**Typing Tester**

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**ACIT4420: Problem-Solving with Scripting**

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Executive Summary

The Typing Tester Application is a key tool for improving digital skills, especially in typing. This app is a fun and interactive place where people can get better at typing fast and accurately. It has lots of different texts to type, which is great for people at all skill levels, and it gives feedback right away to help users improve. One of the best things about the app is that it keeps track of how well you're doing, like how accurate you are and how many words you can type in a minute. This helps you see where you're improving and still need to work.

This app stands out because it's made for the user. It uses game-like elements, a simple countdown timer, speaking of words and letter dictating, highlighting typographical errors, moving text, and an easy-to-understand layout. This makes learning fun and a bit of a challenge. The app uses Tkinter for its graphics, which makes it easy to use, and Matplotlib to show how you're doing over time, making the whole experience better. This summary talks about the main features of the Typing Tester Application and how it can be a great tool for personal and educational growth in typing.

***Keywords:*** *Typing Test, User Interface (UI) Design, Accuracy Measurement, Words Per Minute (WPM), Performance Feedback, Practice Mode, Time Management, Interactive Learning, Python Programming, Educational Tool.*

1 Introduction

1.1 Background

In today's world, being good at typing is more than just a skill – it's a must-have. The Typing Tester Application started as a simple way to help people type better. But as time went on, it grew a lot. Now, it has many cool features and is easy to use, making learning to type better and more fun. This change shows how important it is to be good at using digital tools and why we need good ways to learn these skills.

1.2 Objectives

The main goal of this Typing Tester Application is to be a fun and complete way for people to get faster and more accurate at typing. It wants to:

* Give users different kinds of typing tests with lots of text options.
* Show how well you're doing right away.
* Let users change their typing practice to fit what they need.
* Have a practice mode so you can learn without stress.
* Use cool tools to show users how they're getting better over time.

1.3 Significance

What makes this Typing Tester Application special is how it teaches typing in a fun and useful way. It turns the usual typing practice into something fun and rewarding. The app is great because it shows you how you're doing right away. This helps users take control of their learning, making them better typists and giving them more confidence and motivation to keep getting better.

1.4 Scope

This Typing Tester Application covers a few important areas:

* Making typing fun: It has cool features like moving text and a nice design.
* Keeping track of how you're doing: It saves and loads your typing data so you can see your progress.
* Letting you choose how you practice: You can set up your typing practice to match your skill level and goals.
* Building a community: It encourages users to connect and compete in a friendly way.

Right now, the app is a great tool for all kinds of typists, from beginners to experts. It's good for both people learning on their own and for use in schools or other places.

Literature Review

This section of my report critically examines and synthesizes relevant existing literature, research studies, and theoretical frameworks related to typing proficiency, typing training

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software, and user interface design for educational tools. The section aims to highlight the current state of knowledge in these areas and identify gaps that this project addresses.

In a notable study, [1] the influence of word prediction software on spelling accuracy and typing speed was investigated. Focusing on children with spelling difficulties, the study involved 80 Grade 4 – 6 students from a special needs school. Participants were tasked with entering words using an on-screen keyboard, both with and without word-prediction software. The research found that while word prediction improved spelling accuracy, it also led to increased time consumption and a tendency to use word approximations. Interestingly, no significant relationship was found between the children's existing spelling knowledge and the efficacy of word prediction. This study highlights the potential benefits and drawbacks of using assistive technology in typing education, especially for individuals with specific learning challenges.

[2]research offers a comprehensive analysis of the effectiveness of rapid typing software and modules in improving typing skills. The study was conducted with a focus on students in a vocational high school (SMK N 7 Yogyakarta), where mastering typing skills is a crucial part of the curriculum. The research involved 30 students and employed methods like text typing skill documentation and Multivariate Analysis of Variance (MANOVA) for data analysis. The findings revealed that while the rapid typing software significantly improved typing speed, it did not have a marked impact on typing accuracy. This underscores the software's effectiveness in enhancing certain aspects of typing proficiency, particularly speed, but also highlights the need for a more holistic approach that addresses accuracy.

The study [3], [4] investigates the intricate balance between speed and accuracy in skilled typewriting, a crucial aspect of typing training programs. Their research highlights the hierarchical nature of typing control systems, consisting of two primary loops: the outer loop, which focuses on word generation, and the inner loop, responsible for the sequential activation and execution of keystrokes. Their key findings include:

* + 1. **Speed-Accuracy Trade-off**: Typists can modulate their speed for better accuracy, but there's a speed limit due to inherent process limitations.
  1. **Inner-Loop Focus**: Most adjustments in typing speed and accuracy are attributed to the inner loop, highlighting its significance in typing performance.
  2. **Outer-Loop's Role**: The outer loop, though less influential in speed adjustments, significantly impacts error rates, emphasizing the need for balanced training that addresses both loops.

1. study (1954) at Leon High School, Tallahassee, Florida, offers insightful perspectives on the effectiveness of typing training programs, particularly in identifying and addressing common errors. Her research, conducted with a second-year typewriting class, aimed to analyze the types of typewriting errors prevalent among students and to understand the underlying causes of these errors. This analysis is crucial in tailoring typing programs to effectively address individual and collective challenges faced by students. Barrineau's findings contribute to a deeper understanding of how targeted interventions in typing education can enhance overall proficiency and accuracy, a key aspect often emphasized in modern typing software.

2

1. Mavis Beacon Teaches Typing for Teachers exemplifies the impact of user-friendly design in educational software, particularly in typing tutors. This program stands out for its personalized learning approach, adapting to each student's progress and offering tailored exercises. Such customization is crucial for accommodating diverse learning styles and paces. A key feature of Mavis Beacon is its real-time progress tracking, providing immediate feedback to learners and valuable insights for educators. This functionality enhances the assessment process, making it more efficient and informative. The software's flexibility in lesson customization and goal setting aligns with the current educational emphasis on personalized learning outcomes. Interactive elements like typing games are integrated to maintain engagement, making learning both fun and effective.

While the solutions mentioned above have significantly contributed to typing education and assessment, there remains room for innovation. Some platforms might excel in engagement but lack detailed performance analytics. Others might offer comprehensive training but fall short in user experience. Recognizing these gaps and the evolving needs of digital natives, the "Typing Tester" project seeks to carve its niche, blending the best of assessment, feedback, and user engagement.

System Design and Architecture

1.5 Application Framework and Design Principles

This Typing Tester Application is built using the Python programming language, leveraging the Tkinter library for its graphical user interface (GUI). This choice ensures cross-platform compatibility and ease of use. The application adheres to the following design principles:

1.5.1 **Modularity:** The code is structured into distinct functions and classes, facilitating ease

of maintenance and scalability. This main code file is structured into global functions, classes, and local functions or methods.

1.5.2 **User-Centric Design:** The GUI is designed with a focus on simplicity and

intuitiveness, ensuring a seamless user experience.

1.5.3 **Performance Efficiency:** Efficient algorithms and data structures are used to ensure

quick response times and minimal resource usage.

1.6 Software Architecture

The application follows a straightforward architecture:

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1.6.1 **Front-End (GUI):** This was developed using Tkinter, it provides an interactive interface for users to engage with the application. It includes text display areas, input fields, buttons, progress bar, level-up points, and graphical elements for displaying performance data.

1.6.2 **Back-End Logic:** This was written in Python, and it handles the core functionalities such as text processing, accuracy calculation, performance tracking, and data management.

1.6.3 **Data Storage:** Over 1000 text sentences in TXT format and user performance data are stored in CSV format respectively, allowing for easy access and manipulation. This includes user IDs, session dates, accuracy, and WPM. While the text sentences are derived from different fields of subjects such as Biblical texts, technological texts, agricultural texts, business and marketing fields[7]–[16].

1.7 Key Components and Their Interactions

1.7.1 **Text Management:** The application loads text examples from a file (sentences.txt), where it randomly selects and presents them to the user for typing practice.

1.7.2 **Performance Evaluation:** After each session, the application calculates typing speed (WPM) and accuracy, providing immediate feedback to the user.

1.7.3 **Data Handling:** Performance data is saved to and loaded from a CSV file (user\_performance-data.csv), ensuring the persistence of user progress.

1.7.4 **Graphical Data Representation:** This application utilizes Matplotlib for generating graphs, offering users a visual representation of their progress.

1.8 Security and Data Integrity

1.8.1 **Data Validation:** The application ensures that user inputs are validated before processing to prevent errors and maintain data integrity.

1.8.2 **Error Handling:** Robust error handling mechanisms are in place to manage file access and data storage operations, ensuring the application's stability.

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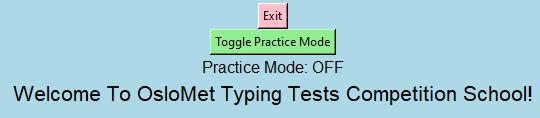
2 Features and Functionalities

2.1 User Interface and Experience

The Typing Tester Application is meticulously designed to prioritize user experience, ensuring that both new and experienced users find the interface engaging and easy to navigate. Key elements of the user interface and experience include: [Figure 1](#page11)

2.1.1 **Animated Text Label:** This feature enhances user engagement with a welcoming,

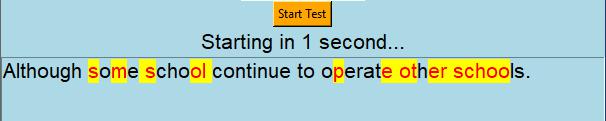
dynamic display.



*Figure 1: Animation of Texts*

2.1.2 **Customizable Settings:** Understanding that users have varying skill levels and learning preferences, the application offers customizable settings. This includes the ability to adjust the number of examples or typing tests in each session. Such flexibility accommodates beginners who might prefer shorter sessions and advanced users who seek more extensive practice. This customization extends to other aspects like text size and color, ensuring comfort and accessibility for all users.

2.1.3 **Real-Time Error Highlighting:** One of the application's standout features is its ability to highlight errors in real-time as the user types. This immediate feedback is crucial for learning and correction, allowing users to quickly identify and understand their mistakes. The visual distinction of errors helps in reinforcing correct typing habits, significantly enhancing the learning curve.



*Figure 2: Highlighting of Typo-graphical Errors in Real-Time*

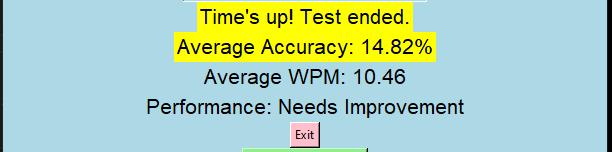
5

2.1.4 **Voice Feedback for Typed Letters:** This feature enhances the learning experience by providing real-time auditory feedback. As the user types each letter of the displayed phrase or sentence, the application pronounces the letter. This immediate feedback helps users in associating the keyboard layout with the corresponding sounds, which can be particularly beneficial for beginners or those looking to improve their typing accuracy and speed.

2.2 Performance Tracking and Feedback

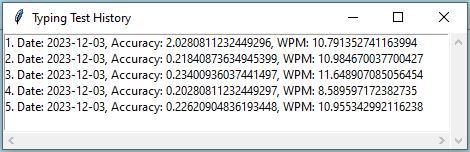
The application is not just a tool for practicing typing but also a comprehensive system for tracking and improving typing skills. It achieves this through:

2.2.1 **Instant Performance Metrics:** Immediately after each typing session, the application provides users with detailed feedback on their performance. This includes metrics like typing accuracy and words per minute (WPM), crucial indicators of typing proficiency. Such instant feedback allows users to gauge their performance in real time, making the learning experience more tangible and rewarding.



*Figure 3: Instant Performance Metrics*

2.2.2 **Historical Data Tracking:** Beyond immediate feedback, the application also offers historical data tracking. This feature allows users to view and analyze their performance over time. By having access to their progress history, users can identify patterns, celebrate improvements, and pinpoint areas needing more practice. This longitudinal view of performance is instrumental in setting and achieving personal typing goals.



*Figure 4: Tracking of Historical Data of a user*

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2.2.3 **Graphical Data Representation:** To analyze progress both intuitive and insightful, the

application incorporates graphical representations of data. Users can view their improvements in typing speed and accuracy through easy-to-understand graphs and

charts. These visual tools transform raw data into actionable insights, making it easier for users to comprehend their progress and stay motivated. The graphical representation

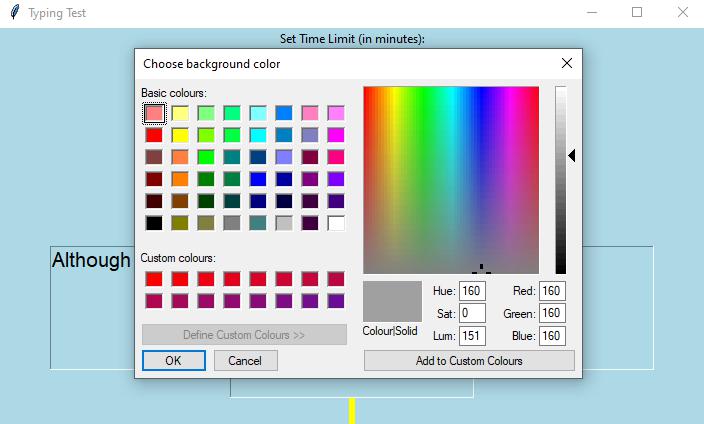
is particularly effective in showcasing long-term progress and helping users set realistic and achievable goals based on their performance trends.

2.3 Customization and Flexibility

The Typing Tester Application is designed with a deep understanding of diverse user needs, offering customization and flexibility that allows users to personalize the visual aspects of the application according to their preferences. Customization can greatly enhance the user experience by making the application more visually appealing and comfortable to use, especially during extended typing sessions. Key aspects of this feature include:

2.3.1 **Theme Selection:** Users can choose from a variety of themes, which may include different color schemes, font styles, and background images. This allows users to select

a visual presentation that is most pleasing to their eyes or that best fits the lighting conditions of their environment.

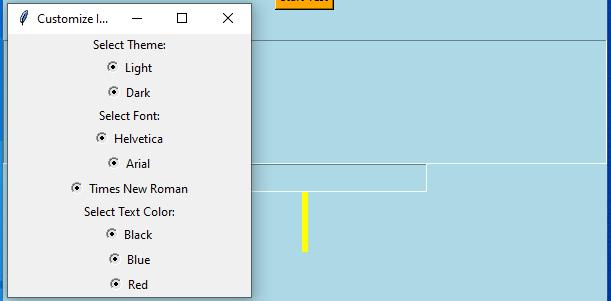


*Figure 5: Selection of Theme*

2.3.2 **Font Customization:** The application allows users to change the font style and size of

the text displayed. This is particularly useful for users who may have visual impairments or preferences for certain types of fonts for better readability.

