TYPING SPEED TESTER - A WEB-BASED TYPING PERFORMANCE ANALYZER

.NET TECHNOLOGY (01CE0523)

MINI PROJECT REPORT

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.NET Technologies (01CE0523)

Mini Project

Faculty of Technology, Marwadi University

Computer Engineering Department

2025-26

CERTIFICATE

This is to certify that the project report submitted along with the project entitled **"Typing Speed Tester – A Web-Based Typing Performance Analyzer Using ASP.NET MVC and ADO.NET"** has been carried out by (**92410103090)** under my guidance in partial fulfillment for the degree of Bachelor of Technology in Computer Engineering, 5th Semester of Marwadi University, Rajkot during the academic year 2025-26.

Sign:

Prof. Priyanka Mangi

Internal Guide

Sign:

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Head of the Department

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Internal Guide	Head of the Department

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I am deeply grateful for their continuous support, valuable suggestions, and encouragement throughout the development of this project. Their expertise in .NET Technologies has been instrumental in the successful completion of this application.

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Finally, I express my gratitude to all the faculty members of the Computer Engineering Department who have contributed to my learning journey and provided the necessary resources and infrastructure for this project.

Abstract

Typing Speed Tester – A Web-Based Typing Performance Analyzer

In today's digital era, typing proficiency has become an essential skill for students, professionals, and individuals across various domains. Fast and accurate typing enhances productivity and efficiency in computer-based work. This project presents a web-based typing speed testing application developed using ASP.NET MVC framework and ADO.NET for database operations.

The Typing Speed Tester is an interactive web application that enables users to test, analyze, and track their typing speed and accuracy in real time. The system displays random text passages for users to type, measures their performance metrics including Words Per Minute (WPM), accuracy percentage, and error count, and securely stores the results in a SQL Server database using ADO.NET CRUD operations.

The application features a clean and intuitive user interface built with HTML5, CSS3, and JavaScript, providing real-time visual feedback with color-coded character matching (green for correct, red for incorrect). Users can view their typing history, analyze performance statistics, and track their improvement over time through comprehensive data visualization.

This project demonstrates key concepts of the .NET Technologies syllabus, including:

- Model-View-Controller (MVC) architectural pattern
- Database connectivity using ADO.NET (SqlConnection, SqlCommand, SqlDataReader)
- CRUD operations (Create, Read, Delete)
- State management using TempData and ViewBag
- Routing and URL patterns
- SQL Server database design and implementation
- Client-side scripting with JavaScript for real-time calculations
- Responsive web design principles

The application serves as both a practical tool for improving typing skills and an educational demonstration of full-stack web development using Microsoft .NET technologies. The system's modular design and clean code structure make it easily extensible for future enhancements such as user authentication, difficulty levels, leaderboards, and advanced analytics.

Keywords: Typing Speed Test, ASP.NET MVC, ADO.NET, Web Application, Performance Tracking, SQL Server, Real-time Monitoring, CRUD Operations

1. Introduction

1.1 Background

Typing speed and accuracy are fundamental skills in the modern digital workplace. With the advancement of web technologies, web-based typing tests have emerged as convenient and interactive solutions for measuring and improving typing performance.

1.2 Motivation

The motivation behind developing this application includes:

1. **Educational Purpose**: To demonstrate practical implementation of .NET Technologies concepts
2. **Practical Utility**: To create a useful tool for improving typing skills
3. **Technical Learning**: To gain hands-on experience in full-stack web development

1.3 Problem Statement

Create a web-based typing speed testing application that:

- Provides an interactive typing test interface
- Calculates accurate performance metrics (WPM, accuracy, errors)
- Stores test results persistently in a database
- Displays test history and statistics

1.4 Objectives

Technical Objectives:

- Implement MVC architectural pattern using ASP.NET MVC
- Use ADO.NET for database operations
- Design SQL Server database schema
- Create CRUD operations for test records
- Implement state management techniques

Functional Objectives:

- Provide intuitive typing test interface
- Calculate WPM and accuracy in real-time
- Store results in SQL Server database
- Display test history and statistics
- Support responsive design

1.5 Scope

Features Included:

- 60-second typing test with timer
- Real-time WPM, accuracy, and error tracking

- Multiple predefined text passages
- Persistent storage in SQL Server
- Complete typing history
- Performance statistics dashboard
- Delete functionality for records

2. Technology used and Implementation Strategy

2.1 Technologies Used

2.1.1 Backend Technologies

1. C# Programming Language

- Object-oriented programming language
- Used for business logic and controller actions

2. ASP.NET MVC 5

- Web application framework
- Implements Model-View-Controller pattern
- Provides routing and model binding

3. ADO.NET

- Database connectivity framework
- Classes used: SqlConnection, SqlCommand, SqlDataReader
- Direct database access without ORM

4. .NET Framework 4.7.2

- Base class libraries and runtime environment

2.1.2 Database

Microsoft SQL Server (LocalDB)

