SPL-1 Project Report

Typing Master: An Interactive Typing Tutor and Typing Game

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1. Introduction

The Typing Tutor and Typing Game Project is an interactive application designed to enhance typing skills while making the learning process interactive and effective. This application includes typing tutorial, typing practice exercises, typing games, detailed performance analysis. This application support both Bangla and English language. By integrating these functionalities, the project aims to provide a platform suitable for beginners looking to improve their typing skill. The incorporation of Bangla typing ensures useability for Bengali language users.

This project is mainly divided into 3 parts:

1. Typing Tutorial: The Typing Tutorial feature provides users with a comprehensive introduction to typing techniques. It gives interactive lessons that teach proper finger placement, hand positioning, and typing posture. Users will learn the basics of touch typing, including home row keys and finger assignment for each key.

2. Practice: In the Practice mode, users have the opportunity to improve their typing skills through a series of structured exercises. Users can select different types of typing exercises such as character type, word type, sentence type, paragraph practice. The application tracks users' progress, including words per minute (WPM) and accuracy, to help them monitor their improvement over time.

3. Typing Game: The Typing Game feature adds challenging aspect to the learning experience. Users can test their typing skill in an exciting game challenge. The game displays falling characters that users must type correctly before they reach the bottom of the screen. There is also another game that tests how many words the user can type in a given time.

2. Background Study

A good typing skill is an important skill in this digital age. With an increasing reliance on computers and digital communication, efficient typing has become a fundamental skill across various professions and daily activities. The project aims to provide a comprehensive solution for individuals seeking to improve their typing speed, accuracy, and technique. This background study explores the significance, and potential benefits of this Typing Tutor software project.

a. Necessity of Typing Tutor Software:

1. Enhancing Digital Literacy: In today's digital age, proficient typing skills are fundamental for effective communication, work efficiency.
2. Workplace Productivity: Improved typing skills lead to increased productivity in professional settings, enabling faster data entry, efficient document creation, and smoother communication.
3. Educational Benefits: For students, typing proficiency is essential for research, assignments, and exams, ensuring they can effectively express their knowledge without being hindered by slow typing speed.
4. Skill Development: A Typing Tutor project facilitates skill development by offering structured tutorials, varied practice exercises, and performance analysis tools, empowering users to track their progress and improve consistently.
5. Personal and Professional Growth: Proficient typing skills are transferable across various domains, contributing to personal growth by boosting confidence and professional growth by enhancing employability.

b. Objectives of Typing Tutor Software:

1. Improving Typing Speed: Enhancing users' typing speed through structured exercises and practice modules to enable faster typing.

2. Increasing Accuracy: Focusing on accuracy in typing to reduce errors and improve overall typing precision.

3. Teaching Proper Technique: Educating users on correct finger placement, posture, and typing techniques to maximize efficiency.

4. Customizable Learning Experience: Providing a personalized learning environment where users can adjust

difficulty levels, choose specific exercises, and track their progress.

5. Multilingual Support: Including support for both Bangla and English language to make more useful to users.

6. Performance Analysis and Tracking: User can check his previous performance and can identify his weak zones.

3. Description of the Project

3.1 Login System: This login system allows user to access the application using their account info, also it helps to store the performance results of every user separately. As usual, there are tow parts in this login system: Login and Sign Up. The Sign Up process allows users to create new accounts or profiles within the application. During Sign Up, users have to provide certain information such as a username and password. This information will be then stored securely in a text file. To store the password securely, I will use basic encryption technique Caesar cipher. The login process verifies the identity of users who already have registered accounts. The application then checks if the entered password matches the stored information in the text file. If the password is valid, the user gains access to their account.

3.2 Typing Tutorial**:** In this project, I have specifically designed the typing tutorial part to make it easy for beginners. In the English tutorial, I have divided all the keys into some different parts according to the fingers needed for typing, making the learning process easier and more interactive. Also in Bengali tutorial I have given Avro phonetic rules.

3.3 Typing Practice: In practice part, user can select different types of practice exercise like alphabet type, word type, text type. Users typing skill specially typing speed (WPM) and accuracy (in percentage) will be checked here. Besides It will also show a histogram to represent the user's weak areas where he makes the most mistakes. Users’ performance result will be saved in a text file so that he can check it later and a performance analysis can be done.

3.4 Game: The Typing Game feature adds a challenging aspect to the learning experience. Users can test their typing speed and accuracy in an exciting game mood. The game displays falling characters that users must type correctly before they reach the bottom of the screen. Besides users will test their skill by practice in a certain duration. Here a score will be given to make the game experience challenging.

3.5 Statistics: Performance history**:** Users' typing exercises performance result will be stored in a text file. User can use the Performance history option to check the previous performance. Also it can show his improvement.

4. Implementation and Testing

4.1 Libraries and header files

In this project I have to use various standard library or header files of C++. I created a root header file named "AllHeaderFile.h" and added all the libraries and header in this root header. Thus I can easily access these header from any cpp program within this project. Some of the most used headers and libraries are:

- <iostream>: Used for console input/output operations, reading from and writing to the standard input/output streams.
- <windows.h>: Used for Windows-specific functionalities like manipulating console screens (clearing screen, setting cursor position), creating windows, handling messages, working with files etc. functionalities available in the Windows operating system.
- <conio.h>: Used for console input operations to get characters from the keyboard, manipulate the console screen, etc. More specifically, conio.h header is used in this project to use the kbhit() and getche() function. kbhit() is used to check if a key has been pressed on the keyboard without blocking the program's execution. getche() is used to get a character from the console input without waiting for the Enter key to be pressed.

- <fstream>: Used for File handling operations like reading from a file, writing to a file, appending to a file, etc.

- <time.h>: Used for obtaining system time, measuring time intervals, formatting time and date, etc.
- <chrono>: This standard library is used for Precise time measurement, calculating time durations, timing operations, etc.
- <iomanip>: Used for manipulating stream formatting options such as setting field width, precision, padding, etc.
- <io.h> and <fcntl.h>: These headers are used for the _setmode and _fileno functions. _setmode is employed to set the mode of a file stream, and _fileno is used to obtain the file descriptor associated with a file stream. In this project, _setmode is used to set the console to output UTF-16 text, ensuring that the console can correctly display wide characters. More specifically, these headers were necessary for working with Bangla text.
- <cstdlib>: Provides functions like malloc, free, exit, etc. used for memory management and general utilities.
- <bits/stdc++.h>: Used to simplify the process of including commonly used standard headers like <iostream>, <vector>, <algorithm>, <string>, etc., in a single include statement.

4.2 Function Definition**:**

In my project I have to create lots of function. To make them reusable, to avoid code repetition and to maintain these functions easily I have added all them in my root header file named “AllHeaderFile.h”. Thus I can easily use these function form any program within this project. Some of the most important functions are:

- void bangla_homepage(): show the homepage for Bangla language.
- void english_homepage(): show the homepage for English language.
- void drawKeyboard(): this function draw a keyboard on the console.
- void drawHistogram(char dataset[],int size,int frequency[]): this function draw a histogram of users’ error statistics on the console.
- void moveCursor(int x,int y): used to move the cursor to a specific position on the console.

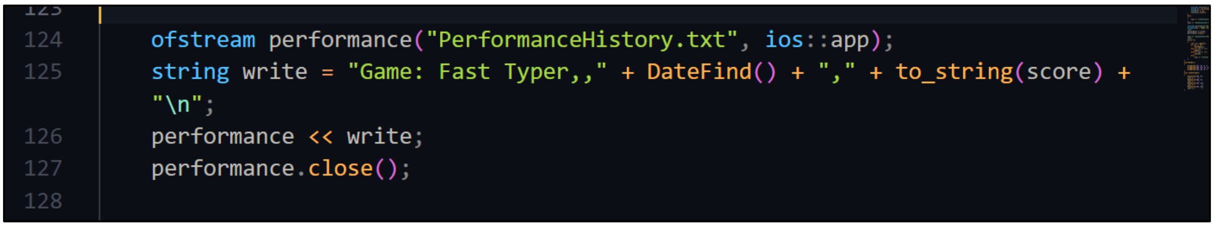
- string RandomWord(): This function returns a random word.
- string bangla_tounicode(wstring key): convert a bangla alphabet to it’s corresponding hex Unicode value.
- void loginsystem(): provides the login system interface.

- void history(): This function will show the users’ performance history.
- void keyDrill(char dataset[],int limit,int lessonNum,int partNum): Used to make a practice exercise on key typing.
- void wordDrill(char dataset[],int limit,int lessonNum,int partNum): Used to make a practice exercise on word typing.
- void bangla_tutorial(): used to provide tutorial of Bangla typing.
- void bangla_typing(): used to make practice exercise on Bangla typing.