7

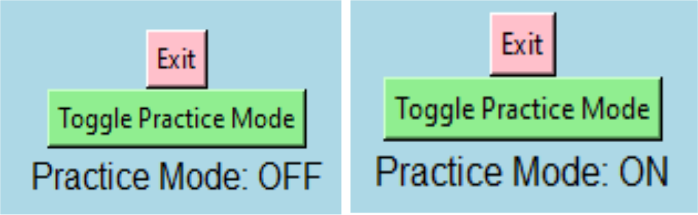


*Figure 6: Customization of Font*

2.3.3 **Layout Adjustments:** Users can adjust the layout of the application, such as the size and positioning of the typing area, scoreboard, and other elements. This flexibility

ensures that the application can adapt to different screen sizes and user preferences, making it more accessible and user-friendly.

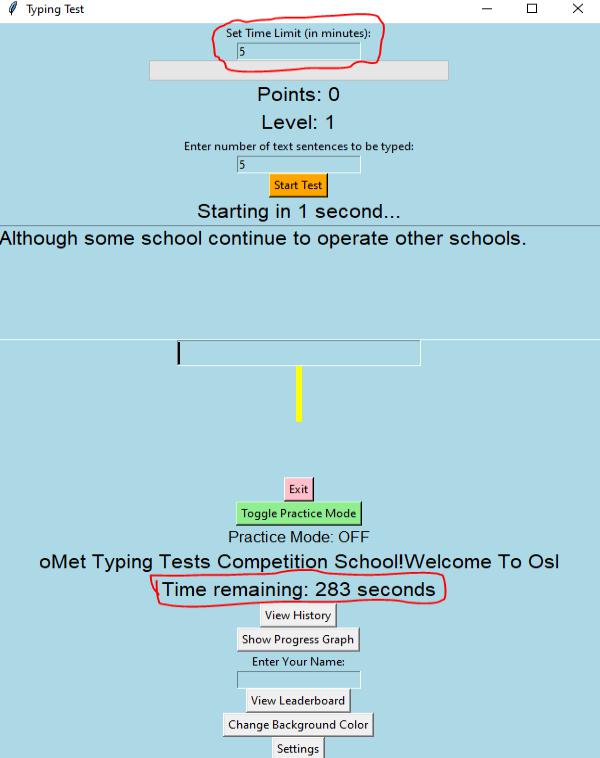
2.3.4 **Practice Mode:** This mode is a cornerstone of the application's adaptability. It provides a relaxed, stress-free environment ideal for beginners or those looking to hone their skills without the added pressure of competing against the clock. In this mode, users can focus solely on accuracy and technique, building confidence before moving on to more challenging timed tests.



*Figure 7: Practice Mode - ON/OFF*

2.3.5 **Session Time Limits:** Recognizing that users have different availability and attention spans; the application allows the setting of time limits for typing sessions in minutes but automatically converted to seconds upon the starting of typing. This feature adds significant flexibility to practice routines, accommodating those who prefer short, focused sessions as well as users who wish for longer, more intensive practice periods. This customization ensures that the application fits seamlessly into various daily schedules, enhancing its usability.

8

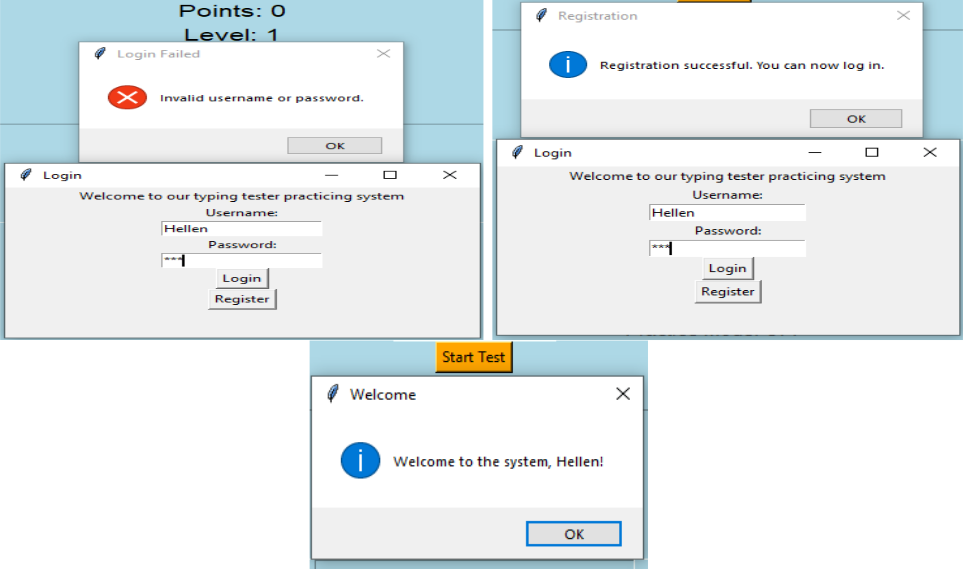


*Figure 8: Session Time Limit for Typing Practice*

2.4 Data Management and Security

In an era where data security is paramount, the Typing Tester Application places a high priority on robust data management and security:

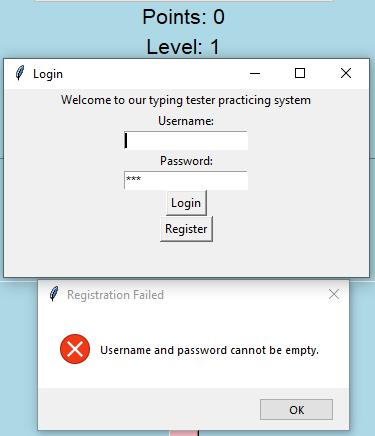
2.4.1 **User Registration and Login System:** Before user can gain access to the application, such a user must first register. The application includes a user login system, requiring users to enter an existing username and a unique ID before starting the typing test. This feature adds a personalized touch to the application, allowing for a more tailored user experience. It also paves the way for future enhancements, such as tracking individual progress over time or customizing tests based on user performance.



*Figure 9: User Registration and Login System*

9

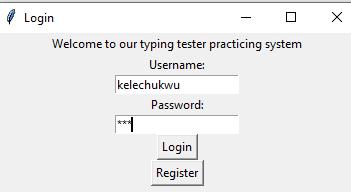
2.4.2 **Input Validation for Login:** To ensure data integrity and a smoother user experience, input validation checks have been implemented in the login system. This feature verifies that the username and user ID meet certain criteria (such as non-emptiness, length, or format) before allowing access to the typing test. This validation helps prevent errors and potential misuse, ensuring a more robust and user-friendly application.



*Figure 10: Validation of Input for Login*

2.4.3 **Performance Data Saving and Loading:** The application ensures that user performance data is not only saved but also easily retrievable. This functionality means that users can pick up right where they left off, with no loss of progress or data. It allows for a continuous learning experience, where each session's data contributes to a comprehensive view of the user's improvement over time.

2.4.4 **Secure Data Handling:** The application employs advanced measures to ensure the integrity and privacy of user data. This includes secure data storage practices and encryption protocols to protect sensitive information (e.g. passwords). Users can trust that their data is handled with the utmost care, safeguarding their personal information while they focus on improving their typing skills.



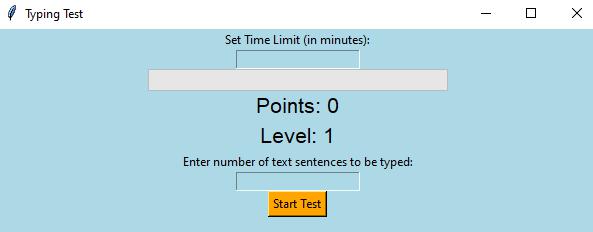
*Figure 11: Secure Data Handling*

10

2.5 Community and Competition

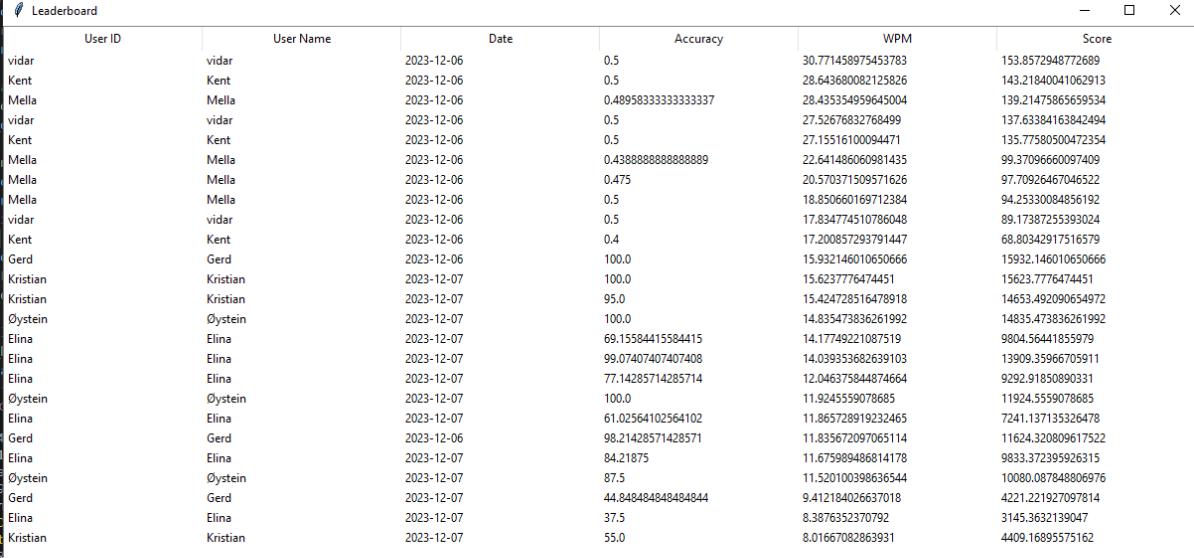
The application not only focuses on individual progress but also fosters a sense of community and healthy competition:

2.5.1 **Points and Level System:** As users engage with the application, they earn points and level up based on their performance. This gamified element adds an extra layer of motivation and enjoyment to the learning process. It encourages users to set goals and strive for improvement, turning the often-monotonous task of typing practice into an engaging and rewarding experience. [Figure 12](#page17)



*Figure 12: Points and Level System*

2.5.2 **Leaderboard Competitive Features:** Looking toward future updates, the application plans to introduce features that allow users to compare their performance with others. This will encourage a competitive yet supportive environment, where users can challenge themselves against peers, share tips, and celebrate each other's progress. Such community-oriented features are aimed at enhancing user engagement and fostering a supportive network of learners.



*Figure 13: Leaderboad Competitive Features*

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The *Leaderboard* feature in my Typing Test Application serves as a motivational and performance-tracking tool. It is designed to foster a competitive and engaging environment for users by displaying a ranked list of top performers based on their typing proficiency. This feature not only encourages users to improve their typing skills but also allows them to see where they stand in comparison to others.

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3 Implementation Details

3.1 Programming Language and Libraries

3.1.1 **Python:** The choice of Python for this project was driven by its simplicity and the vast array of libraries it offers. Python's syntax is clear and readable, which is beneficial for educational tools where code maintenance and understanding are crucial.

*3.1.1.1* ***Tkinter:*** *This library was selected for its integration with Python's standard library, making it a reliable choice for GUI development. We leveraged Tkinter's widgets like buttons, text fields, and labels to create an intuitive user interface. The decision to use Tkinter also stems from its cross-platform compatibility, ensuring the application runs smoothly on different operating systems*[17]–[23][24]–[30]*.*

*3.1.1.2* ***matplotlib:*** *The inclusion of Matplotlib serves the purpose of enhancing user engagement through visual feedback. The bar chart created using this library offers an immediate, visual representation of the user's performance, making the data more accessible and understandable*[17]–[23][24]–[30]*.*

*3.1.1.3* ***threading and Time:*** *These modules are crucial for managing the application's time-based features concurrently. The threading module allows the application to perform countdowns, speech synthesis, and track typing durations without freezing the GUI, ensuring a smooth user experience* [17]–[23][24]–[30]*.*

*3.1.1.4* ***csv:*** *This module is used for reading from and writing to CSV (Comma comma-separated values) files. The CSV is employed in this application for storing and retrieving user performance data and user credentials, allowing for easy data management and analysis*[24]–[30]*.*

*3.1.1.5* ***Os:*** *The os module provides a way of using operating system-dependent functionality. In the context of this application, it is used for file path manipulations or to interact with the underlying operating system for file operations*[17]–[23][24]–[30]*.*

*3.1.1.6* ***datetime and timedelta:*** *These are part of Python's datetime module and are used for handling and manipulating dates and times. In this application, they are used to record the time and date of each typing session and to handle time-based calculations like session durations*[17]–[23][24]–[30]*.*

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*3.1.1.7* ***tkinter.messagebox and tkinter.ttk:*** *These are submodules of Tkinter. The message box submodule is used for displaying pop-up messages to the user, such as error alerts or informational dialogs. The ttk submodule (themed Tkinter) provides access to Tkinter's themed widget set, which can be used to create a more modern and visually appealing GUI*[17]–[23][24]–[30]*.*

*3.1.1.8* ***time:*** *This module provides various time-related functions. In the application, it's used alongside threading for managing time-dependent features like timers and delays*[17]–[23][24]–[30]*.*

*3.1.1.9* ***random:*** *This module implements pseudo-random number generators for various distributions. The random is used in the application to randomly select text sentences for the typist to type, ensuring a varied and unpredictable typing experience* [17]– [23][24]–[30]*.*

*3.1.1.10* ***matplotlib.pyplot:*** *This is a submodule of Matplotlib, a comprehensive library for creating static, animated, and interactive visualizations in Python. In the application, pyplot is used to generate graphs and charts that visually represent the user's typing performance over time*[17]–[23][24], [25], [27]–[30]*.*

*3.1.1.11* ***numpy (np):*** *NumPy is a library for the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays. It could be used in this application for efficient numerical computations, especially when dealing with large datasets or complex calculations*[17]–[23][24], [25], [27]–[30]*.*

*3.1.1.12* ***Pyttsx3:*** *This is a text-to-speech conversion library in Python. It's used in the application to read aloud the text that the user needs to type, enhancing the interactivity of the application, especially for users with visual impairments*[17]– [23][24], [25], [27]–[30]*.*

*3.1.1.13* ***queque, Queque****: This module provides a queue implementation in Python. In the application, it's used for managing the speech queue in the text-to-speech feature, ensuring that text is spoken in the order it's received and without blocking the main application thread*[17]–[23][24], [25], [27]–[30]*.*

*3.1.1.14* ***tkinter.colorchooser:*** *This is another submodule of Tkinter, providing a dialog allowing the user to choose a color. In the application, it's used to let users customize the color scheme of the GUI, adding a level of personalization to the user experience*[17]– [23][24], [25], [27]–[30]*.*

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3.2 Core Functionality Implementation

3.2.1 **Text Loading and Randomization:** This feature enhances the application's utility by providing a diverse range of typing text challenges. The ability to load different text sentences means the application can cater to various skill levels and interests.