- Relational database management system
- Stores typing test results permanently

2.1.3 Frontend Technologies

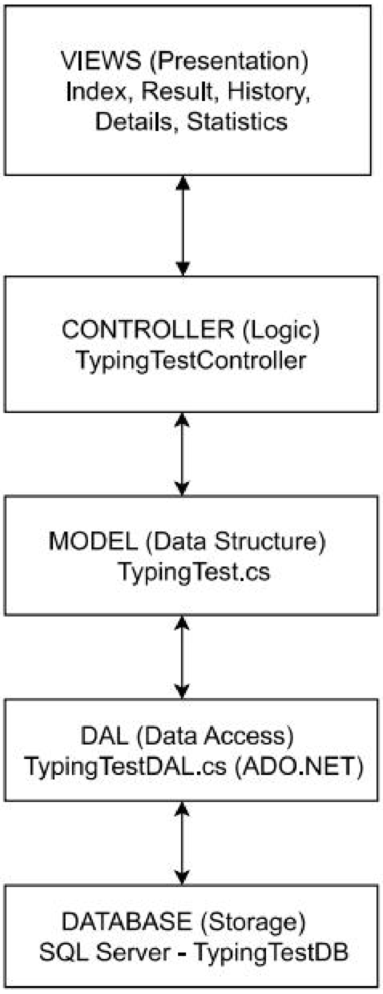
1. HTML5 - Page structure
2. CSS3 - Styling and layout
3. JavaScript - Timer and real-time feedback
4. Razor View Engine - Dynamic content rendering

2.1.4 Development Tools

1. Visual Studio 2022 - IDE for development
2. SQL Server Object Explorer - Database management
3. Web Browsers - Testing (Chrome, Edge)

2.2 Database Design

The application follows **Model-View-Controller (MVC)** architectural pattern:



2.3 Database Design

Database Name: TypingTestDB

Table Name: TypingTests

Column Name	Data Type	Constraints	Description
TestId	INT	PRIMARY KEY, IDENTITY(1,1)	Unique identifier for each test
UserName	NVARCHAR(100)	NOT NULL	Name of the user taking the test
TestDate	DATETIME	NOT NULL, DEFAULT GETDATE()	Timestamp when test was completed
WPM	INT	NOT NULL	Words Per Minute achieved
Accuracy	DECIMAL(5,2)	NOT NULL	Accuracy percentage (0-100)

			(Typing Speed Tester)
ErrorCount	INT	NOT NULL	Number of typing errors made
TimeDuration	INT	NOT NULL	Duration of test in seconds
TestText	NVARCHAR(MAX)	NOT NULL	Original text displayed for typing
TypedText	NVARCHAR(MAX)	NOT NULL	Text actually typed by user

2.4 Module Description

2.4.1 Model (TypingTest.cs)

Represents the data structure with properties: TestId, UserName, TestDate, WPM, Accuracy, ErrorCount, TimeDuration, TestText, TypedText.

2.4.2 Data Access Layer (TypingTestDAL.cs)

Handles database operations using ADO.NET:

- **SaveTestResult() -** Insert new record
- **GetAllResults() -** Retrieve all tests
- **GetResultById() -** Get single test
- **DeleteResult() -** Remove test
- **GetStatistics() -** Calculate aggregates

2.4.3 Controller (TypingTestController.cs)

Manages HTTP requests with action methods:

- **Index() -** Display test page
- **SaveResult() -** Process and save test
- **Result() -** Show test results
- **History() -** Display all tests
- **Details() -** Show test details
- **Delete() -** Remove test
- **Statistics() -** Display statistics

2.4.4 Views

Five Razor views for user interface:

1. **Index.cshtml** - Typing test interface
2. **Result.cshtml** - Test completion page
3. **History.cshtml** - Test history table
4. **Details.cshtml** - Detailed test view
5. **Statistics.cshtml** - Performance dashboard

2.5 Key Algorithms

1. WPM Calculation:

WPM = (Words Typed) / (Time in Minutes)