4.3 File I/O operation

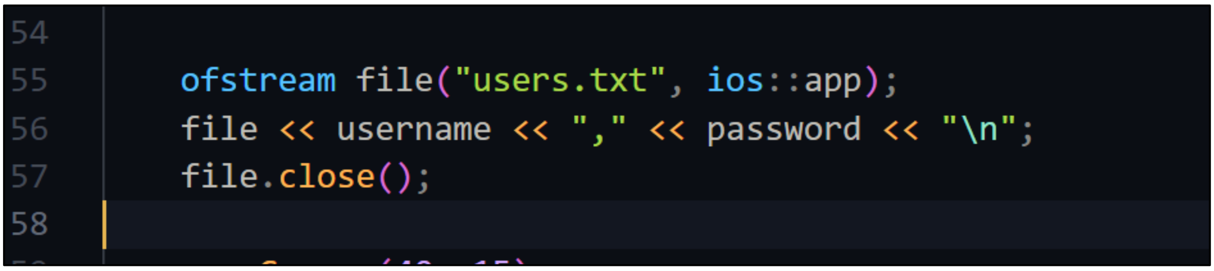
In this project, I have to use file handling operation for storing data to a text file. File I/O operations are used in these cases:

- User info (username & password) save
- user performane result save
- typing excercises dataset store



```
    ofstream performance("PerformanceHistory.txt", ios::app);
    string write = "Game: Fast Typer,," + DateFind() + "," + to_string(score) +
    "\n";
    performance << write;
    performance.close();
```

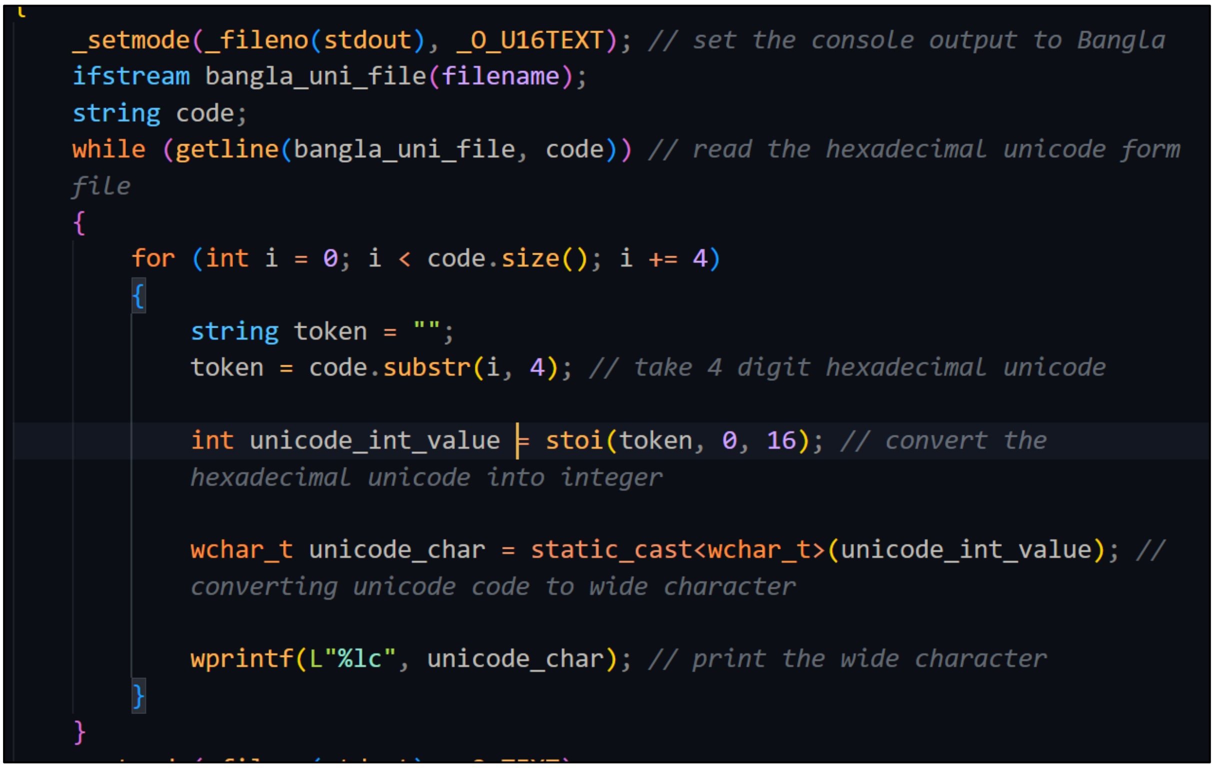
Figure 1: Store users’ performance result into a text file



```
    ofstream file("users.txt", ios::app);
    file << username << "," << password << "\n";
    file.close();
```

Figure 1: Store users info into a text file

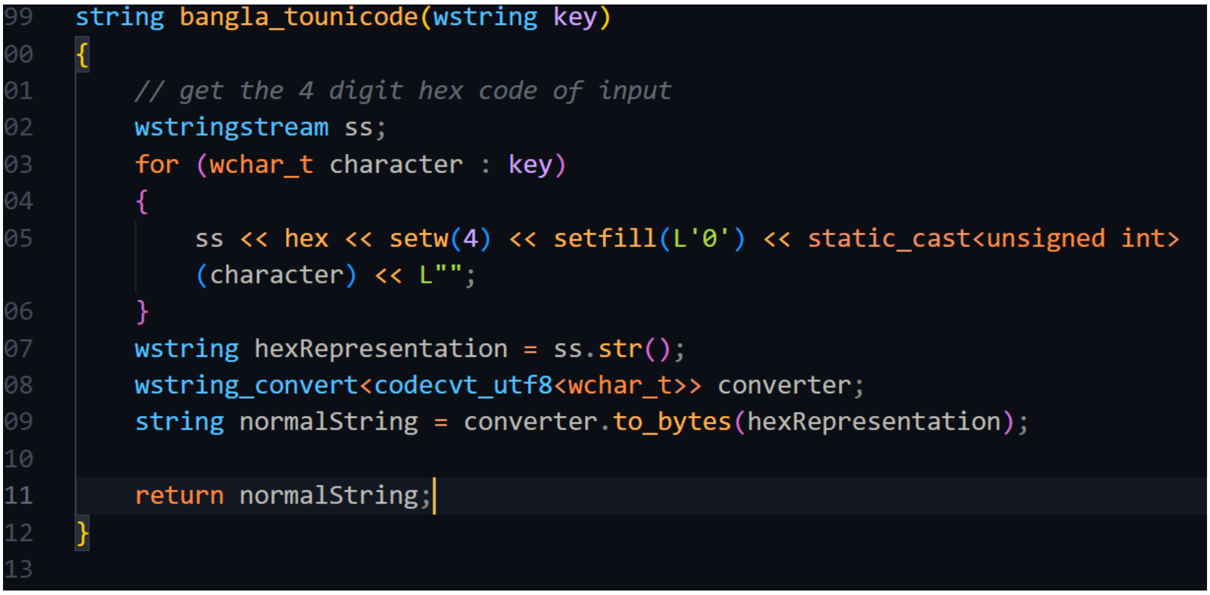
4.4 Bangla text I/O operation



```
    _setmode(_fileno(stdout), _O_U16TEXT); // set the console output to Bangla
    ifstream bangla_uni_file(filename);
    string code;
    while (getline(bangla_uni_file, code)) // read the hexadecimal unicode form
    file
    {
        for (int i = 0; i < code.size(); i += 4)
        {
            string token = "";
            token = code.substr(i, 4); // take 4 digit hexadecimal unicode

            int unicode_int_value = stoi(token, 0, 16); // convert the
            hexadecimal unicode into integer

            wchar_t unicode_char = static_cast<wchar_t>(unicode_int_value); //
            converting unicode code to wide character

            wprintf(L"%lc", unicode_char); // print the wide character
        }
    }
```