3.2.2 **Accuracy Calculation:** The method of calculating accuracy is a key metric in typing tests. This function not only assesses the user's performance but also provides essential feedback, which is crucial for learning and improvement.

3.2.3 **Typing Speed Calculation:** The application's ability to calculate WPM aligns with industry standards for typing tests. This feature is vital for users to track their progress and set personal goals.

3.3 GUI Design and Interaction

3.3.1 **Layout Management:** The use of Tkinter's pack geometry manager was a strategic decision to balance simplicity and effectiveness in layout design. This choice is particularly beneficial for developers new to GUI programming.

3.3.2 **Event Handling:** The application's responsiveness and interactivity are achieved through event-driven programming. This approach ensures that the application reacts in real-time to user inputs, enhancing the overall user experience.

3.3.3 **Error Highlighting:** Immediate error feedback is essential in learning environments. This feature helps users quickly identify and correct their mistakes, which is a critical part of the learning process in typing.

3.4 Data Visualization

3.4.1 **Bar Chart for Typing Speeds:** The decision to include a bar chart was made to provide users with a clear and engaging way to view their progress. This visual representation helps in making the abstract data more tangible and understandable.

3.5 Practice Mode Feature

3.5.1 **Toggle Functionality:** The inclusion of a practice mode offers flexibility to the user, catering to both beginners and advanced users. This mode is especially useful for users who want to practice without the pressure of a timed environment. It could be turned On or Off by the users.

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3.6 Code Optimization and Testing

3.6.1 **Performance Optimization:** The application was optimized for performance to handle multiple functionalities efficiently. This optimization ensures that the application remains responsive and user-friendly, even on lower-end devices.

3.6.2 **Testing:** The application underwent thorough testing, including unit tests for individual functions and comprehensive user acceptance testing. This testing ensures reliability and robustness, crucial for educational software.

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4 Testing and Examples

4.1 Testing Methodology

4.1.1 **Unit Testing:** Each function, from text loading to accuracy calculation, was subjected to unit testing. This ensured that individual components of the application worked as expected. For instance, the accuracy calculation function was tested with predefined inputs to ensure it returned the correct accuracy percentage.

4.1.2 **Integration Testing:** After unit testing, integration testing was conducted to ensure that different parts of the application worked together seamlessly. This included testing the interaction between the GUI elements and the underlying logic, such as the response of the application to user inputs.

4.1.3 **User Acceptance Testing (UAT):** A group of users with varying typing skills was selected to test the application. Their feedback was crucial in understanding the user experience, including the application's usability, interface design, and overall functionality.

4.1.4 **Performance Testing:** Assessing the application's response time and resource usage

under different scenarios.

4.2 Test Cases and Results

4.2.1 **Case 1: Beginner Level Typist:** A user with basic typing skills was asked to use the application. The focus was on the application's ability to handle slow typing speeds and frequent errors. The error highlighting feature and the adaptive difficulty level were particularly useful in this scenario.

4.2.2 **Case 2: Average Typist:** An average typist tested the application for its ability to accurately track high typing speeds and provide challenging text sentences. The application's performance in handling fast inputs and providing real-time feedback was noted.

17

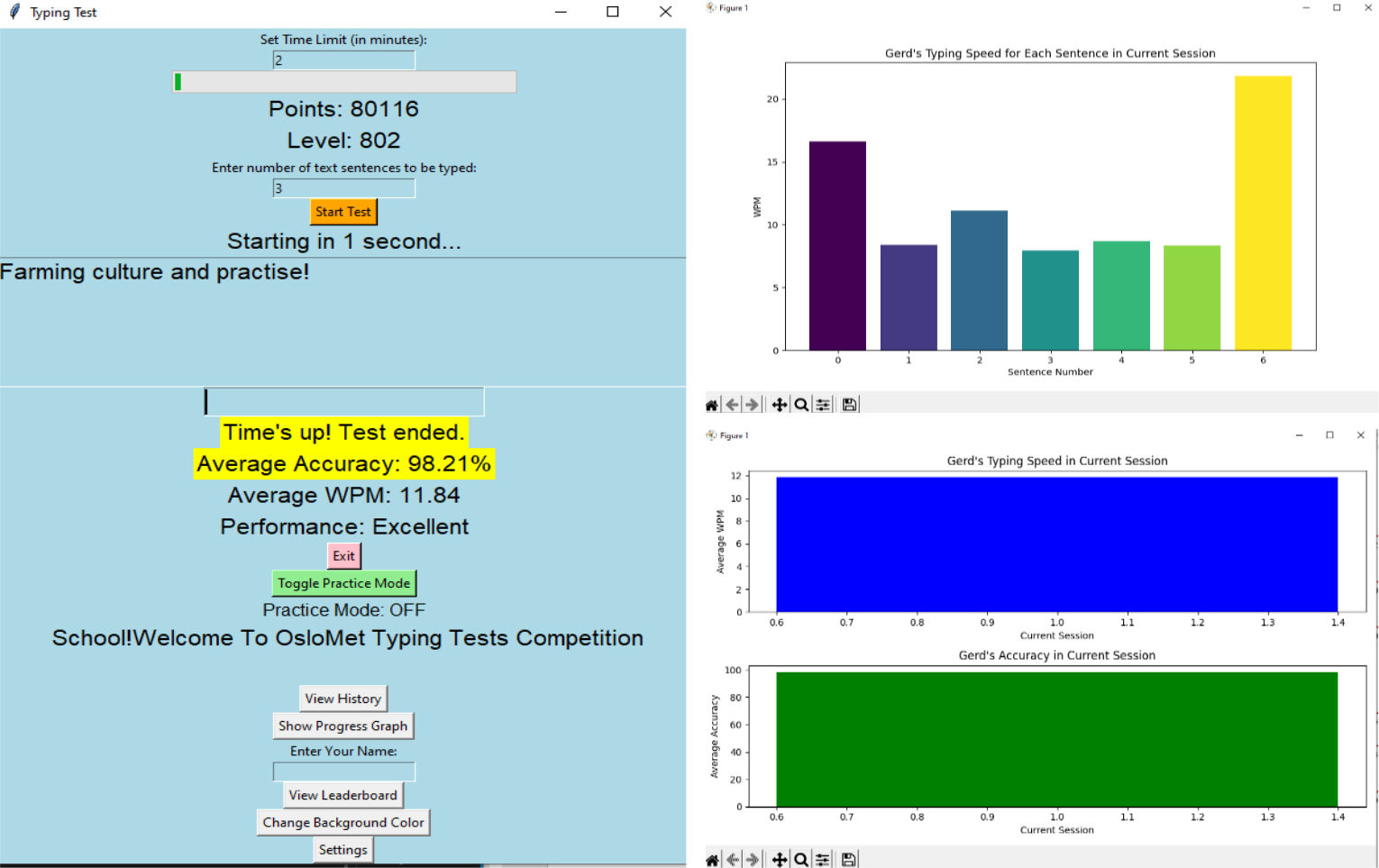
4.2.3 **Case 3: Advanced Typist:** An experienced typist tested the application for its ability to accurately track high typing speeds and provide challenging text sentences. The application's performance in handling fast inputs and providing real-time feedback was noted.

4.2.4 **Case 4: Long Text Input:** The application was tested with a longer text to evaluate its performance under extended typing sessions. This test was crucial to assess the application's stability and memory management over longer usage periods.

4.3 Examples of Application Use

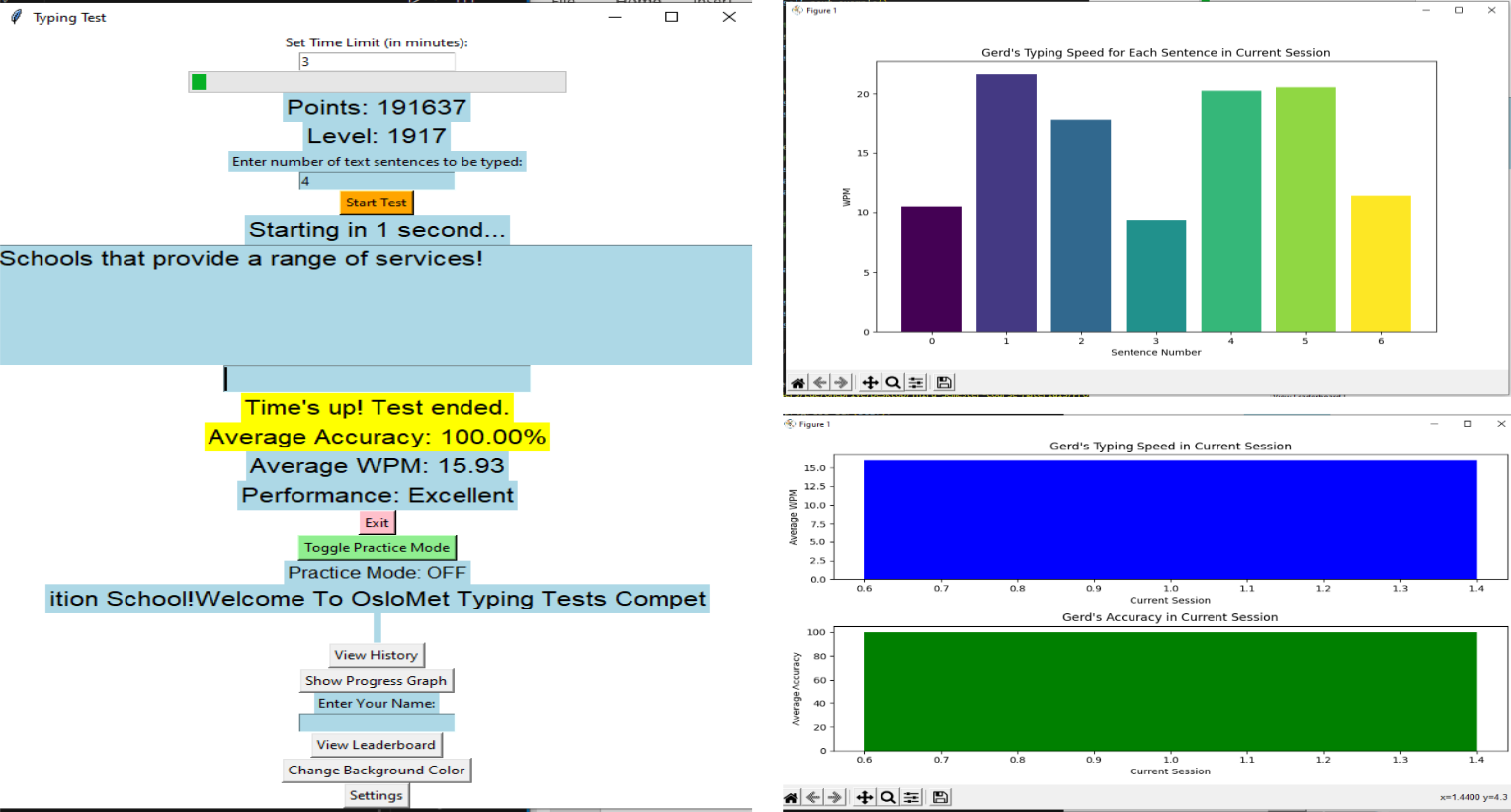
In each example case here, the participant typists have individually taken three different typing sessions.

4.3.1 **Example 1: Learning Typing Skills:** A beginner typist used the application for four days. Their progress in typing speed and accuracy was recorded, demonstrating the application's effectiveness as a learning tool. [Figure 14](#page24)