Example: 40 words in 60 seconds = 40 WPM

2. Accuracy Calculation:

Accuracy = (Correct Characters / Total Characters) × 100

Example: 95 correct out of 100 = 95%

2.6 Implementation Approach

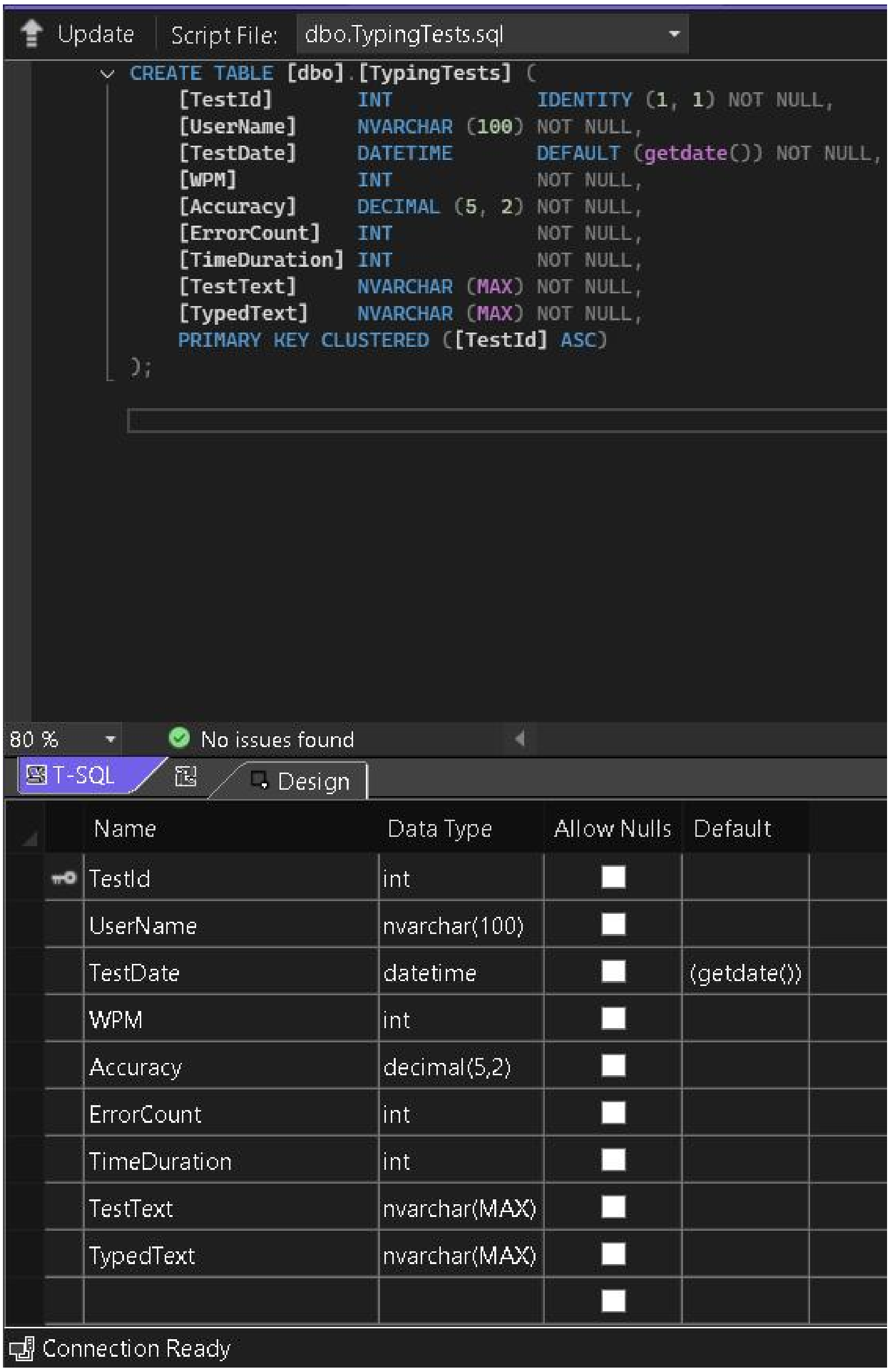
Phase 1: Database design and creation
Phase 2: Model and DAL implementation
Phase 3: Controller development
Phase 4: View creation and styling
Phase 5: Testing and debugging

2.7 Security Features

- **SQL Injection Prevention:** Parameterized queries with SqlParameter
- **Input Validation:** Server-side and client-side checks
- **Error Handling:** Try-catch blocks in DAL methods

