuration. If user have issues with the application on a CI server not functioning as well as the VS plugin, make sure these configuration files are verified in the sources control system.

The console tool makes full use of the NCrunch core engine. This means it can import projects into a solution, parse them, analyze them, create workspaces, build, instrument output assemblies, and run tests. It is, in essence, a frameless version of NCrunch. After a complete engine cycles, the consoles tool will write a set of reports to disk before self-terminating [12].

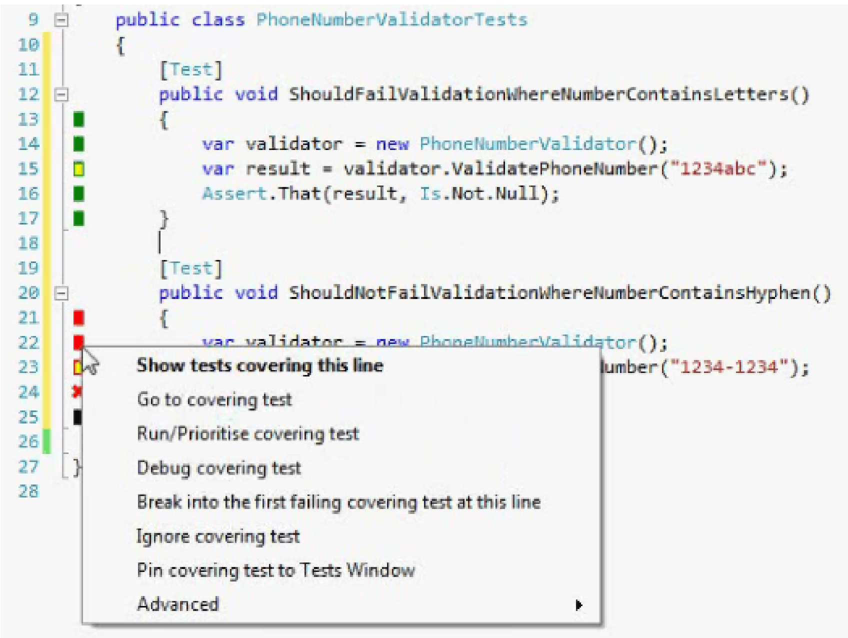
2.3.4 NuGet

NuGet, a.NET package management, is an excellent addition to the.NET development toolkit. It enables developers to use third-party libraries to create and distribute their own solutions. NuGet contains over 98,000 packages, making it the biggest database of third-party.NET components. Developers may use this extension to explore an unfamiliar feed and manually construct packages.

A system for developers to produce, exchange, and consume valuable code is a vital feature for just any modern development platform. Such code is frequently packaged into "packages" that comprise compiled code (as DLLs) as well as other content required by the applications that use these packages.

NuGet is a Microsoft-supported framework for sharing code for.NET (including.NET Core), and it defines how.NET packages are created, hosted, and consumed, as well as offering resources for each of those operations.

A NuGet package is just a single ZIP file with the.nupkg extension that includes compiled code (DLLs), related files, and a complete manifest that provides data like as the product's version number. Programmer that have coding to contribute build packages, which are then compiled to a public or private site. Package consumers obtain such packages from suitable hosts, include them in existing applications, and then incorporate the functionality of such packages into their code. NuGet then handles the intermediate details.



```
public class PhoneNumberValidatorTests
{
    [Test]
    public void ShouldFailValidationWhereNumberContainsLetters()
    {
        var validator = new PhoneNumberValidator();
        var result = validator.ValidatePhoneNumber("1234abc");
        Assert.That(result, Is.Not.Null);
    }

    [Test]
    public void ShouldNotFailValidationWhereNumberContainsHyphen()
    {
        var validator = new PhoneNumberValidator();
                                     umber("1234-1234");

}
```

Show tests covering this line
Go to covering test
Run/Prioritise covering test
Debug covering test
Break into the first failing covering test at this line
Ignore covering test
Pin covering test to Tests Window
Advanced

Fig. 4. NCrunch testing interface [14]