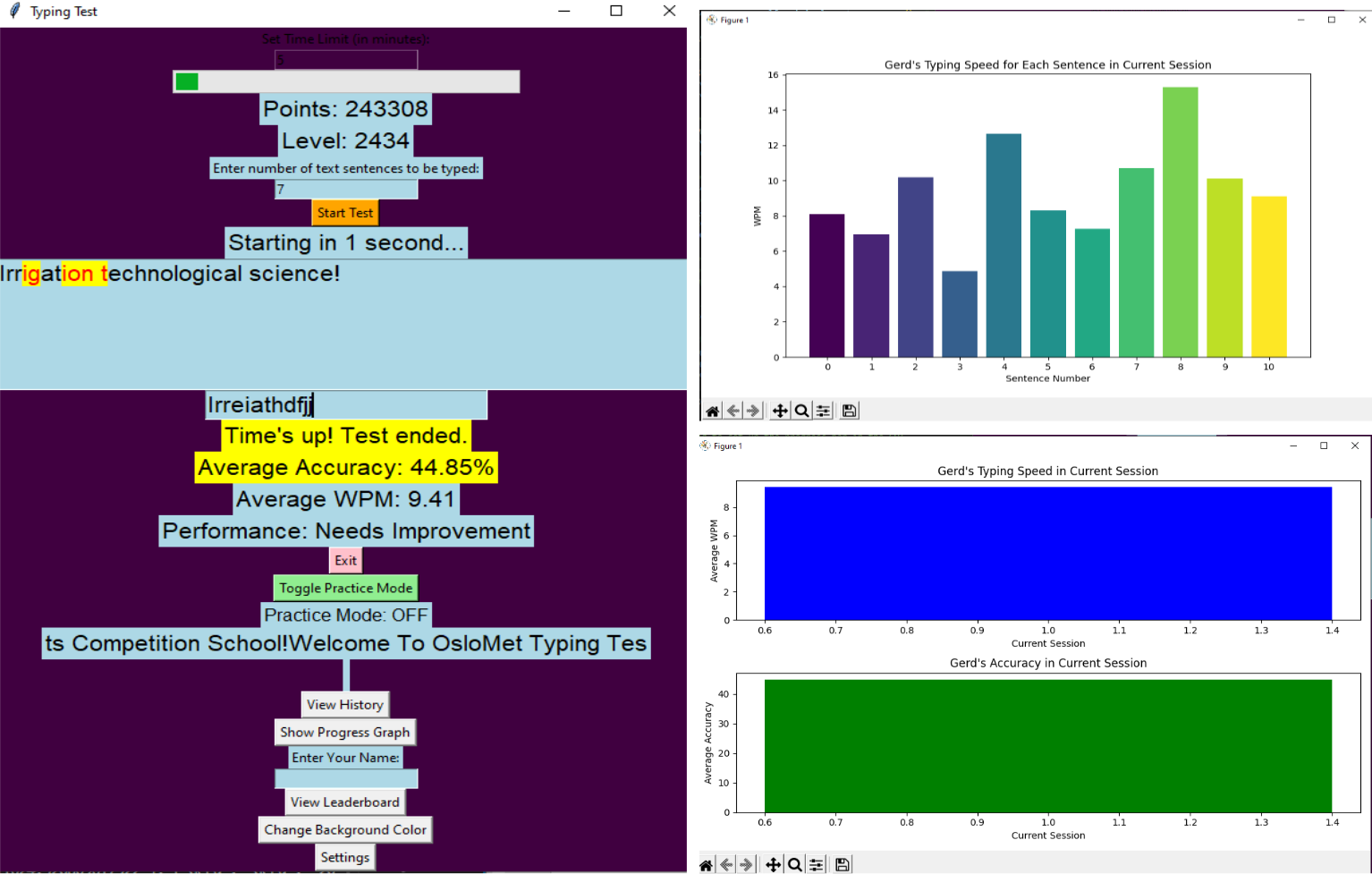


*Figure 14: Example 1a: Learning Typing Skills Session One*

18



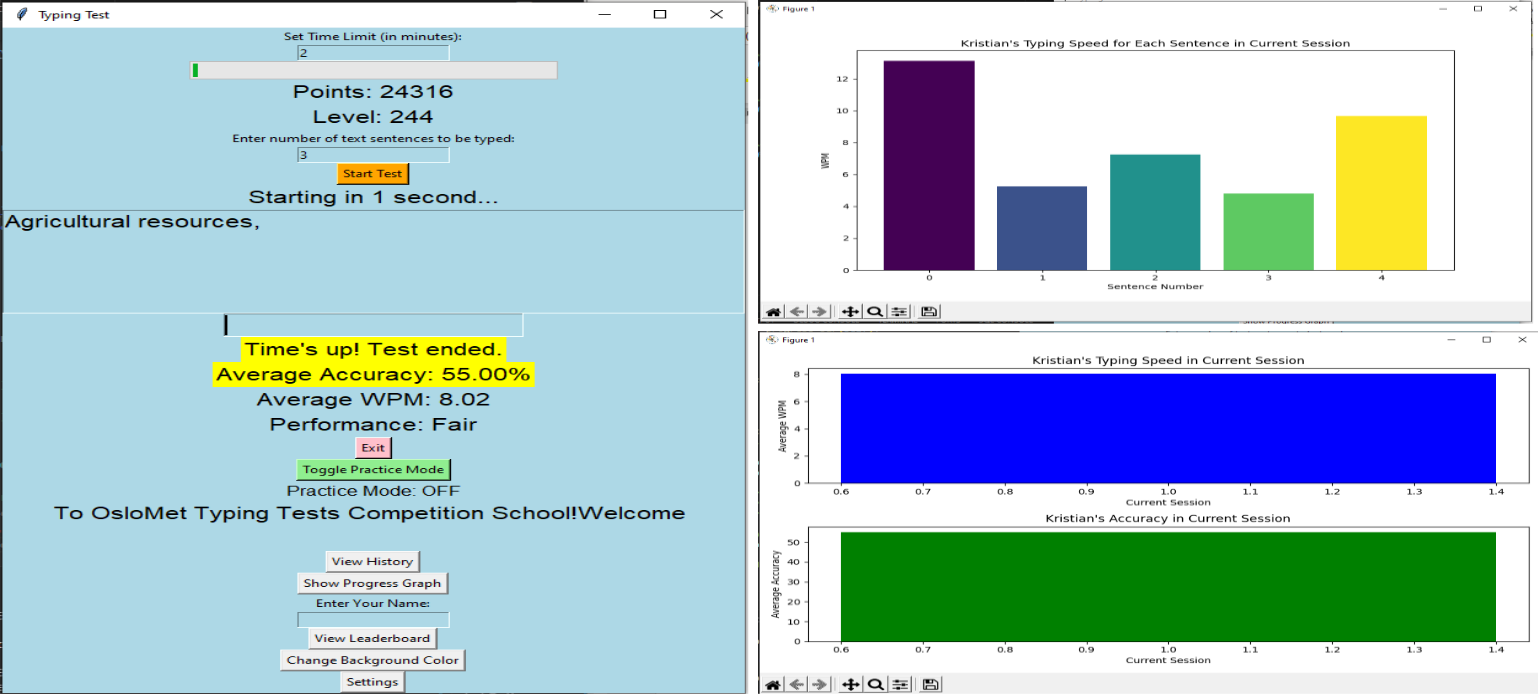
*Figure 15: Example 1b: Learning Typing Skills Session Two*



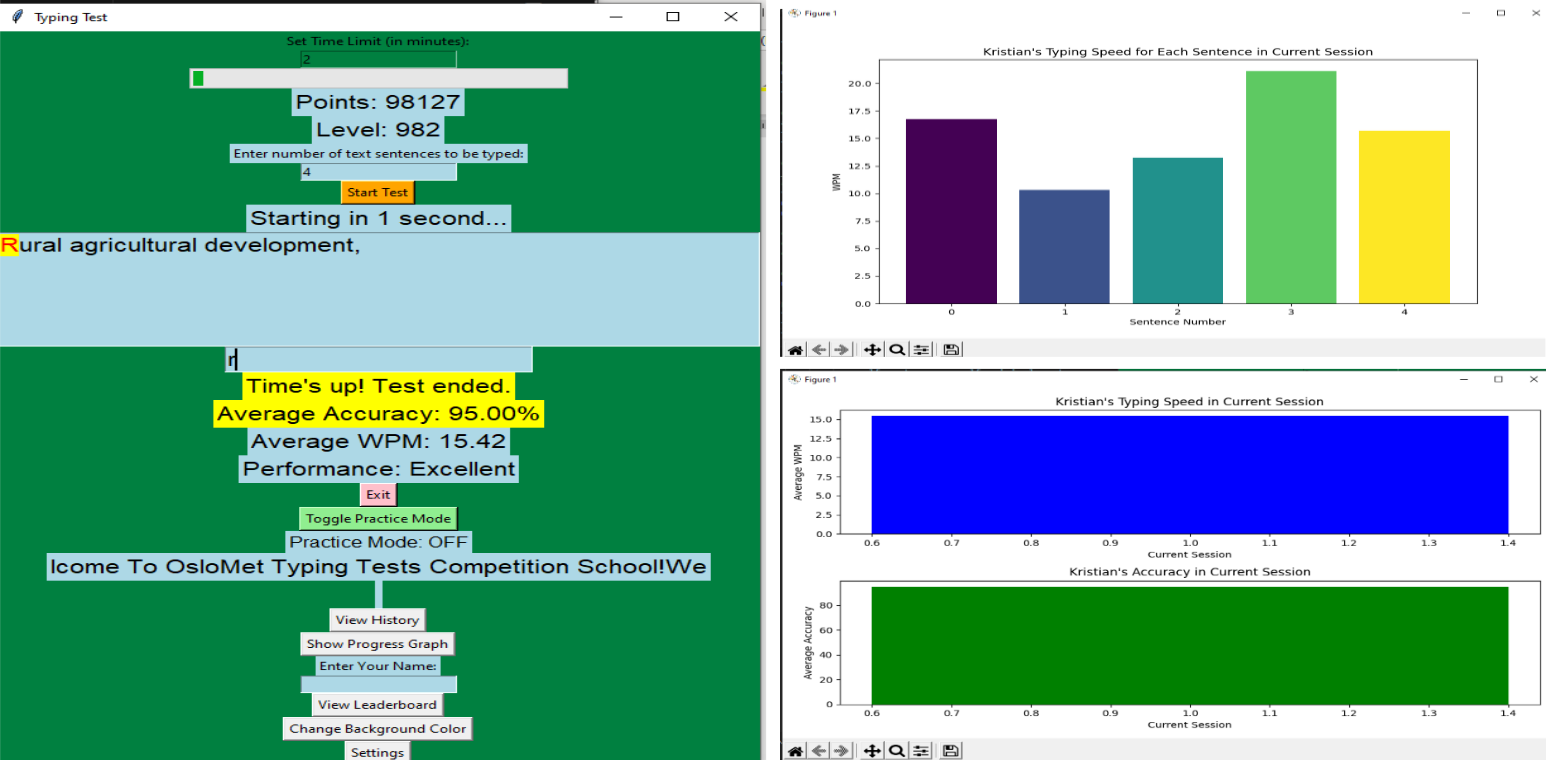
*Figure 16: Example 1c: Learning Typing Skills Session Three*

19

4.3.2 **Example 2: Average Skill Enhancement:** An average typist used the application for four days. Their progress in typing speed and accuracy was recorded, demonstrating the application's effectiveness as a learning tool. [Figure 17](#page26)