Figure 1: Bangla Unicode text read form file and output

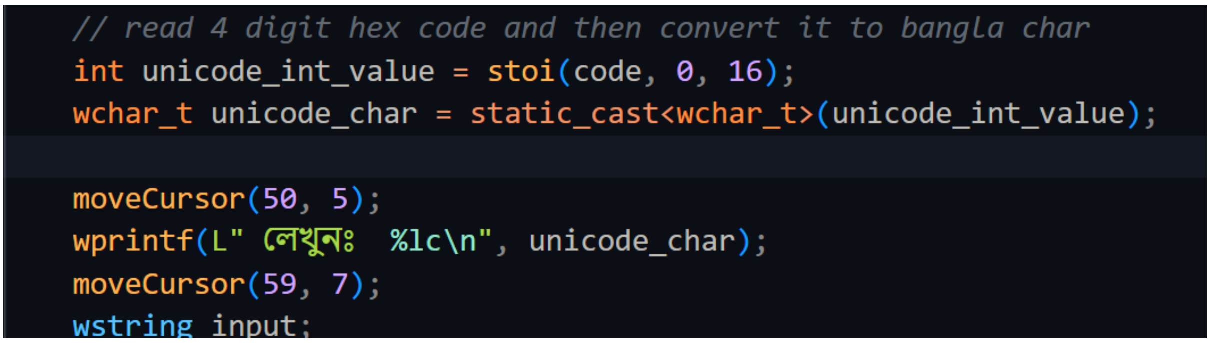
4.5 Bangla text to Hex Unicode convert



```
string bangla_tounicode(wstring key)
{
    // get the 4 digit hex code of input
    wstringstream ss;
    for (wchar_t character : key)
    {
        ss << hex << setw(4) << setfill(L'0') << static_cast<unsigned int>
        (character) << L"";
    }
    wstring hexRepresentation = ss.str();
    wstring_convert<codecvt_utf8<wchar_t>> converter;
    string normalString = converter.to_bytes(hexRepresentation);

    return normalString;
}
```

Figure 1: convert a Bangla text to it’s Unicode

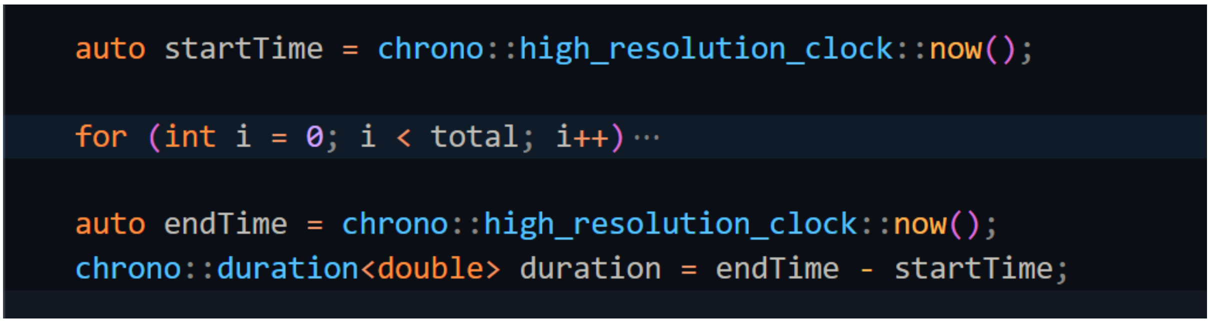
4.6 Unicode hex value to Bangla text convert



```
// read 4 digit hex code and then convert it to bangla char
int unicode_int_value = stoi(code, 0, 16);
wchar_t unicode_char = static_cast<wchar_t>(unicode_int_value);

moveCursor(50, 5);
wprintf(L" লেখুনঃ  %lc\n", unicode_char);
moveCursor(59, 7);
wstring input;
```

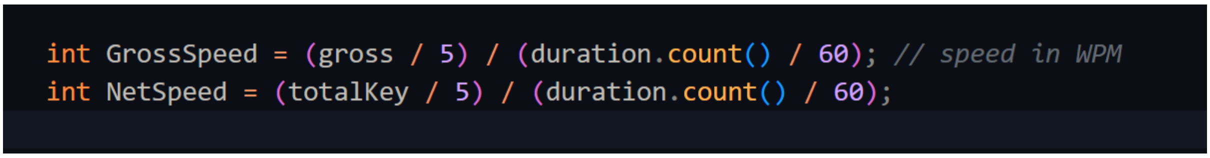
4.7 Typing Time calculation

using the high-resolution clock method from the <chrono> library, this will measures the elapsed time between startTime and endTime. The duration between these two points is then stored in the duration variable, allowing you to analyze or output the elapsed time. Thus the time taken to complete a typing task is calculated.



```
auto startTime = chrono::high_resolution_clock::now();

for (int i = 0; i < total; i++)···

auto endTime = chrono::high_resolution_clock::now();
chrono::duration<double> duration = endTime - startTime;
```

4.8 Typing Speed (WPM) Calculate



```
int GrossSpeed = (gross / 5) / (duration.count() / 60); // speed in WPM
int NetSpeed = (totalKey / 5) / (duration.count() / 60);
```

Here two types of speed measurement will be given. Gross speed and Net speed. Gross speed is the number of keys typed converted into words per minute. It is a simple score showing how fast you were typing the keys. This is actually represents the speed that can gain if user didn't make any mistake.

Net speed is the actual speed which gives the typing speed with errors calculated in the result.

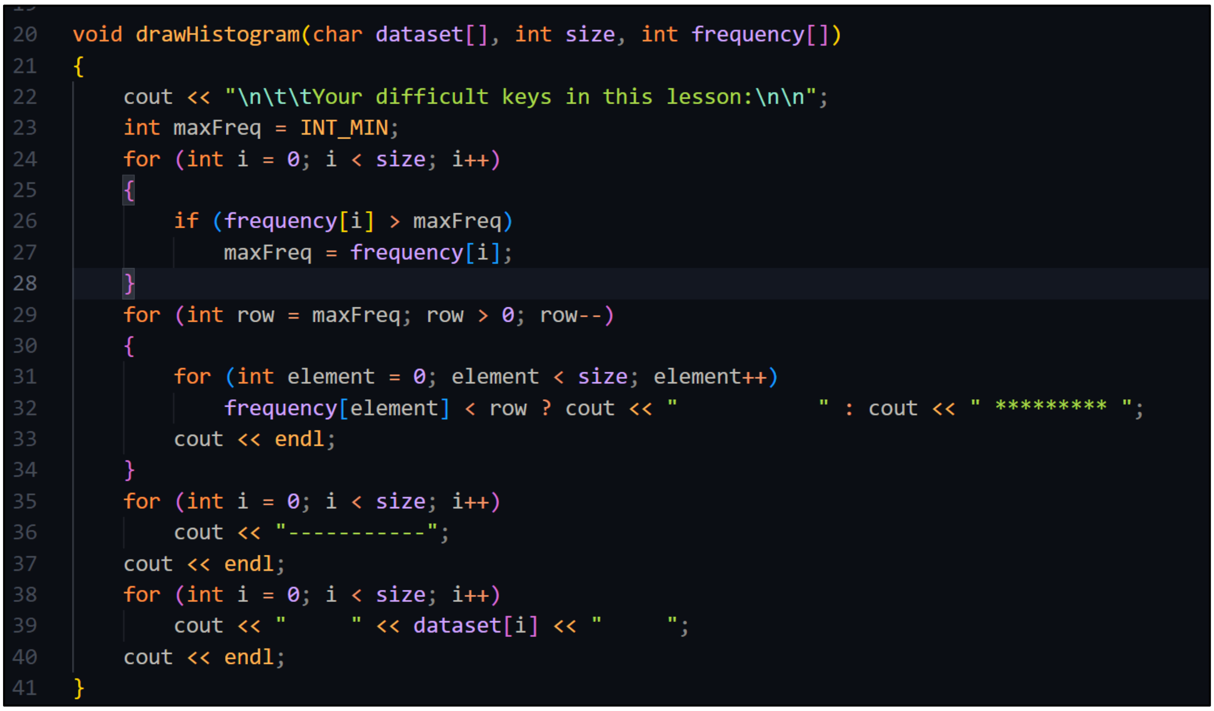
4.9 Accuracy Calculate

Accuracy is a score that represents the number of errors made. Accuracy percentage is the ratio of keys typed correctly to all keys typed. The higher the percentage, the fewer errors users have made. 100% accuracy means no mistakes in that typing practice session.

Accuracy is calculated using standard word length. For each word with an error user get a five keystroke penalty. Accuracy percentage is always rounded down, for example 96.99 is considered 96%. Accuracy goals are defined as: 90% (Easy), 94% (Intermediary), 98% (Advanced).

4.10 Difficult keys analysis using histogram

In a typing exercise, the error will be counted for corresponding keys. So a histogram can be made from this frequency data.