3. Implementation Snapshot

1: SQL Server Object Explorer - Database Structure



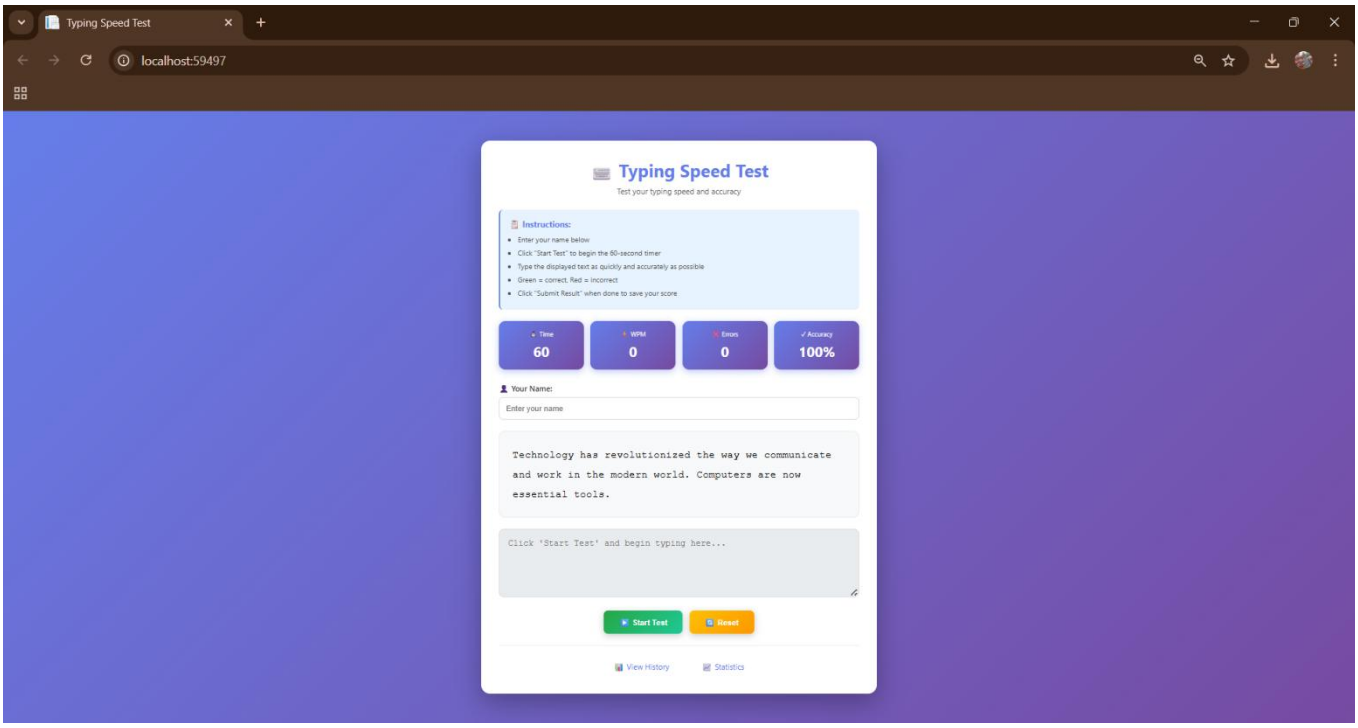
```
CREATE TABLE [dbo].[TypingTests] (
    [TestId]       INT            IDENTITY (1, 1) NOT NULL,
    [UserName]     NVARCHAR (100) NOT NULL,
    [TestDate]     DATETIME       DEFAULT (getdate()) NOT NULL,
    [WPM]          INT            NOT NULL,
    [Accuracy]     DECIMAL (5, 2) NOT NULL,
    [ErrorCount]   INT            NOT NULL,
    [TimeDuration] INT            NOT NULL,
    [TestText]     NVARCHAR (MAX) NOT NULL,
    [TypedText]    NVARCHAR (MAX) NOT NULL,
    PRIMARY KEY CLUSTERED ([TestId] ASC)
);
```

Name	Data Type	Allow Nulls	Default
TestId	int	□	
UserName	nvarchar(100)	□	
TestDate	datetime	□	(getdate())
WPM	int	□	
Accuracy	decimal(5,2)	□	
ErrorCount	int	□	
TimeDuration	int	□	
TestText	nvarchar(MAX)	□	
TypedText	nvarchar(MAX)	□	
		□	

Description: The database structure showing the TypingTests table with all columns, primary key, and default constraint. The table is properly normalized and uses appropriate data types for each field.

2: Home Page / Typing Test Interface (Index)

URL: `http://localhost:59497/TypingTest/Index'



Instructions:

- Enter your name below
- Click "Start Test" to begin the 60-second timer
- Type the displayed text as quickly and accurately as possible
- Green = correct, Red = incorrect
- Click "Submit Result" when done to save your score