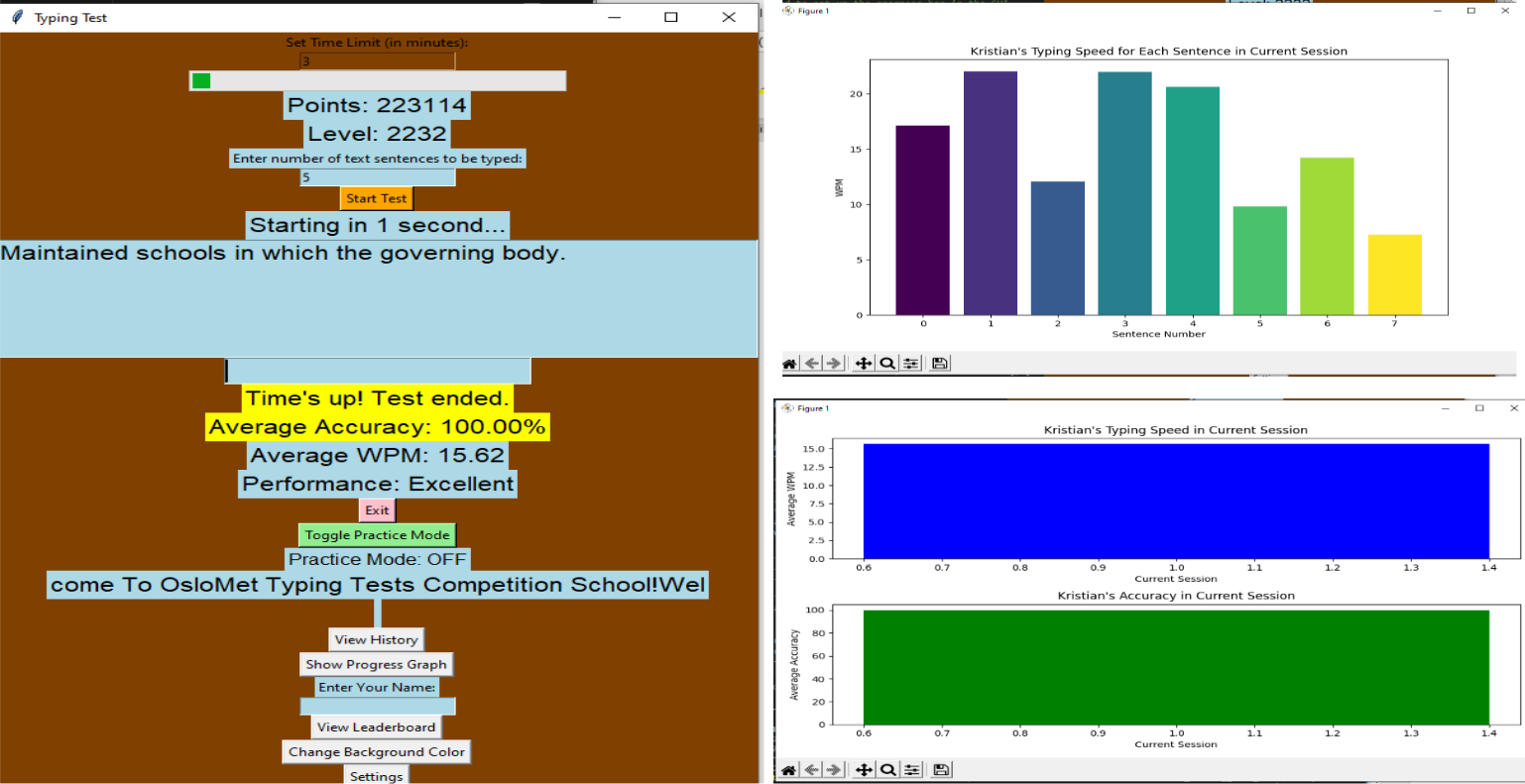


*Figure 17: Example 2a: Average Skill Enhancement Session One*



*Figure 18: Example 2b: Average Skill Enhancement Session Two*

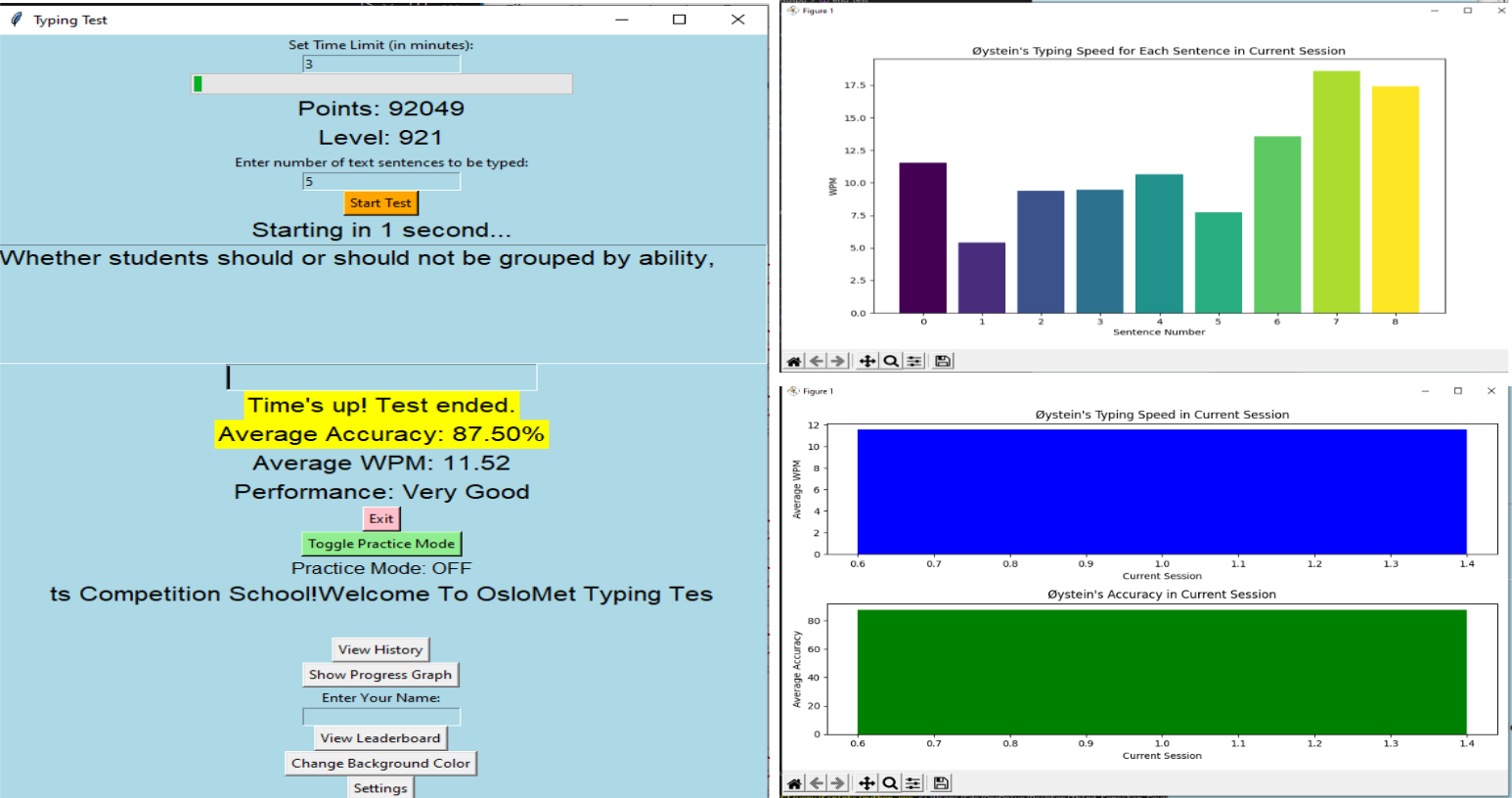
20



*Figure 19: Example 2c: Average Skill Enhancement Session Three*

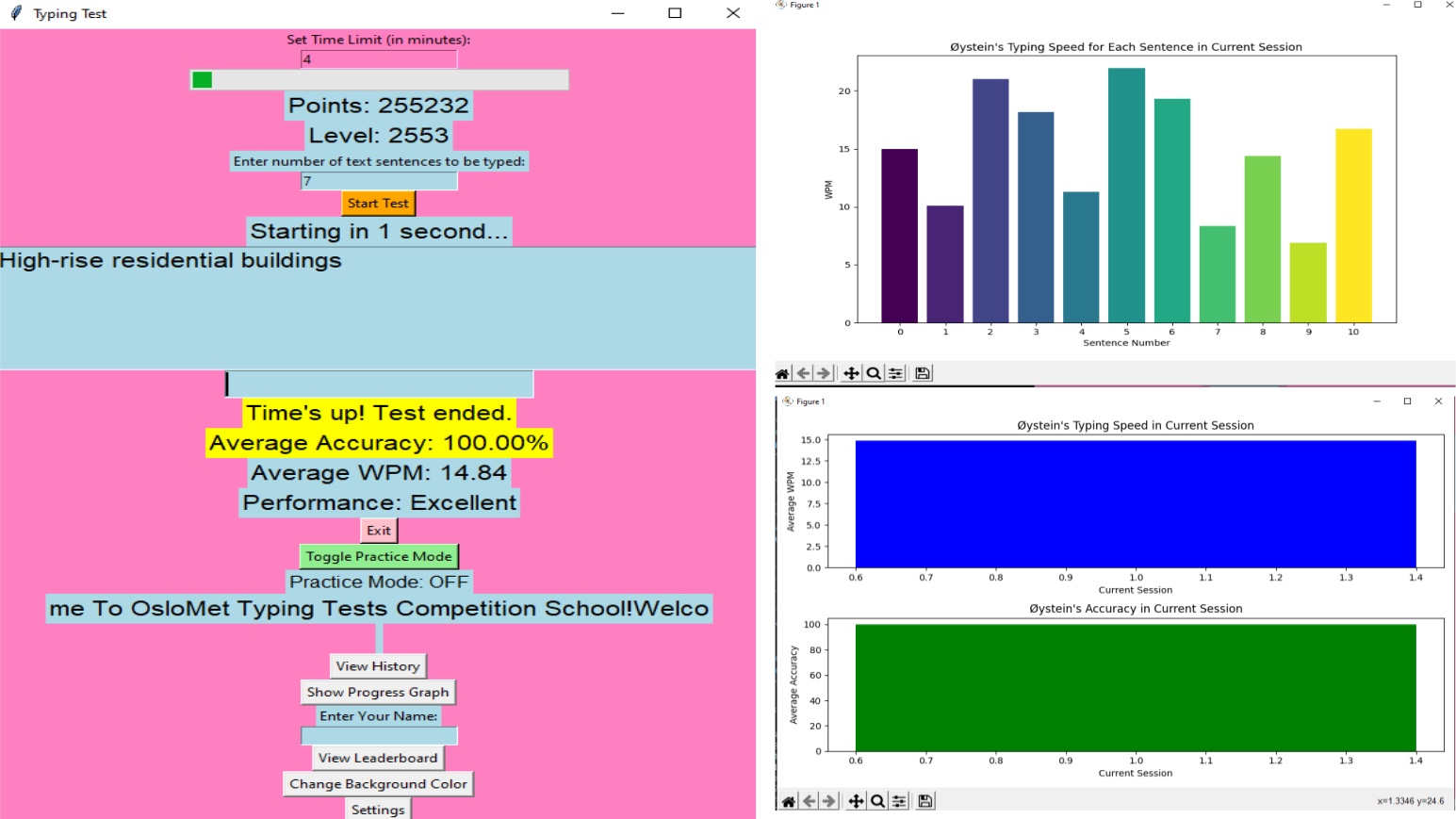
4.3.3 **Example 3: Professional Skill Enhancement:** A professional looking to improve their typing speed for work-related tasks used the application. The improvement in their typing speed and the application's role in this enhancement were documented. [Figure](#page27)

[20](#page27)

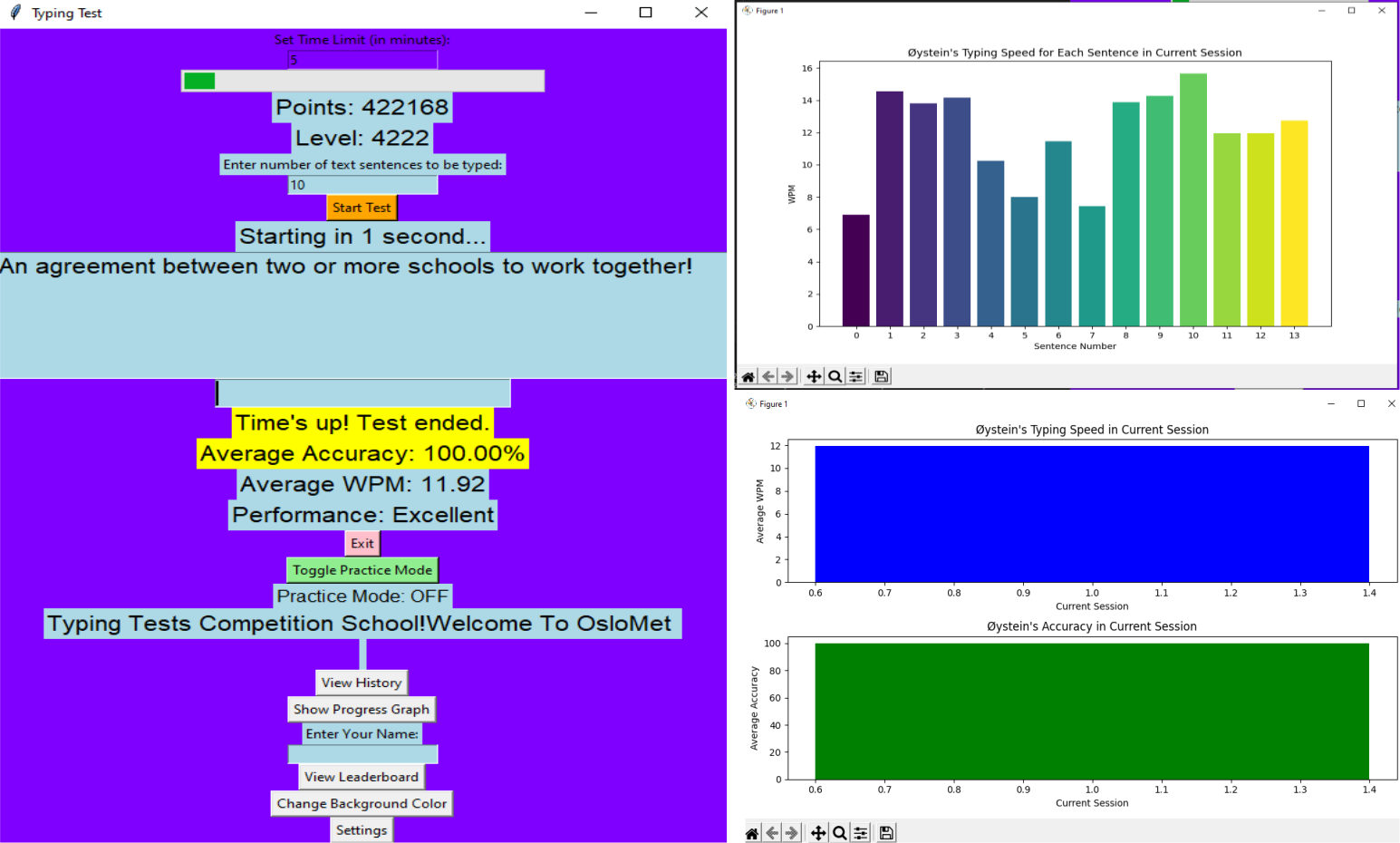


*Figure 20: Example 3a: Professional Skill Enhancement Session One*

21



*Figure 21: Example 3b: Professional Skill Enhancement Session Two*



*Figure 22: Example 3c: Professional Skill Enhancement Session Three*

22

4.4 Challenges and Resolutions

During the development and testing phases, several challenges were encountered:

4.4.1 **Performance Optimization for Voice Feedback:** Initially, the voice feedback feature caused a slowdown in the application's performance, particularly when pronouncing letters. This issue has been addressed, and the application now efficiently handles voice feedback without a significant impact on typing responsiveness. This improvement ensures that users can enjoy the auditory feedback feature without experiencing lag or delays in the application's response.

4.4.2 **Elimination of Redundant Voice Feedback:** The application initially had an issue where it would occasionally repeat the pronunciation of a letter. This redundancy has been resolved, ensuring that each letter is pronounced only once as it is typed. This fix enhances the clarity and usefulness of the voice feedback feature, making the typing experience more seamless and less distracting.

4.4.3 **GUI Responsiveness:** Initially, the application faced issues with GUI lag during intensive typing sessions. This was resolved by optimizing the event handling mechanism in Tkinter.

4.4.4 **Data Integrity:** Ensuring the accuracy and consistency of performance data was a challenge. Implementing robust error handling and data validation mechanisms addressed this issue.

4.4.5 **User Experience:** Feedback from user acceptance testing led to several UI/UX improvements, such as enhanced error highlighting and more intuitive navigation.

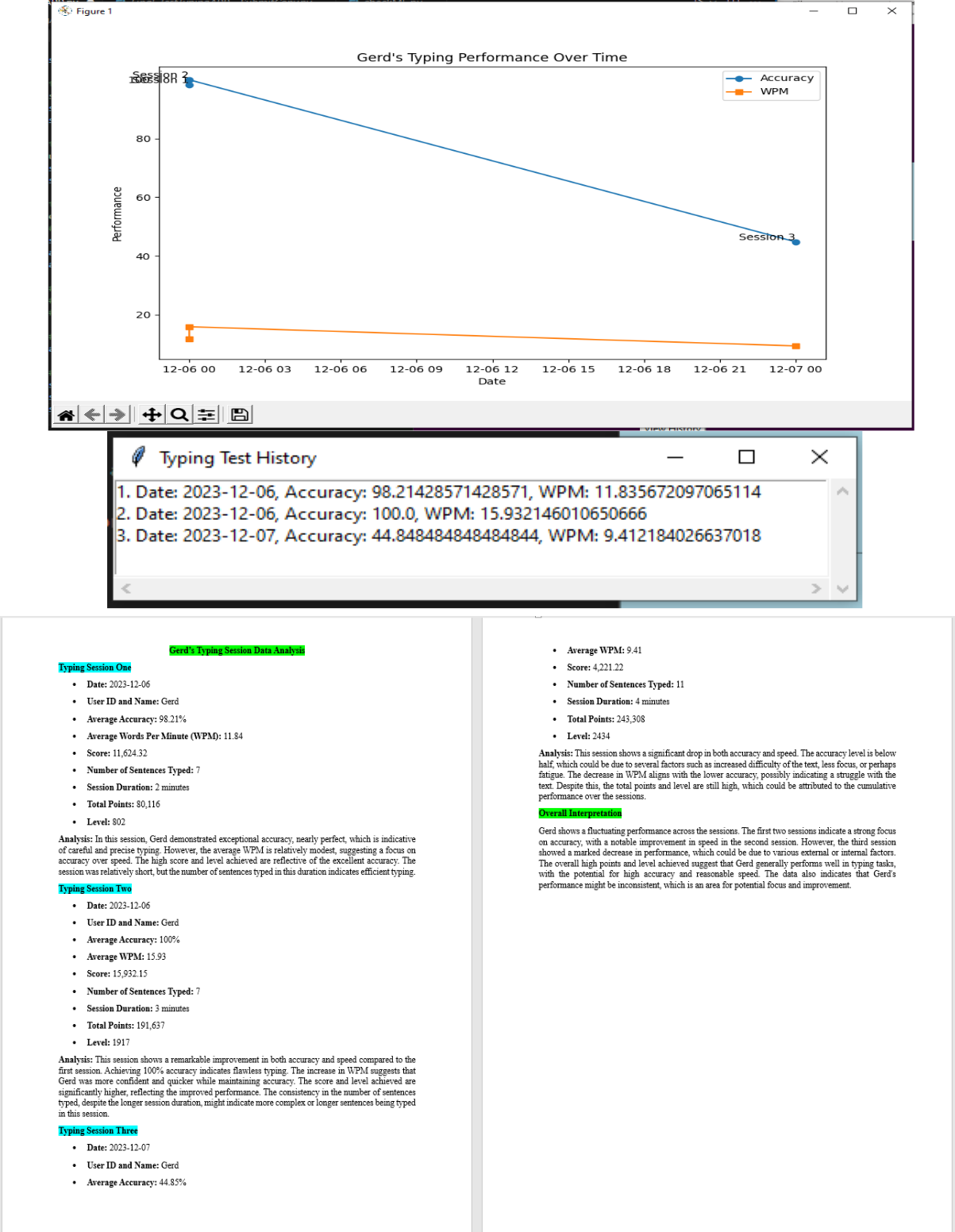
4.5 Documentation and Code Comments

Comprehensive documentation and in-code comments were maintained throughout the development process, ensuring that the application is maintainable and scalable.