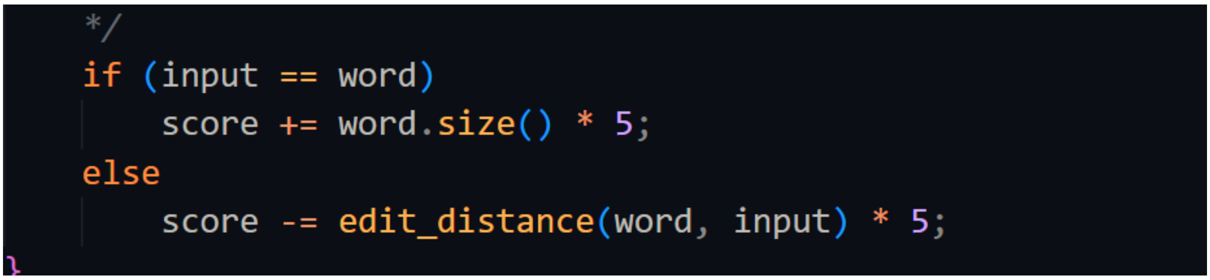


```cpp
void drawHistogram(char dataset[], int size, int frequency[])
{
    cout << "\n\t\tYour difficult keys in this lesson:\n\n";
    int maxFreq = INT_MIN;
    for (int i = 0; i < size; i++)
    {
        if (frequency[i] > maxFreq)
            maxFreq = frequency[i];
    }
    for (int row = maxFreq; row > 0; row--)
    {
        for (int element = 0; element < size; element++)
            frequency[element] < row ? cout << "           " : cout << " ********* ";
        cout << endl;
    }
    for (int i = 0; i < size; i++)
        cout << "-----------";
    cout << endl;
    for (int i = 0; i < size; i++)
        cout << "     " << dataset[i] << "     ";
    cout << endl;
}
```

Figure 1: Error analysis histogram draw on console

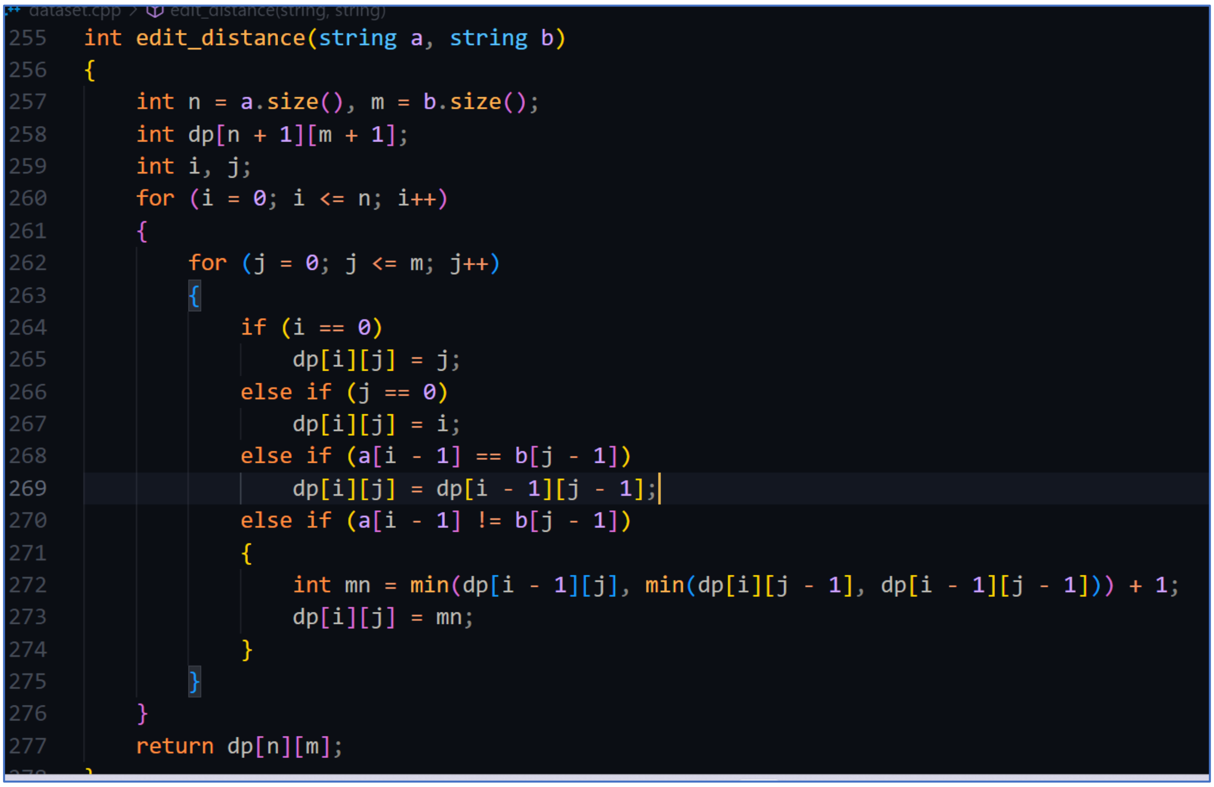
4.11 Edit Distance Algorithm

In the game part, a score will be given to make it more challenging. Here I defined the score giving process like that:



```
    */
    if (input == word)
        score += word.size() * 5;
    else
        score -= edit_distance(word, input) * 5;
}
```

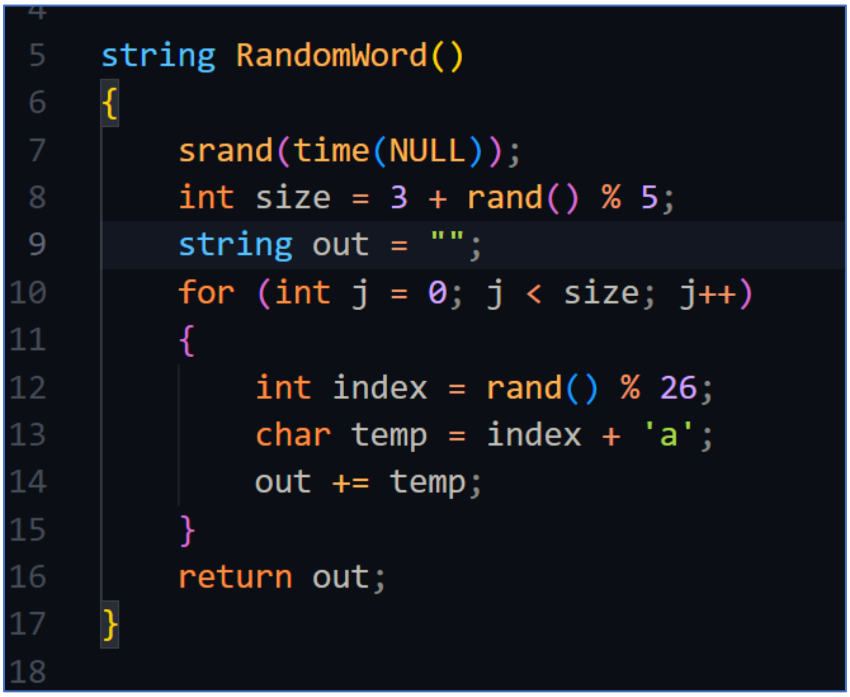
If user type the correct word, his score will be increased by 5*length of the word. But if his input his wrong, I measure the edit distance between the given word and input word. Then user score will be decreased by 5*edit distance. To find the edit distance I use the Dynamic Programming technique.



```
int edit_distance(string a, string b)
{
    int n = a.size(), m = b.size();
    int dp[n + 1][m + 1];
    int i, j;
    for (i = 0; i <= n; i++)
    {
        for (j = 0; j <= m; j++)
        {
            if (i == 0)
                dp[i][j] = j;
            else if (j == 0)
                dp[i][j] = i;
            else if (a[i - 1] == b[j - 1])
                dp[i][j] = dp[i - 1][j - 1];
            else if (a[i - 1] != b[j - 1])
            {
                int mn = min(dp[i - 1][j], min(dp[i][j - 1], dp[i - 1][j - 1])) + 1;
                dp[i][j] = mn;
            }
        }
    }
    return dp[n][m];
```

Figure 1: Calculating the distance between given word and users' input using Edit Distance (DP) algorithm