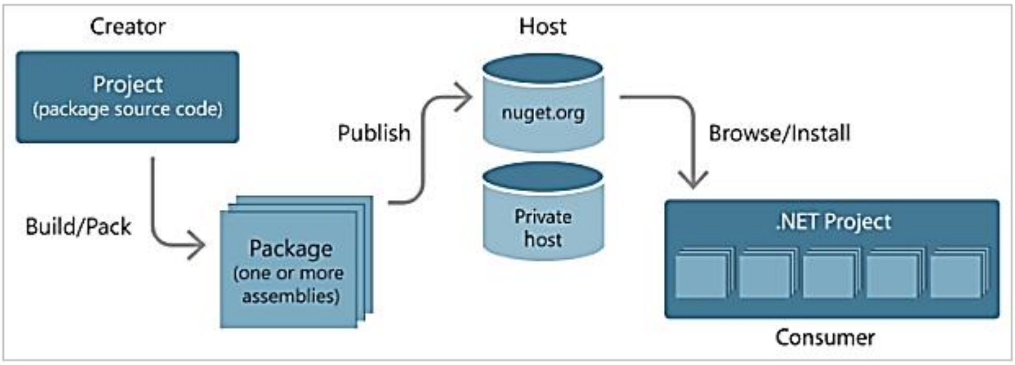


Fig. 5. NuGet process model [15]

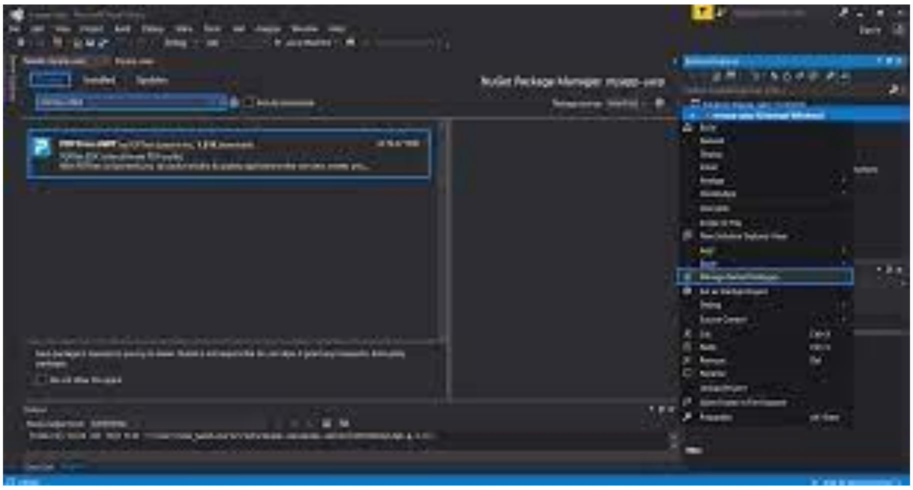


Fig.6. NuGet interface [15]

Because NuGet provides private sites in addition to the public nuget.org host, users can use NuGet packages to share code that is exclusive to an organization or a work group. NuGet packages may also be used to simply bundle their unique code for use in just their own apps. To recap, a NuGet package is a unit of code that may be transferred and does not need or suggest any particular way of sharing. [13].

2.3.5 ELMAH

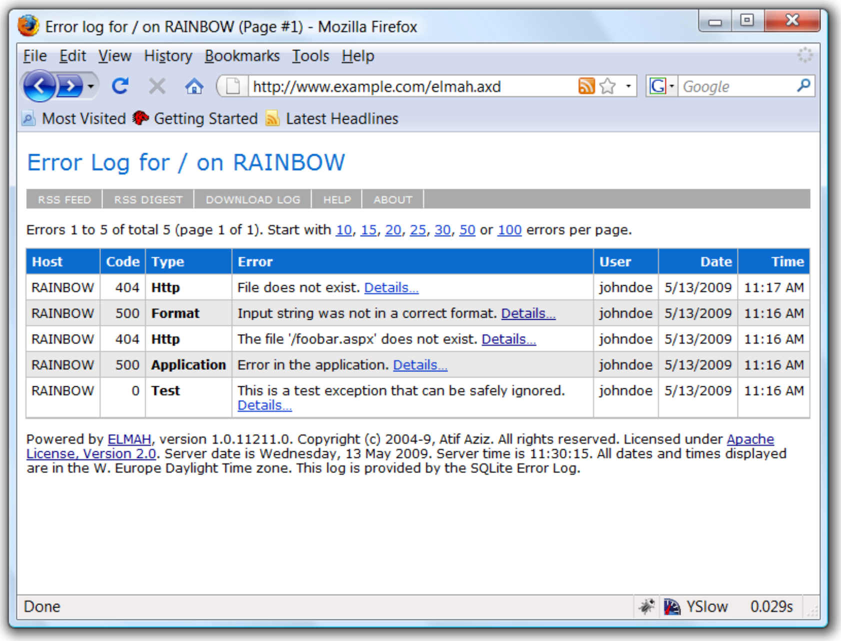
If users are developing a website, users will require Error Logging Modules And Handlers (ELMAH) to debug and log an error for ASP.NET. This error logging package, provided by Google, assists.NET developers in identifying holes in their code. The utility may be quickly added to an existing ASP.NET web application without requiring recompilation or re-deployment [14].