Time	WPM	Errors	✓ Accuracy
60	0	0	100%

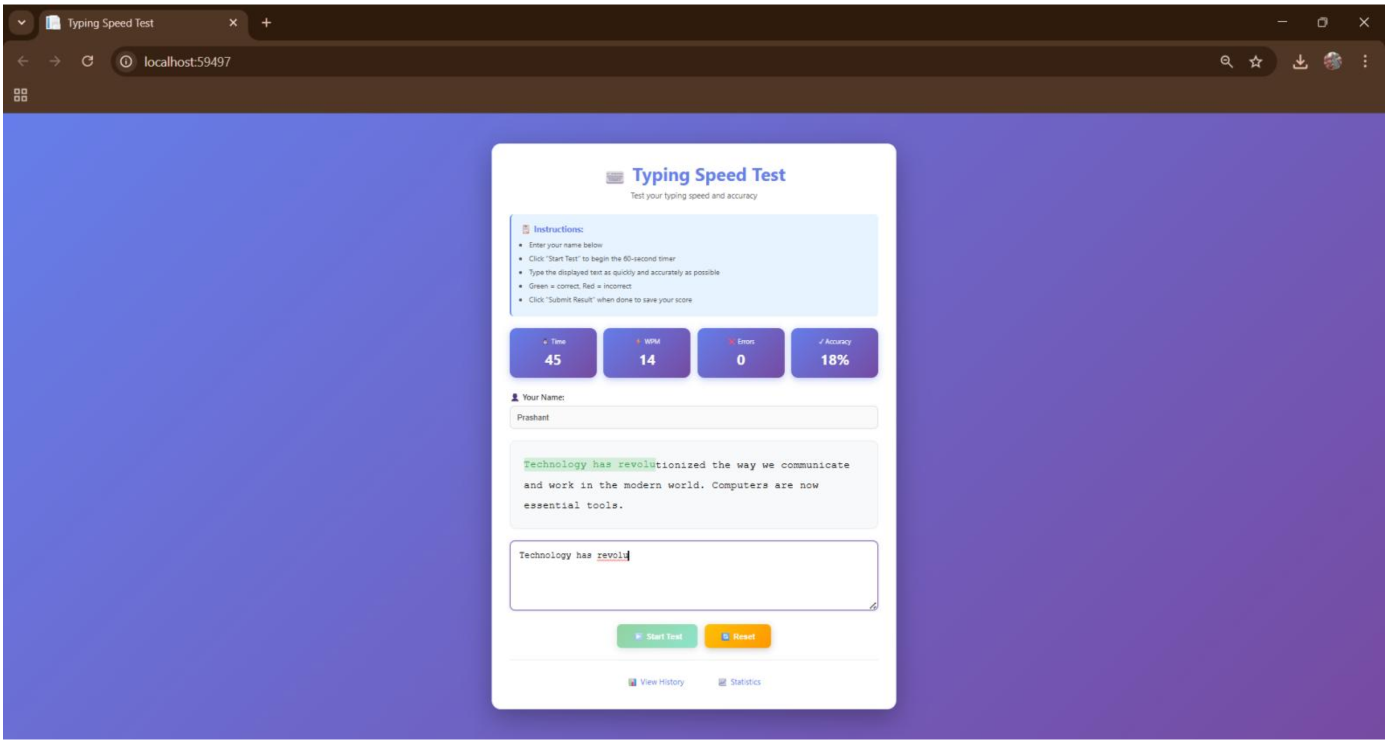
Your Name: Enter your name

```
Technology has revolutionized the way we communicate
and work in the modern world. Computers are now
essential tools.
```

```
Click 'Start Test' and begin typing here...
```

Description: This is the main interface where users begin their typing test. The design is clean and intuitive, with clear instructions and real-time statistics display. All interactive elements are clearly visible and well-organized.

3: Active Typing Test in Progress



Instructions:

- Enter your name below
- Click "Start Test" to begin the 60-second timer
- Type the displayed text as quickly and accurately as possible
- Green = correct, Red = incorrect
- Click "Submit Result" when done to save your score

Time 45

WPM 14

Errors 0

✓ Accuracy 18%

Your Name: Prashant

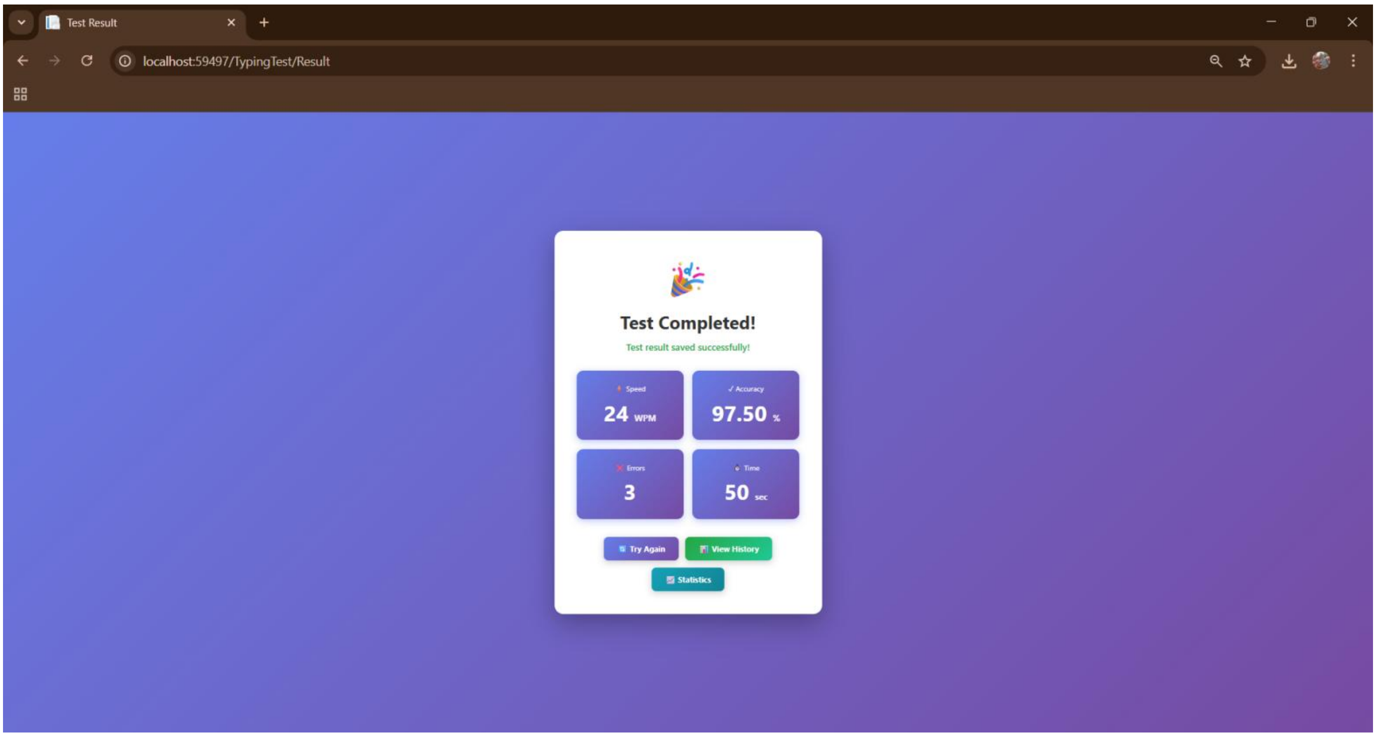
```
Technology has revolutionized the way we communicate
and work in the modern world. Computers are now
essential tools.
```

```
Technology has revolu
```