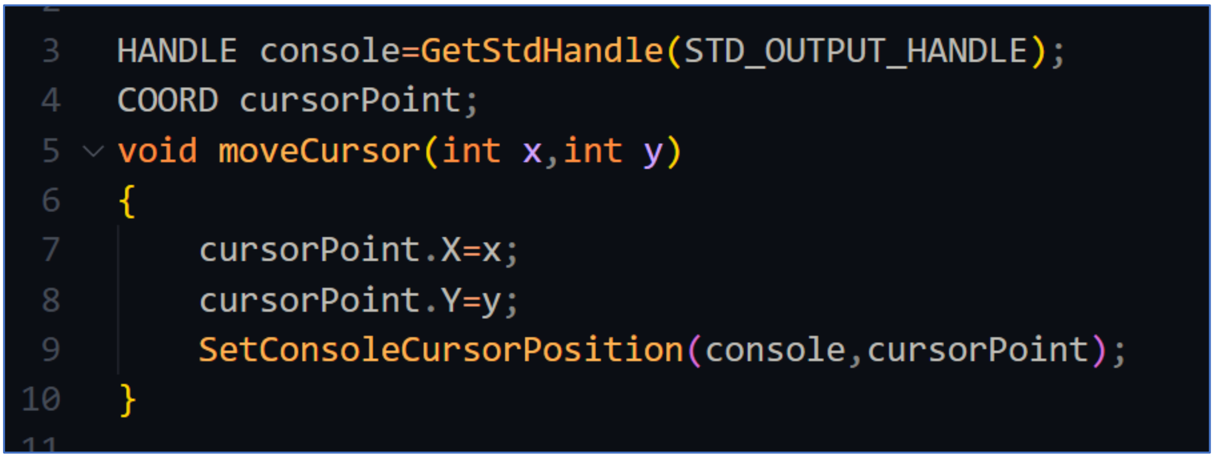
4.12 Random word generate



```
string RandomWord()
{
    srand(time(NULL));
    int size = 3 + rand() % 5;
    string out = "";
    for (int j = 0; j < size; j++)
    {
        int index = rand() % 26;
        char temp = index + 'a';
        out += temp;
    }
    return out;
}
```

Figure 1: Random word generate using rand() function

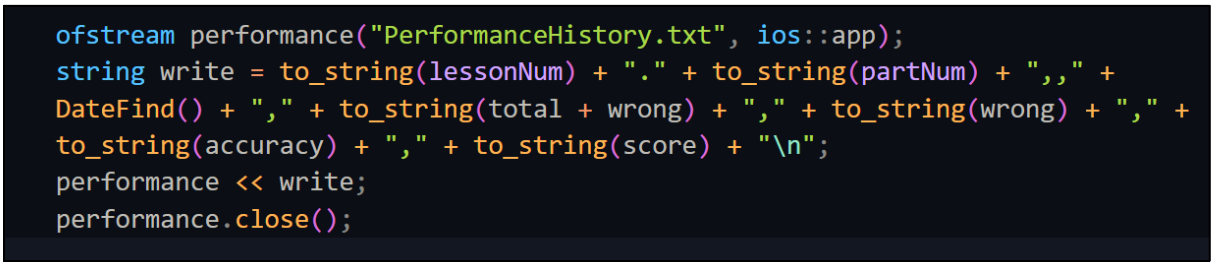
4.13 Cursor move



```
HANDLE console=GetStdHandle(STD_OUTPUT_HANDLE);
COORD cursorPoint;
void moveCursor(int x,int y)
{
    cursorPoint.X=x;
    cursorPoint.Y=y;
    SetConsoleCursorPosition(console,cursorPoint);
}
```

4.14 Login System

4.15 Performance history save

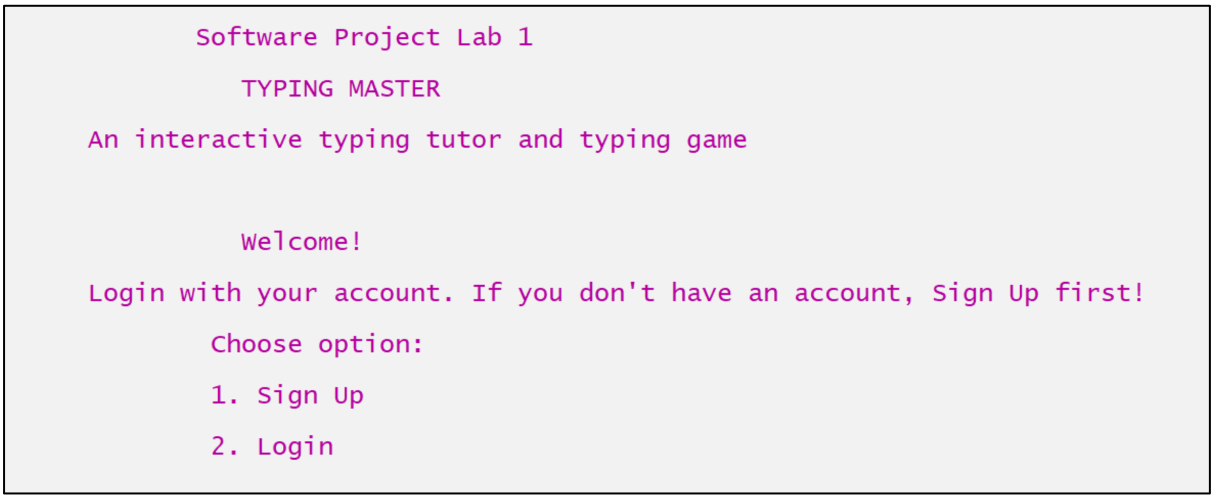


```
ofstream performance("PerformanceHistory.txt", ios::app);
string write = to_string(lessonNum) + "." + to_string(partNum) + ",," +
DateFind() + "," + to_string(total + wrong) + "," + to_string(wrong) + "," +
to_string(accuracy) + "," + to_string(score) + "\n";
performance << write;
performance.close();
```

Figure 1: Store the result into a text file

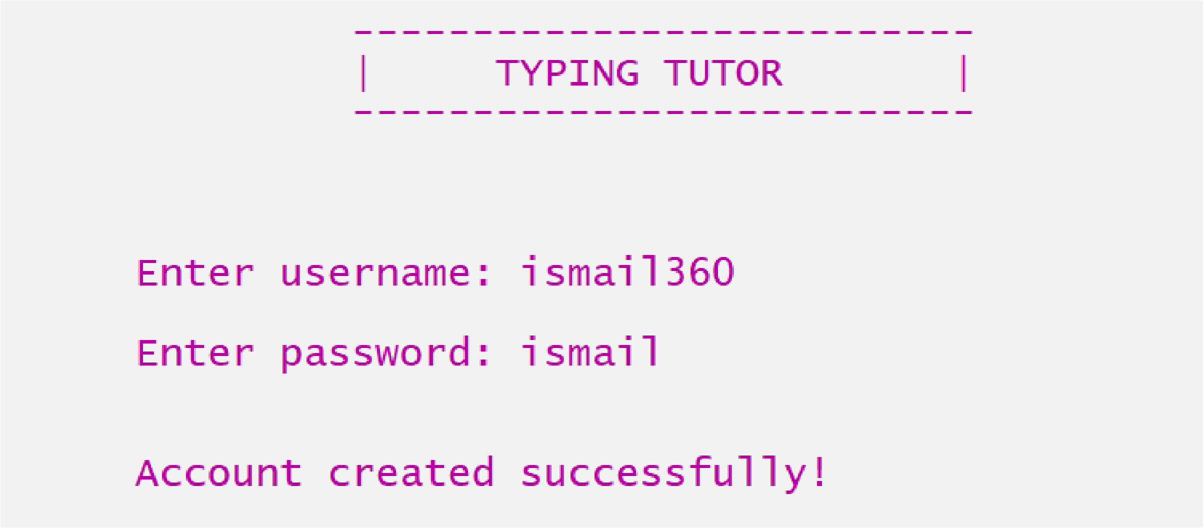
5. User Interface

5.1 Login System:



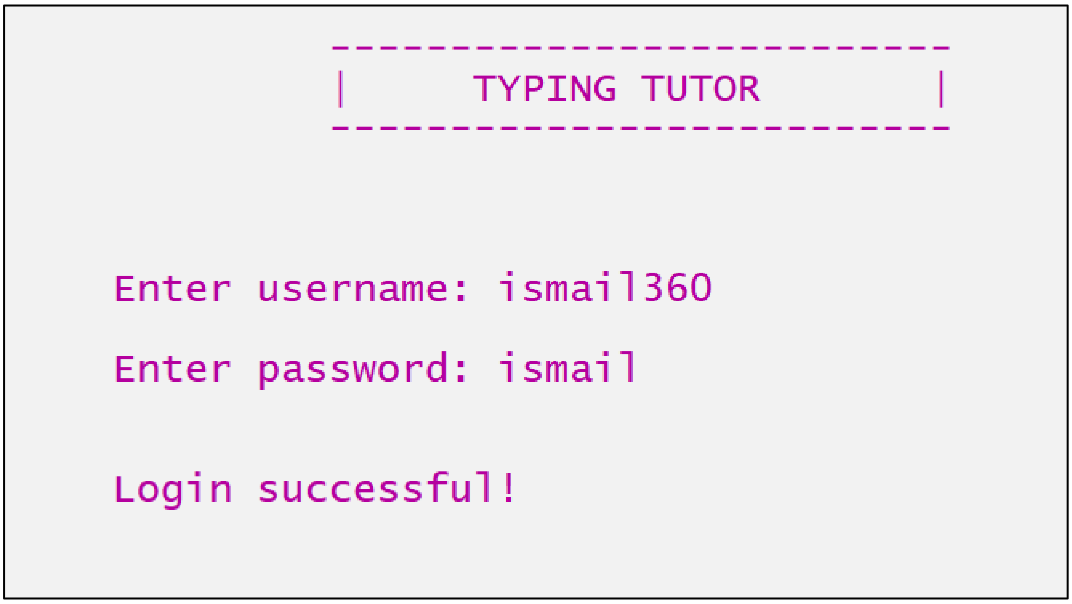
```
       Software Project Lab 1
          TYPING MASTER
An interactive typing tutor and typing game

          Welcome!
Login with your account. If you don't have an account, Sign Up first!
        Choose option:
        1. Sign Up
        2. Login
```