When users put ELMAH into a live web application and setup it properly, you receive the following features without altering a single line of code [15]:

- Almost all unhandled exceptions are logged.
- A web page that allows user to access the whole log of reported exceptions from anywhere.
- An online website that allows user to examine the entire details of every reported exceptions, including colored stack traces, from anywhere in the world.
- Even with customErrors mode enabled, user may often observe the initial yellow screen of death that ASP.NET issued for a specific error.
- E-mail notice of each mistake as it happens.
- An RSS feed of the log's most recent 15 mistakes.

2.3.6 .NET Reflector

By allowing users to view and debug into the code of all the.NET code that deal with,.NET Reflector helps to save time and simplifies development. Track problems in their own program, 3rd components, and any compiled.NET code that use. Third-party code may be seen and debugged in Visual Studio exactly like their own. When users debug, user are able to observe how flow of data thru a module or element and how locals change. Identify dependencies, diff assemblies, and learn how code works by tracking down the specific location of errors in their own code or third-party libraries. See how the program runs in context to replace bad or missing documentation. Discover hidden and undocumented functionality that can further enhance the APIs and technologies they use [16].


Error log for / on RAINBOW (Page #1) - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://www.example.com/elmah.axd
Google
Most Visited Getting Started Latest Headlines
RSS FEED
RSS DIGEST
DOWNLOAD LOG
HELP
ABOUT
Done
YSlow
0.029s

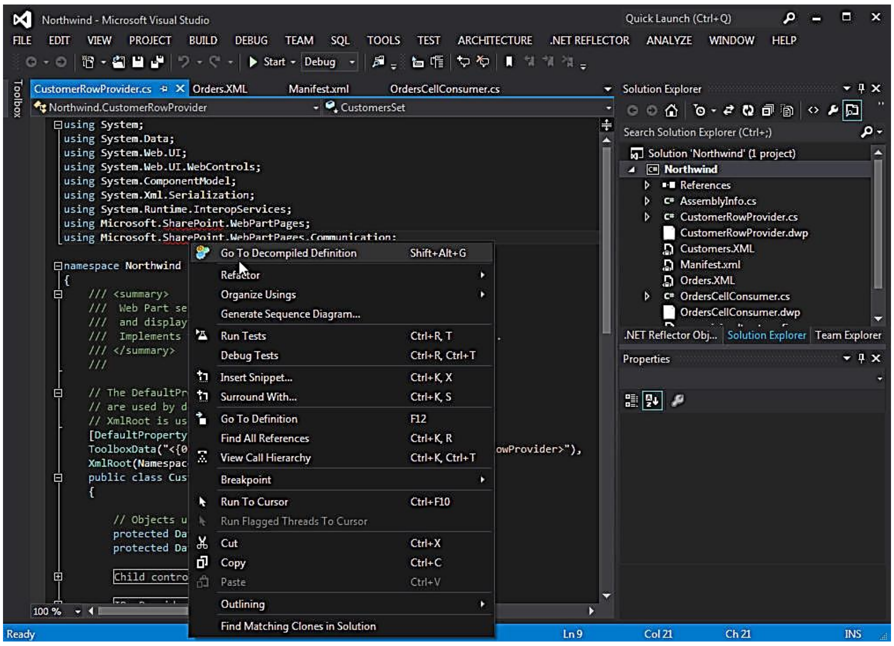
Error Log for / on RAINBOW

Errors 1 to 5 of total 5 (page 1 of 1). Start with 10, 15, 20, 25, 30, 50 or 100 errors per page.

Host	Code	Type	Error	User	Date	Time
RAINBOW	404	**Http**	File does not exist. Details...	johndoe	5/13/2009	11:17 AM
RAINBOW	500	**Format**	Input string was not in a correct format. Details...	johndoe	5/13/2009	11:16 AM
RAINBOW	404	**Http**	The file '/foobar.aspx' does not exist. Details...	johndoe	5/13/2009	11:16 AM
RAINBOW	500	**Application**	Error in the application. Details...	johndoe	5/13/2009	11:16 AM
RAINBOW	0	**Test**	This is a test exception that can be safely ignored. Details...	johndoe	5/13/2009	11:16 AM

Powered by ELMAH, version 1.0.11211.0. Copyright (c) 2004-9, Atif Aziz. All rights reserved. Licensed under Apache License, Version 2.0. Server date is Wednesday, 13 May 2009. Server time is 11:30:15. All dates and times displayed are in the W. Europe Daylight Time zone. This log is provided by the SQLite Error Log.