Description: This screenshot captures the application during an active typing session. The real-time feedback system is working, showing green for correct characters and red for incorrect ones. The statistics update dynamically as the user types.

4: Test Completion - Result Page

URL: `http://localhost:59497/TypingTest/Result`



Test Completed!

Test result saved successfully!

Speed 24 WPM

✓ Accuracy 97.50 %

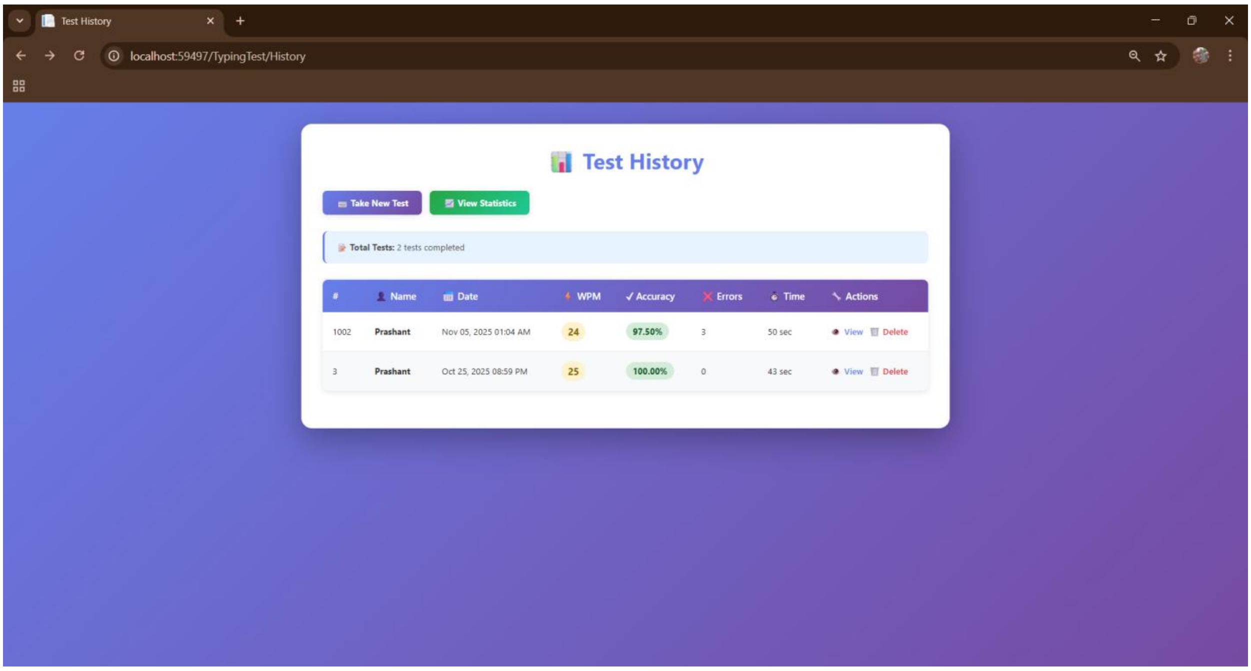
✕ Errors 3

Time 50 sec

Description: After completing a test and clicking "Submit Result," users are redirected to this results page showing their final performance metrics. The page provides clear visual feedback and easy navigation options.