Figure 1: Welcome Page



```
         --------------------------
         |     TYPING TUTOR       |
         --------------------------


Enter username: ismail360
Enter password: ismail

Account created successfully!
```

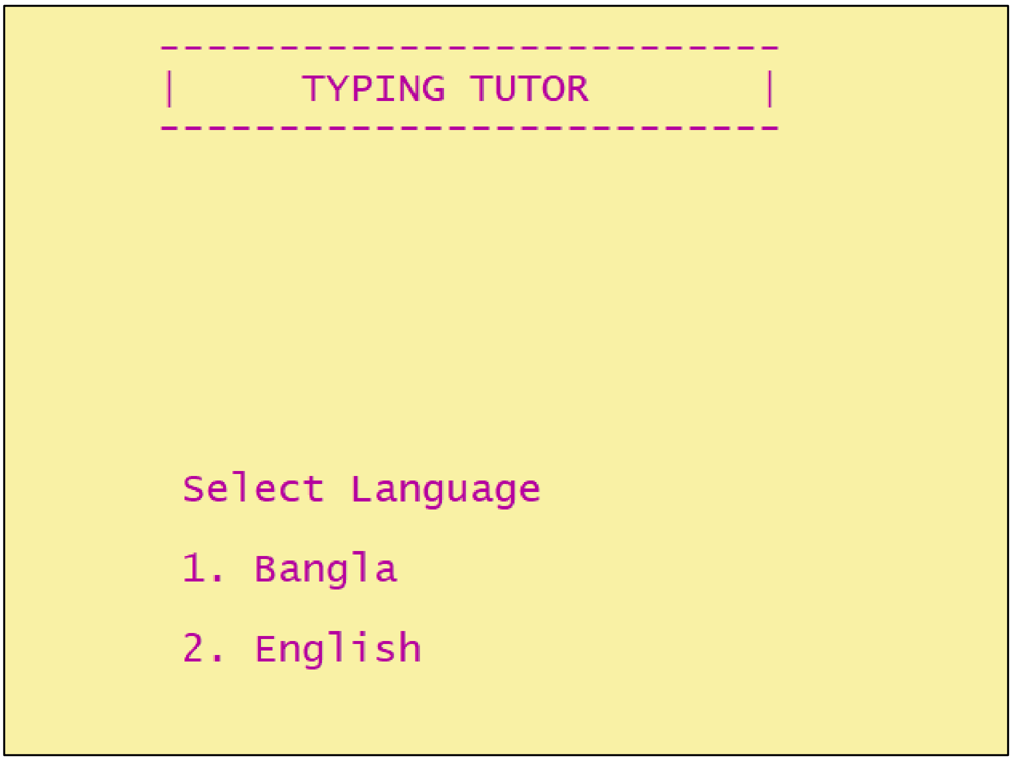
Figure 1: Sign Up Page



```
         --------------------------
         |     TYPING TUTOR       |
         --------------------------


Enter username: ismail360

Enter password: ismail

Login successful!
```

Figure 1: Login Page

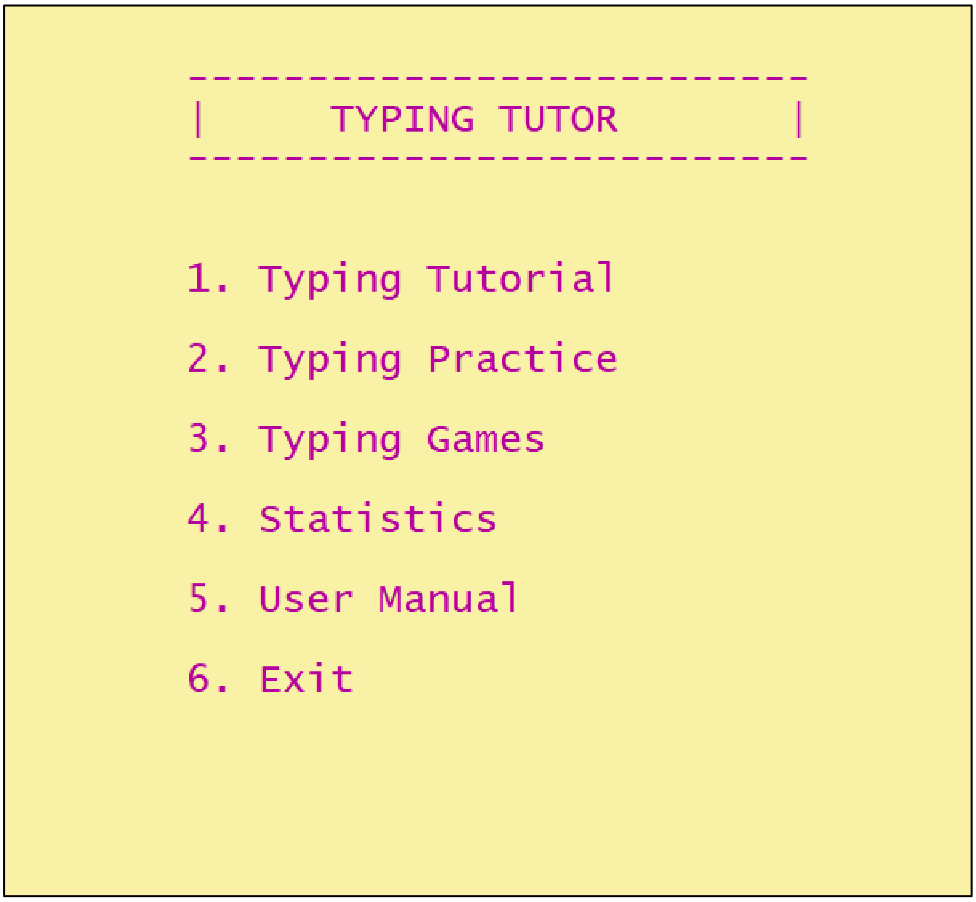
5.2 Language Selection Page



```
--------------------------
|     TYPING TUTOR       |
--------------------------





 Select Language

 1. Bangla

 2. English
```

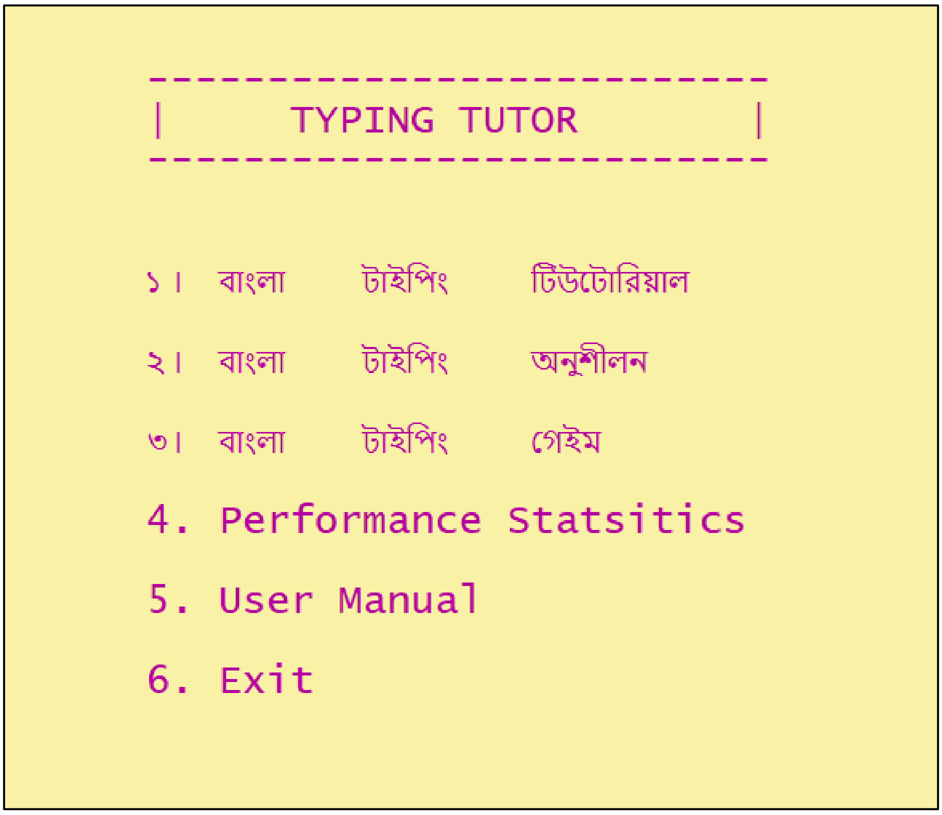
Figure 1: Language selection Page

5.3 Home Page



```
---------------------------
|      TYPING TUTOR        |
---------------------------

1. Typing Tutorial

2. Typing Practice

3. Typing Games

4. Statistics

5. User Manual

6. Exit
```