Fig. 7. Elmah interface [15]



```
using System;
using System.Data;
using System.Web.UI;
using System.Web.UI.WebControls;
using System.ComponentModel;
using System.Xml.Serialization;
using System.Runtime.InteropServices;
using Microsoft.SharePoint.WebPartPages;
using Microsoft.SharePoint.WebPartPages.Communication;

namespace Northwind
{
    /// <summary>
    ///  Web Part se
    ///  and display
    ///  Implements
    /// </summary>
    ///

    // The DefaultPr
    // are used by d
    // XmlRoot is us
    [DefaultProperty
    ToolboxData("<{0                                   owProvider>"),
    XmlRoot(Namespac
    public class Cus
    {

        // Objects u
        protected Da
        protected Da

        Child contro
```

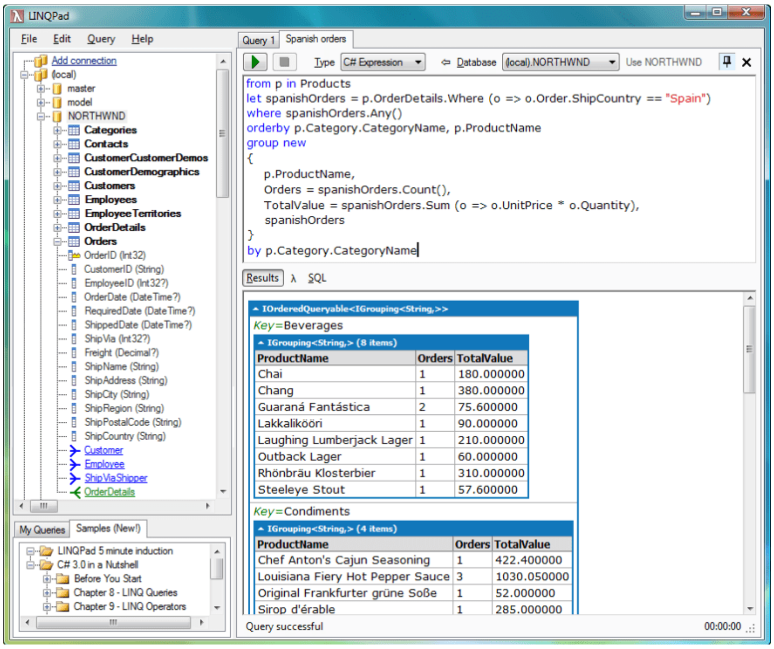
Fig. 8. .Net Reflector interface [16]

2.3.7 LINQPad

LINQPad is a free and lightweight extension. Every .net developer can attest to its effectiveness. It is the best environment for testing LINQ queries and other C#/F#/Visual Basic programs. The extensive output formatting, configurable auto-completion, and integrated debugging make LINQPad popular. The following dialects are supported by LINQPad:

- LINQ to Objects in Entity Framework
- SQL to LINQ
- XML to LINQ

The software is available in multiple versions; for the purposes of this book, we will concentrate on LINQPad 5 version 5.36.03, which is the most recent stable release at the time of writing [17].



```
from p in Products
let spanishOrders = p.OrderDetails.Where (o => o.Order.ShipCountry == "Spain")
where spanishOrders.Any()
orderby p.Category.CategoryName, p.ProductName
group new
{
   p.ProductName,
   Orders = spanishOrders.Count(),
   TotalValue = spanishOrders.Sum (o => o.UnitPrice * o.Quantity),
   spanishOrders
}
by p.Category.CategoryName
```

IOrderedQueryable<IGrouping<String,>>

Key=Beverages

IGrouping<String,> (8 items)

ProductName	Orders	TotalValue
Chai	1	180.000000
Chang	1	380.000000
Guaraná Fantástica	2	75.600000
Lakkalikööri	1	90.000000
Laughing Lumberjack Lager	1	210.000000
Outback Lager	1	60.000000
Rhönbräu Klosterbier	1	310.000000
Steeleye Stout	1	57.600000