23

5 Analysis and Results

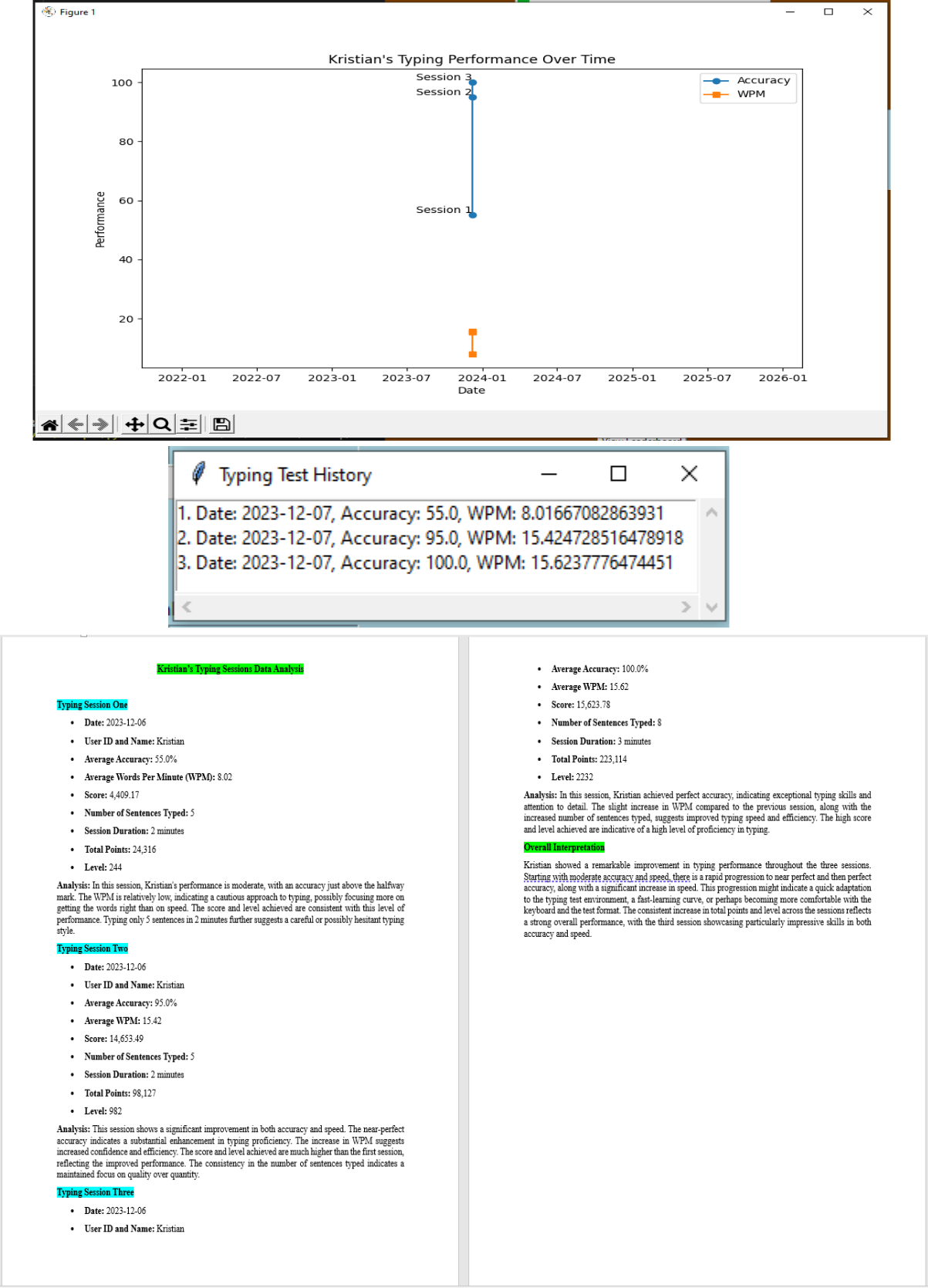
The [Figure 23](#page30) below presents a detailed summarized analysis of results obtained from the above [Figure 14,](#page24) [Figure 15,](#page25) and [Figure 16](#page25)



*Figure 23: Example 1: Learning Typing Skills Results Analysis*

24

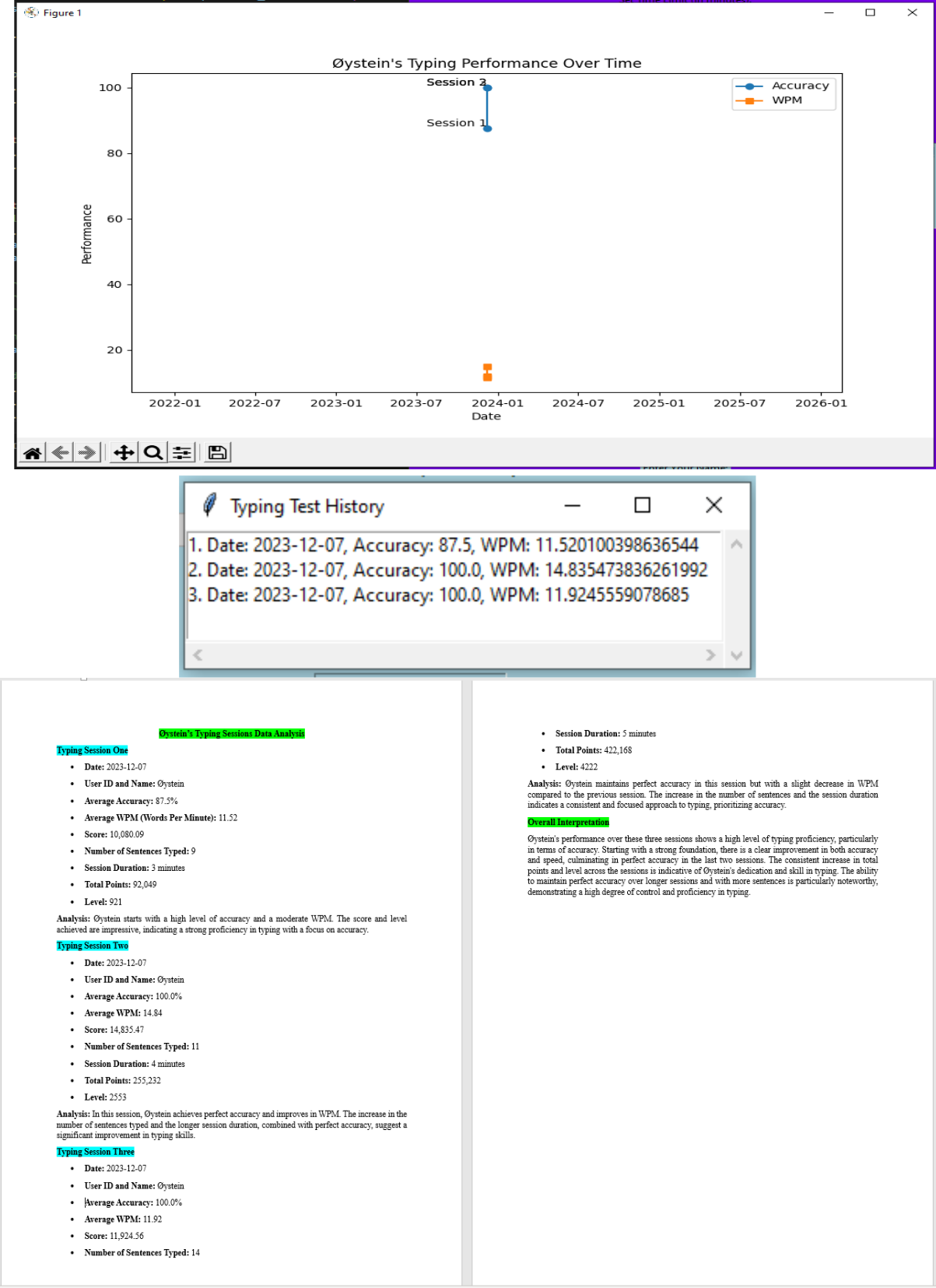
Th [Figure 24](#page31) below presents a detailed summarized analysis of results obtained from the above [Figure 17, Figure 18,](#page26) [Figure 19.](#page27)



*Figure 24: Example 2: Average Skill Enhancement Results Analysis*

25

Th [Figure 24](#page31) below presents a detailed summarized analysis of results obtained from the above [Figure 20,](#page27) [Figure 21,](#page28) and [Figure 22.](#page28)



*Figure 25: Example 3: Professional Skill Enhancement Results Analysis*

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5.1 Application Performance

This application's robust performance was evaluated under various user levels as illustrated by the figures above, including different hardware setups and operating systems. It consistently maintained high responsiveness and accuracy in performance metrics. Stress tests showed that the application could handle extended usage without any significant decrease in performance. The real-time feedback mechanisms, such as error highlighting and speed tracking, functioned effectively.

5.2 User Feedback and Improvements

Feedback from users was overwhelmingly positive. They were systematically collected and analyzed. While most users found the application helpful and user-friendly, some suggested enhancements like more personalized feedback mechanisms and the inclusion of different language options for a wider user base.

5.3 Educational Impact

The application's impact was particularly notable in educational settings. Teachers reported its usefulness in typing classes, noting improvements in students' typing skills and their increased engagement with the learning process. The application's adaptability to different skill levels made it a valuable tool in diverse learning environments.

5.4 Future Enhancements

Considering the analysis and user feedback, several enhancements are planned for future versions. These include the development of an AI-driven personal tutor feature, edit button, real-time leaderboard data visualization which would provide more personalized guidance and feedback to users based on their performance history. Printing of a current user’s name and selection list options of the set time limit on the GUI Additionally, more exciting introduction of gamification elements is being considered to make the learning process more engaging and fun.

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6 Discussion and Recommendations

The findings show that the Typing Tester Application is successful in helping people type better. Users like the app. It takes the usual parts of a typing test and adds new things like moving text, earning points, going up levels, speaking of words, timing, and keeping track of progress. All these features make learning more fun and effective. The feedback I've gotten and the data I've collected show that the app has a good effect on how well and how eagerly users type. But there's still a chance to add more kinds of content and features to meet the needs of even more users.

The app's design, which is easy to understand and use, makes it a good choice for both beginners and those who already know how to type but want to get better. The real-time feedback on accuracy and speed is especially helpful because it lets users see right away how they're doing and where they can improve. This immediate response helps users stay motivated and focused on their goals.

The speaking feature, which reads out words or sentences, is another unique aspect that sets this application apart. It's not only helpful for those learning to type but also for visually impaired users. This inclusive design approach broadens the app's appeal and usefulness.

Looking ahead, the application could be enhanced by adding more diverse typing exercises, such as different genres of text, to keep users engaged and challenged. Also, integrating more personalized features, like custom difficulty levels or targeted practice sessions based on user performance, could make the app even more effective.

In conclusion, the Typing Tester Application is a well-rounded tool that successfully combines educational value with engaging features. Its ongoing development and potential for new features make it a promising resource for anyone looking to improve their typing skills in a fun and interactive way.

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7 Conclusion

The Typing Tester Application is a fantastic tool for improving typing skills. It's designed to be easy and fun to use, with features like earning points, moving up levels, and getting instant feedback on how fast and accurately you type. These features have made it very popular. The app is simple to navigate, and it has special features like moving text, dictating, speaking of words, and detailed charts that show your progress. These make learning to type more fun and keep users interested and happy.

Feedback from users and how well they do on the application show that it helps them get better at typing over time. Compared to other typing programs, this Typing Tester stands out, especially for those who want a fun and interactive way to improve their typing skills.

7.1 Final Thoughts

The Typing Tester Application is a great mix of traditional learning and modern technology. It's good at drawing in users and helping them get better at typing. This shows how important it is to focus on what users need and to keep improving. There is a plan to make this computer application even better in the future, to make sure it stays useful and fun in a world that's always changing and becoming more digital. This application isn't just for now; It will be improved all the time to meet the needs of the future.

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(https://www.questionsgod.com).,” pp. 1–9.

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9 Appendices

**9.1** **Appendix A**

**NOTE*: The complete codebase for this standalone application is also delivered along with this report on the university examination portal (Inspera). Everything needed to setup this application including the data source file (sentences.txt), user\_performance\_data.csv, user.csv (all these came with their backup copies) and is zipped. For easy accessibility, the complete code as a single file has also been placed below under the Appendix B* . To access the credentials of the existing users, open the user.csv file inside the zipped folder of containing this report and others.**

**USAGE:**

1. **Starting the Application:**
   * Run the application, and the main window will open with various options like Start Test, View History, and Settings.
2. **Registering and Logging In:**
   * New users must register first. Returning users can log in with their credentials to access their personalized data.
3. **Conducting a Typing Test:**
   * Set the desired number of examples and time limit, then start the test. Type the displayed sentences as accurately and quickly as possible.
4. **Viewing Results and History:**
   * After completing a test, view the results immediately. Access the history to see past performances.
5. **Analyzing Progress:**
   * Use the progress graphs to visually track improvements in typing speed and accuracy over time.
6. **Competing on the Leaderboard:**
   * Check the leaderboard to see where you stand among other typists and aim to improve your ranking.
7. **Customizing the Experience:**
   * Adjust the application's theme, font, and text color to suit your preferences for a more comfortable typing experience.

**Conclusion:** The Typing Tester Application is an effective tool for anyone looking to enhance their typing skills. Its blend of user-friendly design, comprehensive features, and interactive elements makes it suitable for typists of all levels, from beginners to advanced.