5: Typing Test History Page

URL: `http://localhost:59497/TypingTest/History`



Test History

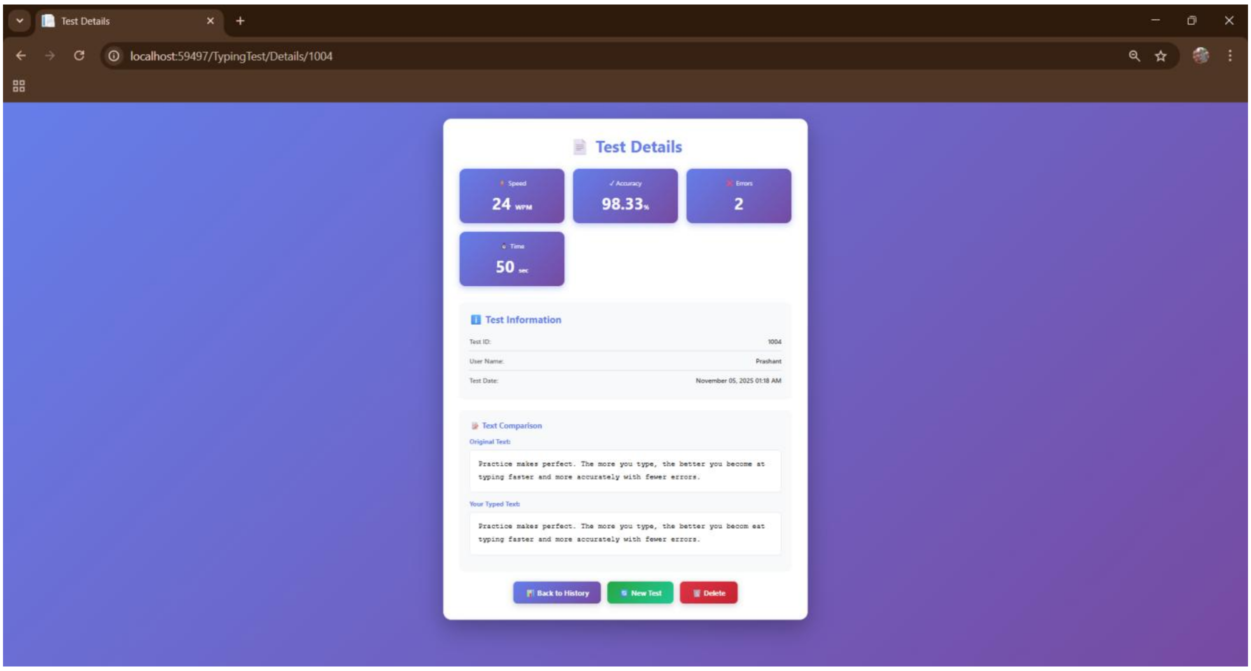
Total Tests: 2 tests completed

#	Name	Date	WPM	✓ Accuracy	Errors	Time	Actions
1002	**Prashant**	Nov 05, 2025 01:04 AM	24	97.50%	3	50 sec	View Delete
3	**Prashant**	Oct 25, 2025 08:59 PM	25	100.00%	0	43 sec	View Delete

Description: The History page displays all completed typing tests in a comprehensive table format. Each test shows detailed metrics, and users can view individual test details or delete records. The color-coding helps users quickly identify their performance levels.

6: Test Details Page

URL: `http://localhost:59497/TypingTest/Details/1`



Test Details

Speed 24 WPM

✓ Accuracy 98.33%

Errors 2

Time 50 sec

Test Information

Test ID:	1004
User Name:	Prashant
Test Date:	November 05, 2025 01:18 AM

Text Comparison

Original Text:

```
Practice makes perfect. The more you type, the better you become at
typing faster and more accurately with fewer errors.
```