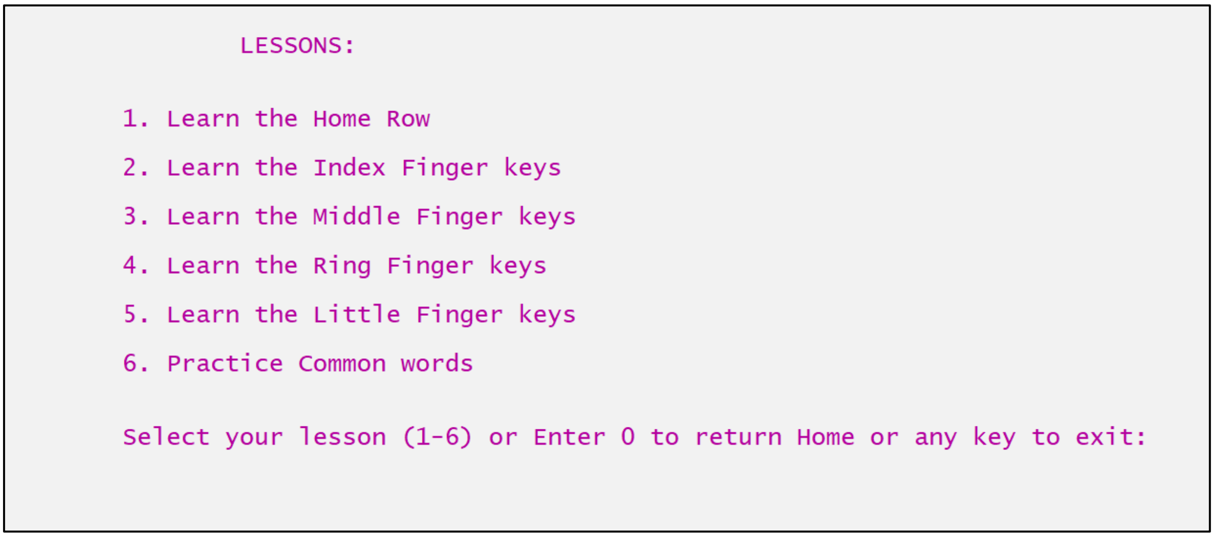
Figure 1: English Language HomePage



```
---------------------------
|      TYPING TUTOR        |
---------------------------

১।  বাংলা    টাইপিং    টিউটোরিয়াল

২।  বাংলা    টাইপিং    অনুশীলন

৩।  বাংলা    টাইপিং    গেইম

4. Performance Statsitics

5. User Manual

6. Exit
```

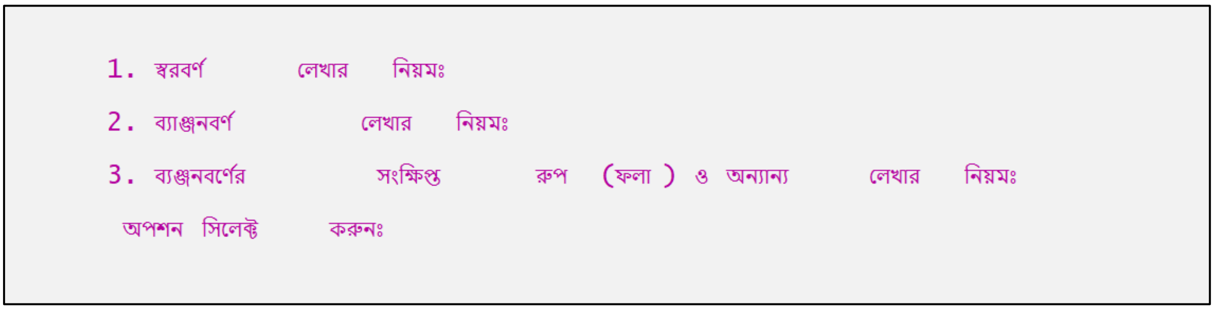
Figure 1: Bangla Language HomePage

5.4 Tutorial Page



```
        LESSONS:

1. Learn the Home Row
2. Learn the Index Finger keys
3. Learn the Middle Finger keys
4. Learn the Ring Finger keys
5. Learn the Little Finger keys
6. Practice Common words

Select your lesson (1-6) or Enter 0 to return Home or any key to exit:
```

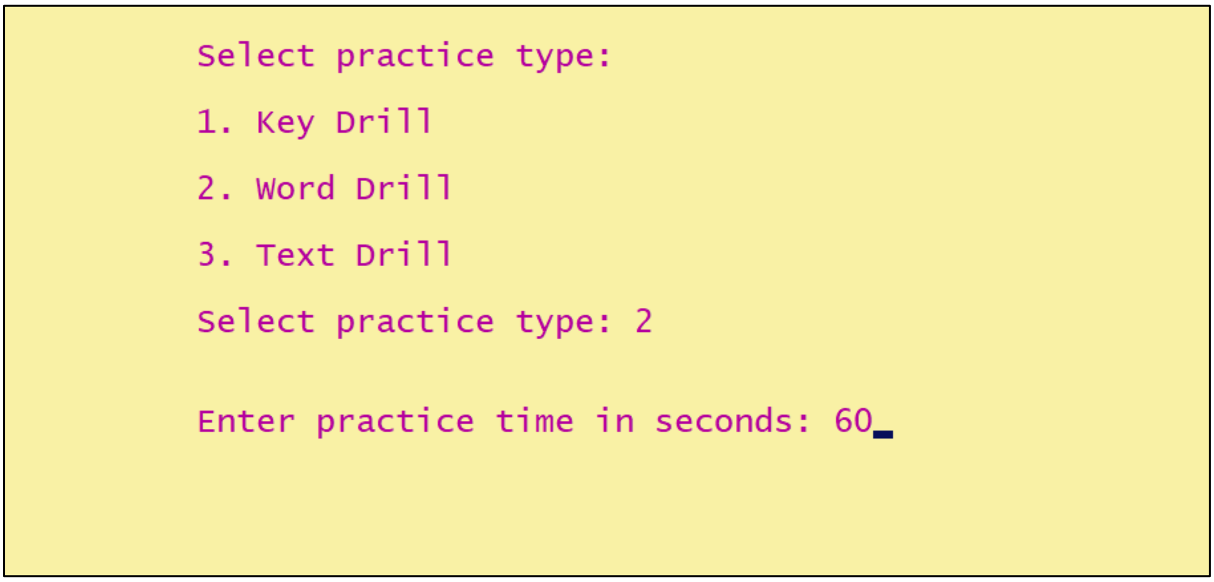
Figure 1: English Tutorial Page



```
1. স্বরবর্ণ লেখার নিয়মঃ
2. ব্যাঞ্জনবর্ণ লেখার নিয়মঃ
3. ব্যঞ্জনবর্ণের সংক্ষিপ্ত রুপ (ফলা ) ও অন্যান্য লেখার নিয়মঃ
 অপশন সিলেক্ট করুনঃ
```