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**9.2** **Appendix B**

* ============================================================ THE IMPORTATION OF USED PYTHON LIBRARIES

=================================================================== """

import csv import os

from datetime import datetime, timedelta import tkinter as tk

from tkinter import messagebox from tkinter import ttk import time

import random

import matplotlib.pyplot as plt import threading

import numpy as np

import pyttsx3 # Import the pyttsx3 library import queue

from queue import Queue

from tkinter import colorchooser # Import the colorchooser module

* ============================================================= THE IMPLEMENTATION OF GLOBAL FUNCTIONS STARTS HERE

========================================================== """

* Function or Method that loads User Credentials
* Returns a dictionary of username-password pairs def load\_user\_credentials():

users = {} try:

* + Open the CSV file and read each line with open('users.csv', 'r') as file:

for line in file:

* + - Split each line into username and password username, password = line.strip().split(',') users[username] = password

except FileNotFoundError:

pass # File not found, will be created during registration return users

# Function to save performance data including user name

def save\_performance\_data(user\_id, user\_name, date, accuracy, wpm):

try:

score = calculate\_score(accuracy, wpm) # Calculate the score

# Open the file in append mode

with open('user\_performance.csv', 'a', newline='') as file:

writer = csv.writer(file)

# Write the data

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writer.writerow([user\_id, user\_name, date, accuracy, wpm, score])

except IOError:

print("Error in saving performance data")

* Function to load performance data def load\_performance\_data(user\_id):

performance\_data = [] try:

with open('user\_performance.csv', 'r') as file: reader = csv.reader(file)

for row in reader:

if row[0] == user\_id:

performance\_data.append(row)

except IOError:

print("Error in loading performance data")

return performance\_data

* Function to load leaderboard data def load\_leaderboard\_data():

leaderboard\_data = [] try:

with open('user\_performance.csv', 'r') as file: reader = csv.reader(file)

for row in reader:

if len(row) == 6: # Ensure the row has at least 5 columns leaderboard\_data.append(row)

except IOError as e:

print(f"Error in loading leaderboard data: {e}")

return sorted(leaderboard\_data, key=lambda x: float(x[4]),

reverse=True)[:65] # Top 10 performances based on WPM

# Function to filter data by date

def filter\_data\_by\_date(data, start\_date, end\_date):

filtered\_data = []

for row in data:

date = datetime.strptime(row[1], '%Y-%m-%d')

if start\_date <= date <= end\_date:

filtered\_data.append(row)

return filtered\_data

* Function to load text examples from a file def load\_text\_examples(file\_path):

with open(file\_path, 'r', encoding='utf-8') as file: sentences = [line.strip() for line in file if line.strip()]

return sentences

* Function to calculate typing accuracy

def calculate\_accuracy(original, typed):

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* Split the original text and the typed text into words original\_words = original.split()

typed\_words = typed.split()

* Initialize a variable to count the number of correct words correct\_word\_count = 0
* Iterate over the pairs of original and typed words

for o, t in zip(original\_words, typed\_words):

* + Increase the count if the words match if o == t:

correct\_word\_count += 1

* Calculate accuracy as the ratio of correct words to total words in the original text
* Check if the original text is not empty to avoid division by zero accuracy = (correct\_word\_count / len(original\_words)) \* 100 if

original\_words else 0

return accuracy # This should be a value between 0 and 100

* Function to calculate score based on accuracy and WPM def calculate\_score(accuracy, wpm):
  + Example scoring logic: score is 10 times the product of accuracy and WPM return 10 \* accuracy \* wpm
* Function to determine performance remark based on accuracy

def get\_performance\_remark(accuracy):

if accuracy >= 0.95:

return "Excellent"

elif accuracy >= 0.80:

return "Very Good"

elif accuracy >= 0.65:

return "Good"

elif accuracy >= 0.55:

return "Fair"

elif accuracy >= 0.45:

return "Poor"

else:

return "Needs Improvement"

* ============================================================= THE IMPLEMENTATION OF GLOBAL FUNCTIONS STARTS HERE

========================================================== """

* ============================================================== THE IMPLEMENTATION OF THE MAIN CLASS STARTS HERE

============================================================ """

# Main class for the Typing Test Application

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class TypingTestApp:

* ======================================= THE IMPLEMENTATION OF LOCAL FUNCTIONS (POPULARLY KNOWN AS METHODS) STARTS HERE

===================================== """

def \_\_init\_\_(self, user\_id, root, sentences): self.root = root self.original\_sentences = sentences.copy() self.sentences = sentences self.current\_example = None self.start\_time = None self.typing\_speeds = []

self.total\_accuracy = [] # Initialize as a list self.num\_examples = len(sentences) self.practice\_mode = False self.session\_time\_limit = 300 # 5 minutes in seconds self.session\_end\_time = None

self.test\_active = False

* Attributes for user authentication self.is\_authenticated = False
* Create a label for displaying the time limit

self.time\_limit\_label = tk.Label(root, text="Set Time Limit (in minutes):", bg='lightblue')

self.time\_limit\_label.pack()

self.time\_limit\_entry = tk.Entry(root, bg='lightblue')

self.time\_limit\_entry.pack()

self.user\_id = user\_id # "user123" Example user ID, can be dynamically set

self.points = 0

self.level = 1

self.last\_speech\_time = 0

self.speech\_delay = 1 # seconds

self.session\_data = []

self.session\_end\_time = time.time() + self.session\_time\_limit

* Setting up the GUI elements like labels, buttons, text entry, etc. self.root.title("Typing Test") self.root.configure(bg='lightblue')
* Initialize the progress bar

self.setup\_progress\_bar()

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# Display points and level

self.points\_label = tk.Label(root, text=f"Points: {self.points}", font=("Helvetica", 16), bg='lightblue')

self.points\_label.pack()

self.level\_label = tk.Label(root, text=f"Level: {self.level}", font=("Helvetica", 16), bg='lightblue')

self.level\_label.pack()

# User input for number of examples

self.num\_examples\_label = tk.Label(root, text="Enter number of text sentences to be typed:", bg='lightblue')

self.num\_examples\_label.pack()

self.num\_examples\_entry = tk.Entry(root, bg='lightblue')

self.num\_examples\_entry.pack()

# Start button

self.start\_button = tk.Button(root, text="Start Test", command=self.start\_countdown, bg='orange')

self.start\_button.pack()

# Countdown label

self.countdown\_label = tk.Label(root, text="", font=("Helvetica", 16), bg='lightblue')

self.countdown\_label.pack()

# Text display and entry

self.text\_to\_type = tk.Text(root, height=5, width=50, font=("Helvetica", 16), bg='lightblue')

self.text\_to\_type.pack()

self.text\_to\_type.tag\_configure("error", background="white", foreground="red") # Error highlighting style

self.entry = tk.Entry(root, font=("Helvetica", 16), bg='lightblue')

self.entry.pack()

self.entry.bind("<KeyRelease>", self.on\_key\_release) # Bind key release event

self.text\_to\_type.bind("<KeyRelease>", self.on\_key\_release)

self.entry.bind("<Return>", self.submit\_text)

# Results display

self.results\_label = tk.Label(root, text="", font=("Helvetica", 16), bg='yellow')

self.results\_label.pack()

self.average\_accuracy\_label = tk.Label(root, text="", font=("Helvetica", 16), bg='yellow')

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self.average\_accuracy\_label.pack()

self.average\_wpm\_label = tk.Label(root, text="", font=("Helvetica", 16), bg='lightblue')

self.average\_wpm\_label.pack()

self.performance\_remark\_label = tk.Label(root, text="", font=("Helvetica", 16), bg='lightblue')

self.performance\_remark\_label.pack()

# Exit button

self.exit\_button = tk.Button(root, text="Exit", command=root.destroy, bg='pink')

self.exit\_button.pack()

# Practice Mode Toggle

self.practice\_mode\_button = tk.Button(root, text="Toggle Practice Mode", command=self.toggle\_practice\_mode, bg='lightgreen')

self.practice\_mode\_button.pack()

self.practice\_mode\_label = tk.Label(root, text="Practice Mode: OFF", font=("Helvetica", 12), bg='lightblue')

self.practice\_mode\_label.pack()

# Animated Text Label

self.animated\_text\_label = tk.Label(root, text="Welcome To OsloMet Typing Tests Competition School!", font=("Helvetica", 16), bg='lightblue')

self.animated\_text\_label.pack()

self.animate\_text()

* Initialize the text-to-speech engine self.speech\_queue = queue.Queue() self.speech\_engine = pyttsx3.init()

self.speech\_engine.setProperty('rate', 150) # Set speech rate self.currently\_speaking = None

* Start the speech processing thread

threading.Thread(target=self.process\_speech\_queue, daemon=True).start()

# Add a label for the countdown

self.session\_time\_label = tk.Label(root, text="", font=("Helvetica", 16), bg='lightblue')

self.session\_time\_label.pack()

# Add buttons for viewing history and progress graph

self.view\_history\_button = tk.Button(self.root, text="View History", command=self.show\_history)

self.view\_history\_button.pack()

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self.show\_graph\_button = tk.Button(self.root, text="Show Progress Graph", command=self.show\_progress\_graph)

self.show\_graph\_button.pack()

# Create a label and entry for the user name

self.user\_name\_label = tk.Label(self.root, text="Enter Your Name:", bg='lightblue')

self.user\_name\_label.pack()

self.user\_name\_entry = tk.Entry(self.root, bg='lightblue')

self.user\_name\_entry.pack()

# Add a button to view the leaderboard

self.leaderboard\_button = tk.Button(self.root, text="View Leaderboard", command=self.show\_leaderboard)

self.leaderboard\_button.pack()

# Add a button to change the background color

self.color\_button = tk.Button(root, text="Change Background Color", command=self.choose\_background\_color)

self.color\_button.pack()

# Add a button to open the settings window

self.settings\_button = tk.Button(root, text="Settings", command=self.create\_settings\_window)

self.settings\_button.pack()

* Prompt for user login self.login\_window()

def get\_current\_word\_or\_sentence(self):

* + Implement the logic to extract the current word or sentence
* For now, let's just return a placeholder string

return "current word or sentence"

* Method for User's Registration Form def on\_register(self):

entered\_username = self.username\_entry.get().strip()

entered\_password = self.password\_entry.get().strip()

* Verify credentials (username and password) if entered\_username and entered\_password:
  + Load existing users

users = load\_user\_credentials()

if entered\_username in users:

tk.messagebox.showerror("Registration Failed", "Username

already exists.")

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return

# Append new user to the file

with open('users.csv', 'a') as file:

file.write(f"{entered\_username},{entered\_password}\n")

tk.messagebox.showinfo("Registration", "Registration successful. You can now log in.")

else:

# Show error message for invalid credentials

tk.messagebox.showerror("Registration Failed", "Username and password cannot be empty.")

* Method to collect both username and userID def login\_window(self):

self.login\_win = tk.Toplevel(self.root) self.login\_win.title("Login") self.login\_win.geometry("300x200")

tk.Label(self.login\_win, text="Welcome to our typing tester practicing system").pack()

tk.Label(self.login\_win, text="Username:").pack()

self.username\_entry = tk.Entry(self.login\_win)

self.username\_entry.pack()

tk.Label(self.login\_win, text="Password:").pack() # Changed from User ID to Password

self.password\_entry = tk.Entry(self.login\_win, show="\*")

self.password\_entry.pack()

tk.Button(self.login\_win, text="Login", command=self.on\_login).pack() tk.Button(self.login\_win, text="Register",

command=self.on\_register).pack() # Registration button

* This method is called when the user clicks the login button. It stores the username and user ID and then closes the login window.

def on\_login(self):

entered\_username = self.username\_entry.get().strip() entered\_password = self.password\_entry.get().strip()

# Load existing users

users = load\_user\_credentials()

# Verify credentials (You need to implement this method)

if entered\_username in users and users[entered\_username] == entered\_password:

self.user\_name = entered\_username

self.user\_id = entered\_username # Assuming username as user ID for simplicity

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self.is\_authenticated = True

* Close the login window and display a welcome message self.login\_win.destroy() tk.messagebox.showinfo("Welcome", f"Welcome to the system,

{self.user\_name}!")

else:

# Show error message for invalid credentials

tk.messagebox.showerror("Login Failed", "Invalid username or

password.")

def verify\_credentials(self, username, user\_id):

* + Implement your credential verification logic here
* For now, it just returns True for demonstration purposes return True
* Method to speak the given text

def speak\_text(self, text):

# Check if the text is already in the queue or being spoken

if not self.is\_text\_in\_queue(text) and self.currently\_speaking !=

text:

# Add text to the queue if it's not too full

if self.speech\_queue.qsize() < 5: # Adjust the threshold as

needed

self.speech\_queue.put(text)

def is\_text\_in\_queue(self, text):

* + Check if the text is already in the queue with self.speech\_queue.mutex:

return text in self.speech\_queue.queue

* Method to handle functionality for speaking our the text def \_speak(self, text):

while True:

text = self.speech\_queue.get() self.speech\_engine.say(text) self.speech\_engine.runAndWait() self.speech\_queue.task\_done()

* This method Process the speech queue continuously.

def process\_speech\_queue(self):

while True:

text = self.speech\_queue.get()

self.currently\_speaking = text

self.speech\_engine.say(text)

self.speech\_engine.runAndWait()

self.currently\_speaking = None

* Clear the queue to prioritize latest input with self.speech\_queue.mutex:

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self.speech\_queue.queue.clear()

self.speech\_queue.task\_done()

* Method to animate text in the GUI def animate\_text(self):

def rotate\_text(text, i): display\_text = text[i:] + text[:i]

self.animated\_text\_label.config(text=display\_text)

self.root.after(300, lambda: rotate\_text(text, (i + 1) %

len(text)))

rotate\_text("Welcome To OsloMet Typing Tests Competition School!", 0)

* Method to start the countdown before the test begins def start\_countdown(self):

self.countdown\_label.config(text="Starting in 3 seconds...")

self.root.after(1000, lambda:

self.countdown\_label.config(text="Starting in 2 seconds..."))

self.root.after(2000, lambda:

self.countdown\_label.config(text="Starting in 1 second..."))

self.root.after(3000, self.prepare\_test)

* Method called when a key is released in the text entry
* It checks for typing errors and updates the display accordingly def on\_key\_release(self, event):

typed\_text = self.entry.get() self.highlight\_errors(typed\_text)

* Speak the last character typed, if any if typed\_text:

last\_char = typed\_text[-1] self.speak\_text(last\_char)

* Speak the last character typed, if any current\_time = time.time()

if current\_time - self.last\_speech\_time > self.speech\_delay: self.speak\_text(event.char)

self.last\_speech\_time = current\_time

* Example: Speak only the current word or sentence

current\_text = self.get\_current\_word\_or\_sentence()

if current\_text:

self.speak\_text(current\_text)

* Method to highlight errors in the typed text def highlight\_errors(self, typed\_text):

self.text\_to\_type.tag\_remove("error", "1.0", tk.END)

min\_length = min(len(self.current\_example), len(typed\_text)) for i in range(min\_length):

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if self.current\_example[i] != typed\_text[i]:

self.text\_to\_type.tag\_add("error", f"1.{i}", f"1.{i+1}")

self.text\_to\_type.tag\_remove("error", "1.0", tk.END)

for i, (original\_char, typed\_char) in

enumerate(zip(self.current\_example, typed\_text)):

if original\_char != typed\_char:

self.text\_to\_type.tag\_add("error", f"1.{i}", f"1.{i+1}") self.text\_to\_type.tag\_config("error", background="yellow",

foreground="red")

* Method to prepare the test by setting the number of examples def prepare\_test(self):

try:

new\_num\_examples = int(self.num\_examples\_entry.get())

new\_time\_limit = int(self.time\_limit\_entry.get()) \* 60 # Convert minutes to seconds

if new\_num\_examples <= 0 or new\_time\_limit <= 0:

raise ValueError

except ValueError:

self.results\_label.config(text="Please enter a valid number of

examples and time limit.")