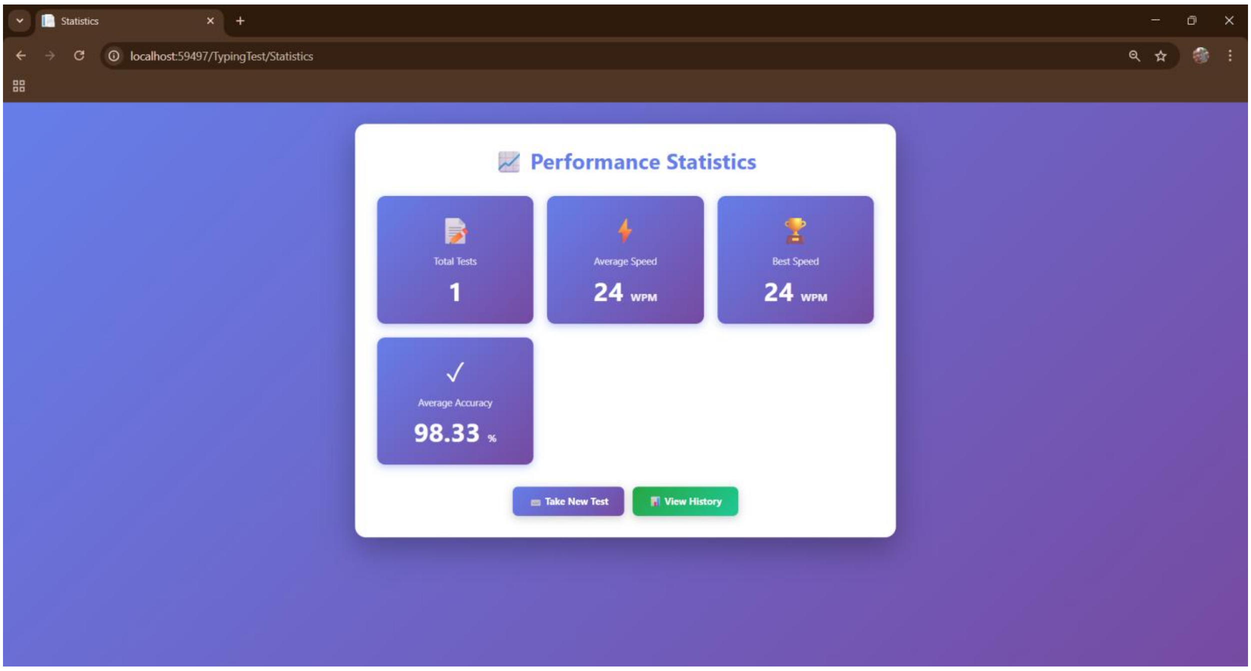
Your Typed Text:

```
Practice makes perfect. The more you type, the better you becom eat
typing faster and more accurately with fewer errors.
```

Description: The Details page provides an in-depth view of a single typing test, including all performance metrics and a side-by-side comparison of the original text versus what the user actually typed. This helps users identify their typing patterns and mistakes.

7: Performance Statistics Dashboard

URL: `http://localhost:59497/TypingTest/Statistics`



Performance Statistics

Total Tests 1

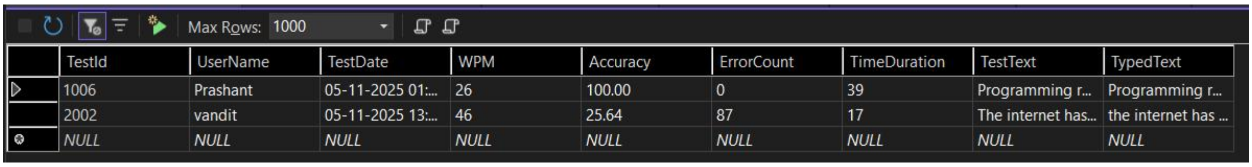
Average Speed 24 WPM

Best Speed 24 WPM

Average Accuracy 98.33 %

Description: The Statistics page provides an overview of the user's overall typing performance. It calculates and displays aggregate metrics including total tests completed, average typing speed, personal best, and average accuracy. This helps users track their improvement over time.

8: SQL Server table with sample data



TestId	UserName	TestDate	WPM	Accuracy	ErrorCount	TimeDuration	TestText	TypedText
1006	Prashant	05-11-2025 01:...	26	100.00	0	39	Programming r...	Programming r...
2002	vandit	05-11-2025 13:...	46	25.64	87	17	The internet has...	the internet has ...
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Description: The above screenshot shows sample test records successfully stored in the TypingTests table using ADO.NET operations.

4. Conclusion

4.1 Project Summary

The Typing Speed Tester project has been successfully developed using ASP.NET MVC and ADO.NET. The application provides a complete platform for testing and tracking typing performance.

Key achievements include:

- Successfully implemented MVC architectural pattern
- Used ADO.NET for all database operations
- Created five functional views with clean UI
- Implemented real-time performance tracking
- Stored data persistently in SQL Server
- Provided comprehensive history and statistics

4.2 Objectives Achieved

All project objectives were successfully met:

Technical:

- MVC architecture implementation
- ADO.NET database operations
- SQL Server database design
- CRUD operations
- State management

Functional:

- Interactive typing test
- Real-time metrics calculation
- Persistent data storage
- History and statistics display
- Responsive design

4.3 Learning Outcomes

Through this project, I gained practical experience in:

- ASP.NET MVC framework development
- ADO.NET and database connectivity
- SQL Server database design
- Full-stack web development
- Problem-solving and debugging

4.4 Limitations

- No user authentication system

- Limited text variety (8 passages)
- Basic statistics without graphs
- No export functionality

4.5 Future Scope

Potential enhancements include:

- User login/registration system
- More text passages with difficulty levels
- Graphical charts for progress tracking
- Leaderboard and competitive features
- Export results to PDF/Excel

4.6 Conclusion

This mini project successfully demonstrates the practical application of .NET Technologies concepts. The Typing Speed Tester serves as both a useful tool and an educational project showcasing MVC architecture, ADO.NET operations, and database management.

The project has enhanced my understanding of web application development and prepared me for building more complex applications in the future.

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