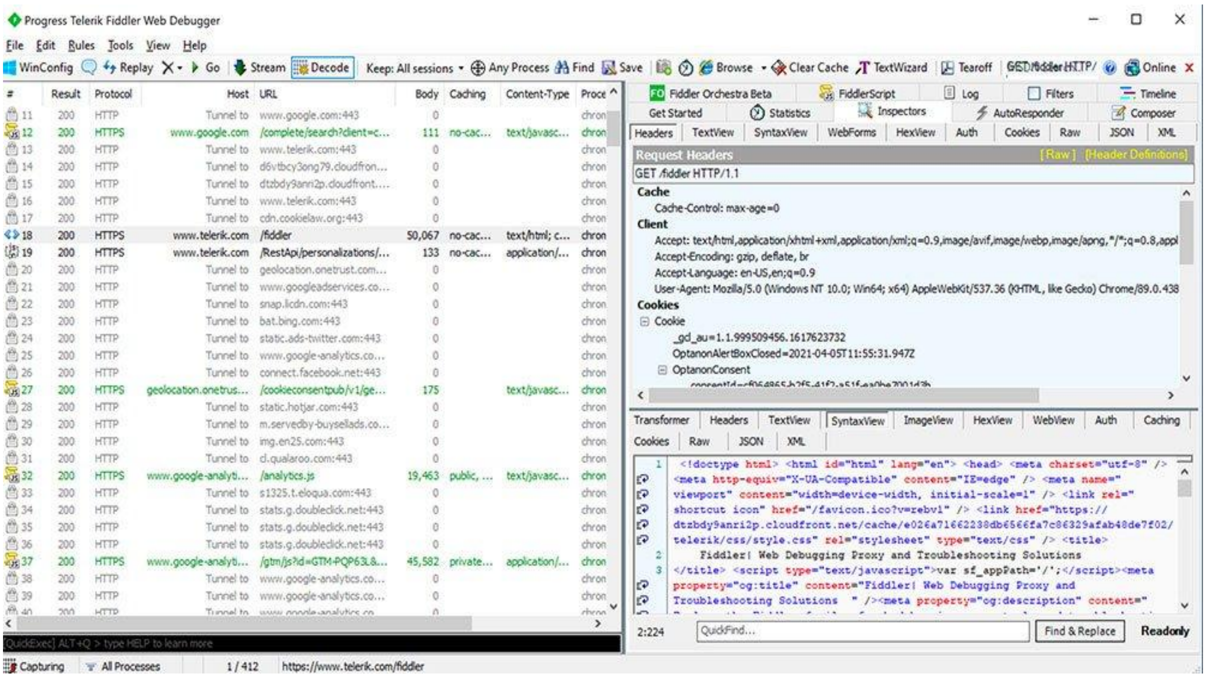
Key=Condiments

IGrouping<String,> (4 items)

ProductName	Orders	TotalValue
Chef Anton's Cajun Seasoning	1	422.400000
Louisiana Fiery Hot Pepper Sauce	3	1030.050000
Original Frankfurter grüne Soße	1	52.000000
Sirop d'érable	1	285.000000

Query successful

Fig. 8. LINQPad interface [17]


Progress Telerik Fiddler Web Debugger
File Edit Rules Tools View Help
WinConfig Replay Go Stream Decode Keep: All sessions Any Process Find Save Browse Clear Cache TextWizard Tearoff GET /fiddler HTTP/ Online
Fiddler Orchestra Beta FiddlerScript Log Filters Timeline
Get Started Statistics Inspectors AutoResponder Composer
Headers TextView SyntaxView WebForms HexView Auth Cookies Raw JSON XML
Transformer Headers TextView SyntaxView ImageView HexView WebView Auth Caching
Cookies Raw JSON XML
[QuickExec] ALT+Q > type HELP to learn more
Capturing All Processes 1 / 412 https://www.telerik.com/fiddler
2:224 QuickFind... Find & Replace Readonly