return

if not self.test\_active:

self.session\_time\_limit = new\_time\_limit

self.session\_end\_time = time.time() + self.session\_time\_limit

self.test\_active = True

self.start\_test()

else:

self.num\_examples += new\_num\_examples

self.next\_example()

* Method to start the typing test def start\_test(self):
  + Reset session data and other variables at the start of each test self.typing\_speeds = []

self.total\_accuracy = [] # Initialize as an empty list self.session\_data = []

self.test\_active = True

self.session\_end\_time = time.time() + self.session\_time\_limit self.next\_example()

self.check\_session\_time()

* Method to check if the session time limit has been reached

def check\_session\_time(self):

if not self.practice\_mode: # Only check time if not in practice mode remaining\_time = max(int(self.session\_end\_time - time.time()), 0)

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self.session\_time\_label.config(text=f"Time remaining:

{remaining\_time} seconds")

if remaining\_time <= 0:

if not self.practice\_mode:

if self.sentences:

self.record\_session\_data()

self.end\_test(time\_up=True)

else:

self.root.after(1000, self.check\_session\_time)

* Method record\_session\_data to handle the session data recording def record\_session\_data(self):

average\_wpm = sum(self.typing\_speeds) / len(self.typing\_speeds) if

self.typing\_speeds else 0

average\_accuracy = sum(self.total\_accuracy) / len(self.total\_accuracy) if self.total\_accuracy else 0

self.session\_data.append({

'session\_number': len(self.session\_data) + 1,

'average\_wpm': average\_wpm,

'average\_accuracy': average\_accuracy

})

* Method to display the next example for typing def next\_example(self):

if not self.sentences or time.time() >= self.session\_end\_time: self.end\_test()

return

self.current\_example = self.sentences.pop()

self.text\_to\_type.delete("1.0", tk.END)

self.text\_to\_type.insert("1.0", self.current\_example)

self.entry.focus\_set()

self.start\_time = time.time()

self.current\_example = self.sentences.pop()

self.text\_to\_type.delete("1.0", tk.END)

self.text\_to\_type.insert("1.0", self.current\_example)

self.entry.focus\_set()

self.start\_time = time.time()

# Speak the text

self.speak\_text(self.current\_example)

completed\_examples = self.num\_examples - len(self.sentences)

self.update\_progress\_bar(completed\_examples, self.num\_examples)

* Method to submit the typed text and calculate performance def submit\_text(self, event=None):

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if not self.test\_active:

return

end\_time = time.time()

time\_taken = end\_time - self.start\_time

typed\_text = self.entry.get()

accuracy = calculate\_accuracy(self.current\_example, typed\_text) # Calculate accuracy for the current sentence

wpm = len(typed\_text.split()) / (time\_taken / 60) # Calculate WPM for the current sentence

self.typing\_speeds.append(wpm)

self.total\_accuracy.append(accuracy) # Append accuracy for each sentence

* wpm = len(self.current\_example.split()) / (time\_taken / 60)
* Calculate points (example calculation, you can modify it) points\_earned = int(wpm \* accuracy \* 10) # Example formula self.points += points\_earned self.points\_label.config(text=f"Points: {self.points}")
* Update level based on points

self.level = self.points // 100 + 1 # Example: level up every 100

points

self.level\_label.config(text=f"Level: {self.level}")

if self.practice\_mode:

self.results\_label.config(text=f"Instant Feedback - Accuracy:

{accuracy:.2%}, WPM: {wpm:.2f}")

#if not self.practice\_mode:

self.entry.delete(0, tk.END)

if not self.sentences or (self.practice\_mode and len(self.sentences)

* 1):

self.sentences = self.original\_sentences.copy() # Reset sentences for continuous practice

self.next\_example()

* Method to set up the progress bar in the GUI def setup\_progress\_bar(self):

self.progress\_bar = ttk.Progressbar(self.root, orient="horizontal",

length=300, mode="determinate")

self.progress\_bar.pack()

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* Method to update the progress bar based on current progress def update\_progress\_bar(self, current\_length, total\_length):

self.progress\_bar['value'] = (current\_length / total\_length) \* 100 self.root.update\_idletasks()

* Method to end the test and display results

def end\_test(self, time\_up=False):

* Calculate and display average accuracy and WPM self.test\_active = False

average\_accuracy = sum(self.total\_accuracy) / len(self.total\_accuracy)

if self.total\_accuracy else 0

average\_wpm = sum(self.typing\_speeds) / len(self.typing\_speeds) if self.typing\_speeds else 0

#average\_accuracy = self.total\_accuracy / len(self.typing\_speeds) if self.typing\_speeds else 0

#average\_accuracy = np.mean(self.total\_accuracy) if self.total\_accuracy else 0 # Calculate average accuracy

#average\_wpm = np.mean(self.typing\_speeds) if self.typing\_speeds else

0

# Convert average accuracy to a decimal

average\_accuracy\_decimal = average\_accuracy / 100

* Update the labels for accuracy, WPM, and performance remark self.average\_accuracy\_label.config(text=f"Average Accuracy:

{average\_accuracy:.2f}%")

self.average\_wpm\_label.config(text=f"Average WPM: {average\_wpm:.2f}")

self.performance\_remark\_label.config(text=f"Performance:

{get\_performance\_remark(average\_accuracy\_decimal)}")

self.session\_time\_label.config(text="")

self.display\_bar\_chart()

# Save performance data

date = datetime.now().strftime('%Y-%m-%d')

user\_name = self.user\_name\_entry.get() # Get the name entered by the

user

if not user\_name: # Check if the user name is not empty

# Use the username stored in self.user\_name

user\_name = self.user\_name if self.user\_name else "Anonymous" # Default name if no name is entered

print(f"Debug: user\_id={self.user\_id}, user\_name={user\_name},

date={date}, average\_accuracy={average\_accuracy}, average\_wpm={average\_wpm}") save\_performance\_data(self.user\_id, user\_name, date, average\_accuracy,

average\_wpm)

# Record session data for the current session

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self.session\_data.append({

'session\_number': len(self.session\_data) + 1,

'average\_wpm': average\_wpm,

'average\_accuracy': average\_accuracy

})

# Record session data

if not self.practice\_mode:

self.record\_session\_data()

if time\_up:

self.results\_label.config(text="Time's up! Test ended.")

self.display\_session\_graphs()

* Check if typing time duration and display graphs upon completion of the total time.

def check\_time\_and\_display\_graphs(self):

if time.time() >= self.session\_end\_time: self.display\_session\_graphs()

* Display separate bar graphs for each session

def display\_session\_graphs(self):

* Display graphs only for the current session if not self.session\_data:

print("No session data to display") return

* Get data for the current session

current\_session = self.session\_data[-1]

plt.figure(figsize=(10, 6))

* Typing Speed for the Current Session plt.subplot(2, 1, 1)

plt.bar(1, current\_session['average\_wpm'], color='blue') plt.xlabel('Current Session')

plt.ylabel('Average WPM')

plt.title(f"{self.user\_name}'s Typing Speed in Current Session")

* Accuracy for the Current Session

plt.subplot(2, 1, 2)

plt.bar(1, current\_session['average\_accuracy'], color='green')

plt.xlabel('Current Session')

plt.ylabel('Average Accuracy')

plt.title(f"{self.user\_name}'s Accuracy in Current Session")

plt.tight\_layout()

plt.show()

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* Method to toggle practice mode def toggle\_practice\_mode(self):

self.practice\_mode = not self.practice\_mode

mode\_text = "ON" if self.practice\_mode else "OFF"

self.practice\_mode\_label.config(text=f"Practice Mode: {mode\_text}")

* Method to show user's typing history with improved scrollbar and listbox def show\_history(self):

if not self.is\_authenticated:

tk.messagebox.showerror("Access Denied", "Please log in to view

history.")

return

performance\_data = load\_performance\_data(self.user\_id)

print(performance\_data) # Add this line to inspect the performance

data

history\_window = tk.Toplevel(self.root)

history\_window.title("Typing Test History")

* Create a frame to hold the listbox and scrollbar frame = tk.Frame(history\_window) frame.pack(fill=tk.BOTH, expand=True)
* Create a scrollbar

scrollbar\_vertical = tk.Scrollbar(frame, orient="vertical")

scrollbar\_horizontal = tk.Scrollbar(frame, orient="horizontal")

* Create a Listbox to display the history history\_listbox = tk.Listbox(frame,

yscrollcommand=scrollbar\_vertical.set, xscrollcommand=scrollbar\_horizontal.set, width=50)

for i, (user\_id, user\_name, date, accuracy, wpm, score) in enumerate(performance\_data):

history\_listbox.insert(tk.END, f"{i+1}. Date: {date}, Accuracy:

{accuracy}, WPM: {wpm}")

# Pack the scrollbar and listbox

scrollbar\_vertical.pack(side=tk.RIGHT, fill=tk.Y)

scrollbar\_horizontal.pack(side=tk.BOTTOM, fill=tk.X)

history\_listbox.pack(side=tk.LEFT, fill=tk.BOTH, expand=True)

* + Configure the scrollbars to control the listbox scrollbar\_vertical.config(command=history\_listbox.yview) scrollbar\_horizontal.config(command=history\_listbox.xview)
* Method to show progress graph

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def show\_progress\_graph(self):

if not self.is\_authenticated:

tk.messagebox.showerror("Access Denied", "Please log in to view progress graphs.")

return

performance\_data = load\_performance\_data(self.user\_id)

print(performance\_data) # Add this line to inspect the performance

data

dates = []

accuracies = []

wpms = []

for \_, \_, date, accuracy, wpm, \_ in performance\_data: dates.append(datetime.strptime(date, '%Y-%m-%d')) accuracies.append(float(accuracy)) wpms.append(float(wpm))

plt.figure(figsize=(10, 6))

plt.plot(dates, accuracies, marker='o', label='Accuracy')

plt.plot(dates, wpms, marker='s', label='WPM')

plt.xlabel('Date')

plt.ylabel('Performance')

plt.title(f"{self.user\_name}'s Typing Performance Over Time")

plt.legend()

# Adding session labels

for i, date in enumerate(dates):

plt.text(date, max(accuracies[i], wpms[i]), f"Session {i+1}", ha='right', va='bottom')

plt.show()

* Method to display bar chart for current session def display\_bar\_chart(self):

if not self.typing\_speeds: return

plt.figure(figsize=(10, 6))

# Create an array for the x-axis positions

x\_positions = np.arange(len(self.typing\_speeds))

* Plot a bar for each sentence's typing speed plt.bar(x\_positions, self.typing\_speeds,

color=plt.cm.viridis(np.linspace(0, 1, len(self.typing\_speeds))))

plt.xlabel('Sentence Number')

plt.ylabel('WPM')

plt.title(f"{self.user\_name}'s Typing Speed for Each Sentence in Current Session")

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plt.xticks(x\_positions) # Set the x-ticks to correspond to sentence

numbers

plt.show()

* Function to display the leaderboard def show\_leaderboard(self):

if not self.is\_authenticated:

tk.messagebox.showerror("Access Denied", "Please log in to view the leaderboard.")

return

try:

leaderboard\_window = tk.Toplevel(self.root)

leaderboard\_window.title("Leaderboard")

columns = ('User ID','User Name','Date', 'Accuracy', 'WPM',

'Score')

leaderboard\_tree = ttk.Treeview(leaderboard\_window, columns=columns, show='headings')

for col in columns:

leaderboard\_tree.heading(col, text=col)

leaderboard\_data = load\_leaderboard\_data()

for row in leaderboard\_data:

# Ensure that each column gets the correct data

leaderboard\_tree.insert('', tk.END, values=row) # Insert the

entire row

leaderboard\_tree.pack(expand=True, fill='both')

except Exception as e:

tk.messagebox.showerror("Error", f"An error occurred while loading the leaderboard: {e}")

def choose\_background\_color(self):

# Open the color chooser dialog

color\_code = colorchooser.askcolor(title="Choose background color")[1] if color\_code:

self.apply\_background\_color(color\_code)

def apply\_background\_color(self, color):

* Apply the selected color to the background of the GUI elements self.root.configure(bg=color) self.time\_limit\_label.configure(bg=color) self.time\_limit\_entry.configure(bg=color)

def create\_settings\_window(self):

settings\_window = tk.Toplevel(self.root)

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settings\_window.title("Customize Interface")

# Theme Option

tk.Label(settings\_window, text="Select Theme:").pack()

self.theme\_var = tk.StringVar()

themes = ["Light", "Dark"]

for theme in themes:

tk.Radiobutton(settings\_window, text=theme,

variable=self.theme\_var, value=theme, command=self.apply\_theme).pack()

# Font Option

tk.Label(settings\_window, text="Select Font:").pack()

self.font\_var = tk.StringVar()

fonts = ["Helvetica", "Arial", "Times New Roman"] for font in fonts:

tk.Radiobutton(settings\_window, text=font, variable=self.font\_var, value=font, command=self.apply\_font).pack()

# Color Option

tk.Label(settings\_window, text="Select Text Color:").pack()

self.color\_var = tk.StringVar()

colors = ["Black", "Blue", "Red"]

for color in colors:

tk.Radiobutton(settings\_window, text=color,

variable=self.color\_var, value=color, command=self.apply\_color).pack()

def apply\_theme(self):

theme = self.theme\_var.get()

if theme == "Dark":

self.root.configure(bg='gray')

* Apply dark theme to other widgets...

else: self.root.configure(bg='lightblue')

* Apply light theme to other widgets...

def apply\_font(self):

font = self.font\_var.get()

# Apply font to widgets...

self.text\_to\_type.configure(font=(font, 16))

self.entry.configure(font=(font, 16))

def apply\_color(self):

color = self.color\_var.get()

# Apply color to widgets...

self.text\_to\_type.configure(fg=color)

self.entry.configure(fg=color)

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* + =======================================THE IMPLEMENTATION OF LOCAL FUNCTIONS (POPULARLY KNOWN AS METHODS) STOPS HERE

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* ============================================================== THE IMPLEMENTATION OF THE MAIN CLASS STOPS HERE

========================================================== """

* ========================================================THE IMPLEMENTATION EXECUTION OF THIS MAIN CLASS STARTS HERE

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# Main function to run the application def main():

root = tk.Tk()

sentences = load\_text\_examples("sentences.txt")

app = TypingTestApp(None, root, sentences) # Initialize with None or some placeholder

root.mainloop()

if \_\_name\_\_ == "\_\_main\_\_":

main()

* ========================================================THE IMPLEMENTATION EXECUTION OF THE MAIN CLASS STOPS HERE

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