#	Result	Protocol	Host	URL	Body	Caching	Content-Type	Proce
11	200	HTTP	Tunnel to	www.google.com:443	0			chron
12	200	HTTPS	www.google.com	/complete/search?client=c...	111	no-cac...	text/javasc...	chron
13	200	HTTP	Tunnel to	www.telerik.com:443	0			chron
14	200	HTTP	Tunnel to	d6vtbcy3ong79.cloudfron...	0			chron
15	200	HTTP	Tunnel to	dtzbdy9anri2p.cloudfront....	0			chron
16	200	HTTP	Tunnel to	www.telerik.com:443	0			chron
17	200	HTTP	Tunnel to	cdn.cookielaw.org:443	0			chron
18	200	HTTPS	www.telerik.com	/fiddler	50,067	no-cac...	text/html; c...	chron
19	200	HTTPS	www.telerik.com	/RestApi/personalizations/...	133	no-cac...	application/...	chron
20	200	HTTP	Tunnel to	geolocation.onetrust.com...	0			chron
21	200	HTTP	Tunnel to	www.googleadservices.co...	0			chron
22	200	HTTP	Tunnel to	snap.licdn.com:443	0			chron
23	200	HTTP	Tunnel to	bat.bing.com:443	0			chron
24	200	HTTP	Tunnel to	static.ads-twitter.com:443	0			chron
25	200	HTTP	Tunnel to	www.google-analytics.co...	0			chron
26	200	HTTP	Tunnel to	connect.facebook.net:443	0			chron
27	200	HTTPS	geolocation.onetrus...	/cookieconsentpub/v1/ge...	175		text/javasc...	chron
28	200	HTTP	Tunnel to	static.hotjar.com:443	0			chron
29	200	HTTP	Tunnel to	m.servedby-buysellads.co...	0			chron
30	200	HTTP	Tunnel to	img.en25.com:443	0			chron
31	200	HTTP	Tunnel to	cl.qualaroo.com:443	0			chron
32	200	HTTPS	www.google-analyti...	/analytics.js	19,463	public, ...	text/javasc...	chron
33	200	HTTP	Tunnel to	s1325.t.eloqua.com:443	0			chron
34	200	HTTP	Tunnel to	stats.g.doubleclick.net:443	0			chron
35	200	HTTP	Tunnel to	stats.g.doubleclick.net:443	0			chron
36	200	HTTP	Tunnel to	stats.g.doubleclick.net:443	0			chron
37	200	HTTPS	www.google-analyti...	/gtm/js?id=GTM-PQP63L&...	45,582	private...	application/...	chron
38	200	HTTP	Tunnel to	www.google-analytics.co...	0			chron
39	200	HTTP	Tunnel to	www.google-analytics.co...	0			chron

```
Request Headers                                   [Raw]  [Header Definitions]
GET /fiddler HTTP/1.1
Cache
    Cache-Control: max-age=0
Client
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,appl
    Accept-Encoding: gzip, deflate, br
    Accept-Language: en-US,en;q=0.9
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/89.0.438
Cookies
  ⊟ Cookie
        _gd_au=1.1.999509456.1617623732
        OptanonAlertBoxClosed=2021-04-05T11:55:31.947Z
     ⊟ OptanonConsent
```

```
 <!doctype html> <html id="html" lang="en"> <head> <meta charset="utf-8" />
<meta http-equiv="X-UA-Compatible" content="IE=edge" /> <meta name="
viewport" content="width=device-width, initial-scale=1" /> <link rel="
shortcut icon" href="/favicon.ico?v=rebv1" /> <link href="https://
dtzbdy9anri2p.cloudfront.net/cache/e026a71662238db6566fa7c86329afab48de7f02/
telerik/css/style.css" rel="stylesheet" type="text/css" /> <title>
    Fiddler| Web Debugging Proxy and Troubleshooting Solutions
</title> <script type="text/javascript">var sf_appPath='/';</script><meta
property="og:title" content="Fiddler| Web Debugging Proxy and
Troubleshooting Solutions  " /><meta property="og:description" content="
```

Fig. 9. Fiddler interface [18]

2.3.8 Fiddler

Fiddler is necessary while discussing dot net development tools. It enables developers to quickly publish dynamic data grids and includes customization capabilities for displaying data in a desired way. This invaluable.NET utility, provided by Telerik, is utilized between those applications and intercepts any communication.

By collecting network traffic between both the Internet and test PCs, the Fiddler tool assists you in debugging web applications. The tool allows you to analyze incoming and outgoing data in order to monitor and adjust requests and replies before they are seen by the browser. Fiddler also contains a robust event-based scripting subsystem that can be extended with any.NET Framework language [18].

3. RESULTS AND DISCUSSION

Millions of software engineers rely on the.NET framework as an open-source technology. As a result, the number of third-party development tools has increased. To gain firsthand knowledge of the most important and useful development tools available.

3.1 Web Essentials for Visual Studio

This Visual Studio plugin enhances the core VS functionality by including task shortcuts and improved Intellisense for CSS/HTML/JavaScript, among other things. This is a helpful option for Visual Studio web designers that might significantly increase productivity.

Custom editors, a Browser Link for easily seeing changes in browsers, TypeScript, Fewer, Markdown, and CoffeeScript support are all bundled in a single addon.

3.2 Resharper

Jetbrains has created a Visual Studio extension for this. Resharper gives the ability to examine code quality and rapidly detect and correct mistakes. It also has several shortcuts for rapid refactoring and navigation.

The following are some significant aspects of ReSharper that were employed in this study [1]:

- Over 1200 quick-fixes for C#, XAML, VB.NET, ASP.NET, TypeScript, JavaScript, and other languages are included in ReSharper.
- Context actions: ReSharper's contextual acts save developers time when making minor modifications to their code.
- Refactorings: ReSharper's collection of refactorings outnumbers Visual Studio's in terms of number, usefulness, and breadth of application.

Table 1. Analysis of tools [11,13-18]

Tools	Features	Weakness	Rating
Web Essentials for visual studio	• image optimizer • bundler and minifier • web compiler • PHP tools • NPM Task Runner • WebPack Task Runner • Image sprites • Package installer	• Visual Studio Code contains a big number of extensions, which might make it challenging to identify the proper one for a certain task or slow down the software's speed. • Some users might find the UI to be confusing or cluttered, particularly if a large number of extensions are installed.	**4.5/5**
Resharper	• Code quality analysis • Code editing helper • Code generation • Eliminate error and code smells • Safely change your code base • Compliance to coding standards	• Slows down Visual Studio after a time. Even for little jobs, it becomes quite sluggish.	**4.5/5**
Ncrunch	• Visual Studio's automatic concurrent testing • Test as you type • Create for large, complicated projects. • Distributed processing • Highly customizable	• Problem running large test • Problem with code coverage	
NuGet	• NuGet offers the core nuget.org repository with private hosting support, as well as the tools required for developers to create, publish, and consume packages. • Most importantly, NuGet keeps track of the packages utilized in a project and allows you to recover and replace those items from that list.	• Resuming incomplete downloads in the event of network disruptions • Resuming incomplete downloads in the event of network disruptions • Adding a user-friendly platform for adding and updating packages • Package development feature in Visual Studio	**4.4/5**
Elmah	• Error Logging • Uptime Monitoring • Deployment Tracking • Heartbeats Monitoring	• The ASP.NET MVC integration might be cumbersome. • Some of the configuration pages are not very self-explanatory.	**4.9/5**
.NET Reflector	• A call tree and inheritance browser	• To use the VS Extension, it costs $199,	**4.2/5**

Tools	**Features**	**Weakness**	**Rating**
	• The ability to transform your source code across languages like C# and VB • When.NET Reflector is paired with add-ins, it may be used to facilitate testing and improve teamwork.	which is rather pricey when comparable alternatives are entirely free.	
LINQPad	• Linqpad has proven to be a valuable tool for swiftly and effectively diagnosing the application that they maintain. It appears to be very user friendly and easy to understand. • Linqpad is compatible with all databases and their activities. • Linqpad is written in C# and makes considerable use of language-integrated queries. • Linqpad provides IntelliSense/auto-completion functionality for database operations.	• It was difficult to set up the application, especially due to having to switch computers twice. It would be convenient to be able to transfer all files and settings from one computer to another. • For our C# scripts, LINQPad is case-sensitive. Although it is doable, we must ensure that we reference the necessary properties in our code in order for the script to be properly tested.	**4.6/5**
Fiddler	• Live Traffic Inspection • Rule Builder • Save and share session	• Fiddler does not yet support HTTP Pipelining. • The HTTPS decryption capability in Fiddler does not perform properly with upstream authenticating proxy servers. • Fiddler consumes HTTP/1xx messages from a stream. • The buffering mode in Fiddler is incompatible with COMET-style apps. To send such replies to the client, users must enable Streaming mode. • In certain inspections, the output of HTTP requests/responses is incorrect if a binary null exists in the content.	**4.4/5**

3.3 Ncrunch

The console tool makes extensive use of the NCrunch core engine. This means it can import projects into a solution, parse them, analyze them, create workspaces, build, instrument output assemblies, and run tests. It is, in essence, a headless version of NCrunch. After one major engine cycles, the consoles tool will write a set of outputs to disk before self-terminating.

3.4 NuGet

NuGet is a.NET package management system that allows you to utilize third-party libraries while also developing and publishing your own. It is the huge database of third-party.NET components, with over 98 thousand packages already available.

NuGet automates the integration of third-party components into the Visual Studio projects during design time, and it offers a command-line interface for CI/CD automatic deployments. It is an essential need.

3.5 Elmah

When an issue happens on a production site, we utilize ELMAH to figure out what's going on in their code. This assists the developer in two ways: first, it records the error when it occurs, and second, it removes the user from the issue.

The feature is useful when releasing a website into the open since you want to know if you missed anything in your code, but it's usually advisable to turn it off after a specific amount of people.

3.6 .NET Reflector

.NET Reflector is a.NET framework decompiler and static analyzer. It assists you in understanding and debugging your.NET program, includes third-party modules, even if you lack documentation or comments.

Reflector offers me a strong understanding of what an assembly includes and what code does when decompiled.

3.7 LINQPad

This is a secure environment in which to test your LINQ queries or any C#/F#/Visual Basic software. The tool includes a debugger and autocomplete capabilities and is ideal for experimenting with fast feedback.

LINQPad is a LINQ-specific notepad (simple, I know). I've been using LINQPad for a long now and consider it an indispensable tool for experimenting with LINQ and testing source code before incorporating them into the code.

3.8 Fiddler

By collecting network traffic between the Internet and test PCs, the Fiddler tool assists you in debugging web applications. The tool allows you to analyze incoming and outgoing data in order to monitor and adjust requests and replies before they are seen by the browser. Fiddler also contains a robust event-based scripting subsystem that can be extended with any.NET Framework language.

By creating an offline replica of the test site, Fiddler and the HTTP replay features can assist you in troubleshooting client-side difficulties with web applications. You may use these tools to generate offline pictures of the browsing experience, which you can subsequently package and analyze to gain more precise debug information.

3.9 Analysis of Tools

This was our selection of the top five.NET development tools. Finally, the decision will be influenced mostly by the project that are attempting to finish. These technologies are used by over seven million dot net developers to automate many manual operations in order to save time and eliminate human mistakes. The main line is that no matter the tools that use, be sure they allow users to complete a job without errors and on schedule.

4. CONCLUSION

The option of. The .net tool changes widely depending on the activity or scenario. Using extra tools may liberate people from routine tasks and automate numerous operations, improving business performance and reducing mistakes. Some of them contain similarities as well as differences that might be quite useful in a certain context.

Many more tools are utilized in.Net application development projects. These are just a handful of the tools available. You may utilize the best.NET Development Tools available on the market today depending on the quality of the tools and the company requirements. The important thing to remember is that each tool you use should motivate users to accomplish the assignment on time.

COMPETING INTERESTS

Author has declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

1. Price MJ, C. 8.0 and. NET Core 3.0-Modern Cross-Platform Development: build applications with C#,. NET Core, Entity Framework Core. ASp. net core, and ML. net using visual studio code. Packt Publishing Ltd; 2019.
2. Flexbase. Essential. NET tools that every developer should have in their arsenal. 2019;2/11:10.
3. Vermeir N. "ASP. NET Core," in introducing. NET 6: Getting Started with Blazor, MAUI, Windows App SDK, Desktop Development, and Containers, ed: Springer. 2022;177-219.
4. Ghelani D, Hua TK, Koduru SKR. A model-driven approach for online banking application using AngularJS framework. Am J Inf Sci Technol. 2022;6:52-63.
5. Anoymonus. 2021;2/11. Available:https://www.altexsoft.com/blog/engineering/the-good-and-the-bad-of-net-framework-programming/.
6. Liu X. The design and development of university teaching management information system based on Asp. Net. In: 11th International Conference of Information and Communication Technology (ICTech). 2022;2022:371-5.
7. Liu X, Luo L. Research and implementation of multi database access technology in ASP. NET. In: CIBDA; 3rd International Conference on Computer Information and Big Data Applications. 2022;2022:1-4.
8. Denis K. Web application development; 2021.
9. Saadat R. Fronted web development; 2020.
10. Ramel D. Mads Kristensen unveils 'the essentials' Visual Studio extension pack for all devs. Visual Studio magazine; 2020. Available:https://visualstudiomagazine.com/articles/2020/07/09/essentials-extensions.aspx
11. Firouzi E, Sami A. Visual Studio automated refactoring tool should improve development time, but ReSharper led to more solution-build failures. In: IEEE Workshop on Mining and Analyzing Interaction Histories (MAINT). 2019;2019:2-6. DOI: 10.1109/MAINT.2019.8666936
12. Anoymonus. (n.d, 2/12). NCrunch console tool. Available:https://www.ncrunch.net/documentation/tools_console-tool
13. Anoymonus. An introduction to NuGet. 2022;2/12. Available:https://learn.microsoft.com/en-us/nuget/what-is-nuget
14. Watson M. (n.d, 2/12). Best error logging and uptime monitoring for. NET. Available:https://elmah.io/features/
15. Anoymonus. Logging error details with ELMAH. 2022;2/12. Available from: https://learn.microsoft.com/en-us/aspnet/web-forms/overview/older-versions-getting-started/deploying-web-site-projects/logging-error-details-with-elmah-cs
16. Regate. Vols. 3/3. .NET Reflector 11 Documentation; 2021. Available:https://documentation.red-gate.com/ref.
17. Kurzyniec Ł. LINQPad – the. Net Programmer's Playground. 2018;3/3.
18. Anoymonus. (n.d, 4/3). Welcome to fiddler everywhere! Available:https://docs.telerik.com/fiddler-everywhere/introduction

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