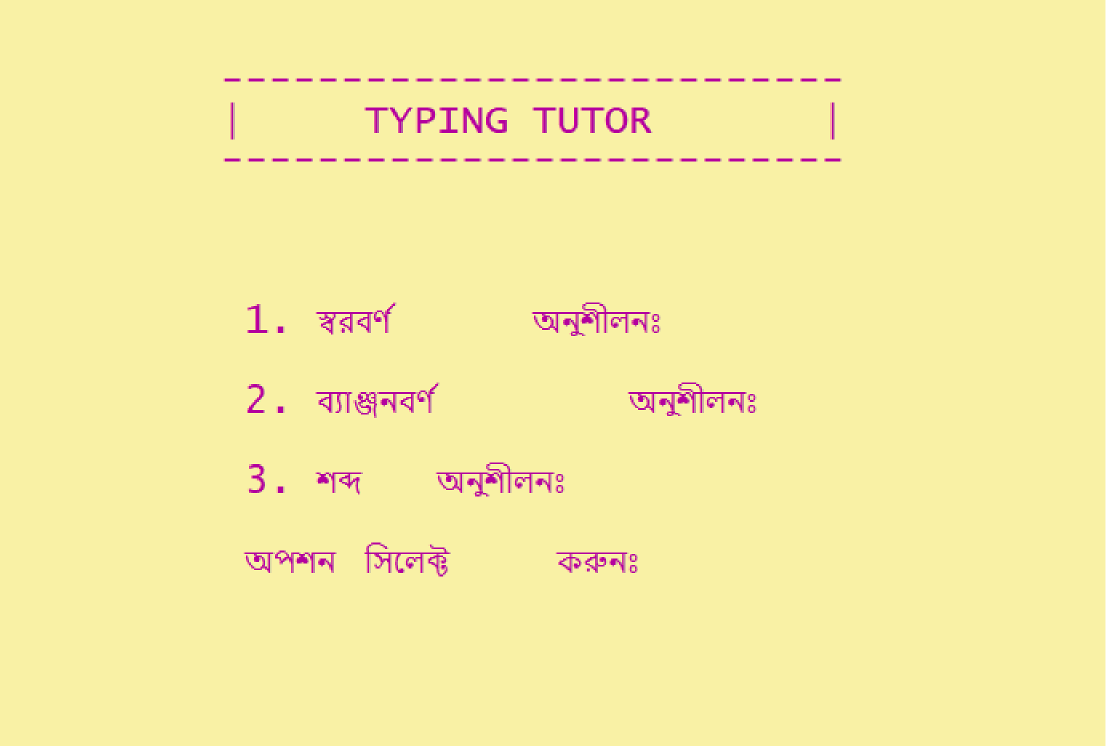
Figure 1: Bangla Tutorial Page

5.5 Typing Practice Page



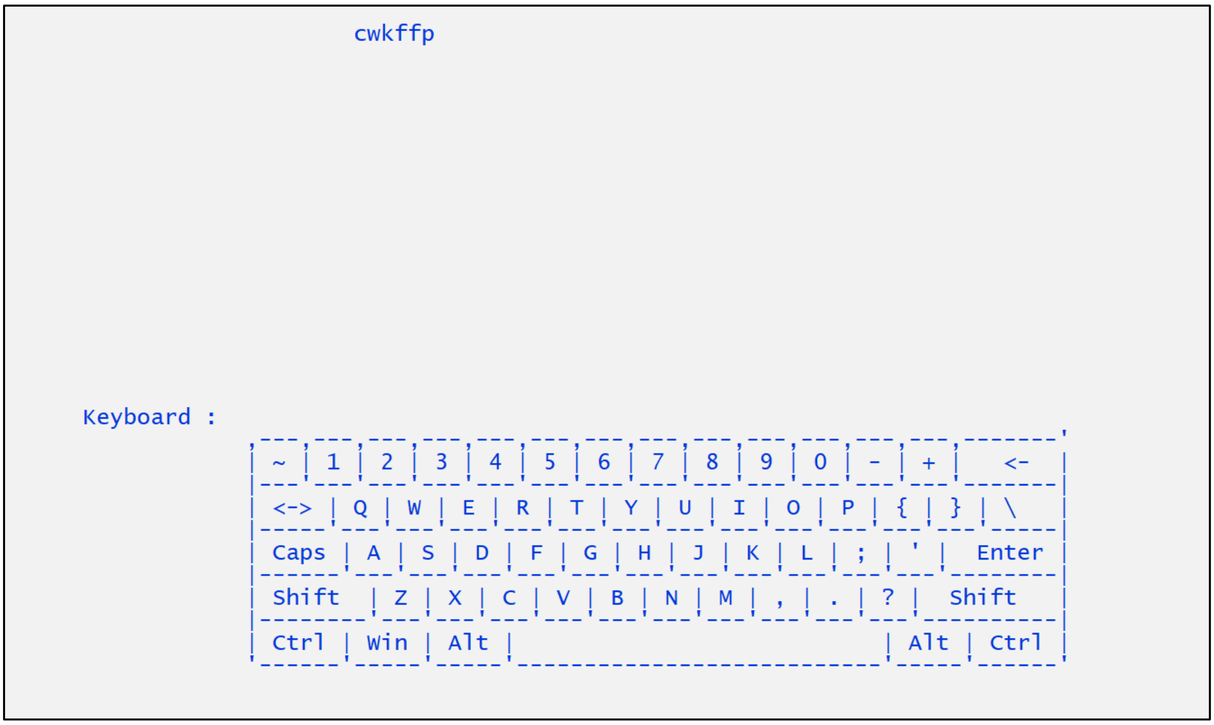
```
Select practice type:
1. Key Drill
2. Word Drill
3. Text Drill
Select practice type: 2

Enter practice time in seconds: 60_
```

Figure 1: Practice Type Selection and Timer set (Engish)



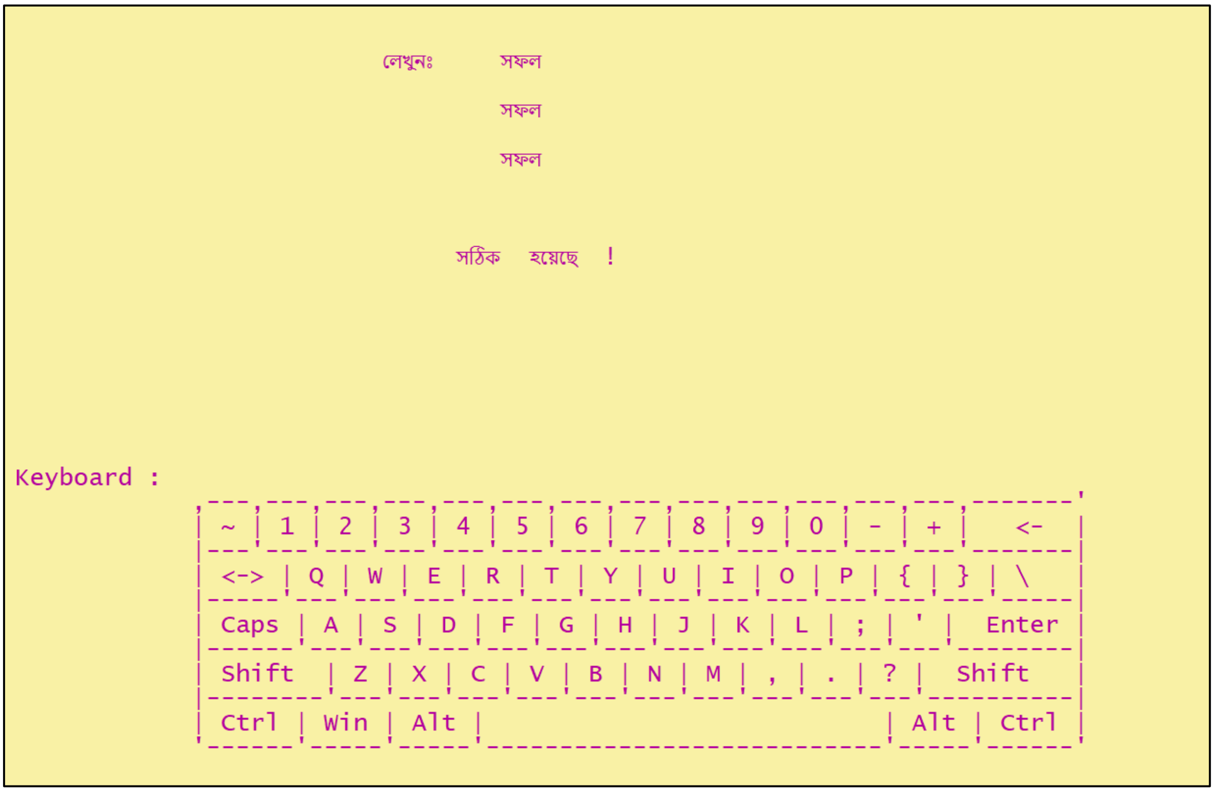
```
 -----------------------------
 |      TYPING TUTOR         |
 -----------------------------


  1. স্বরবর্ণ          অনুশীলনঃ

  2. ব্যাঞ্জনবর্ণ              অনুশীলনঃ

  3. শব্দ      অনুশীলনঃ

  অপশন  সিলেক্ট        করুনঃ
```

Figure 1: Practice Type Selection (Bangla)



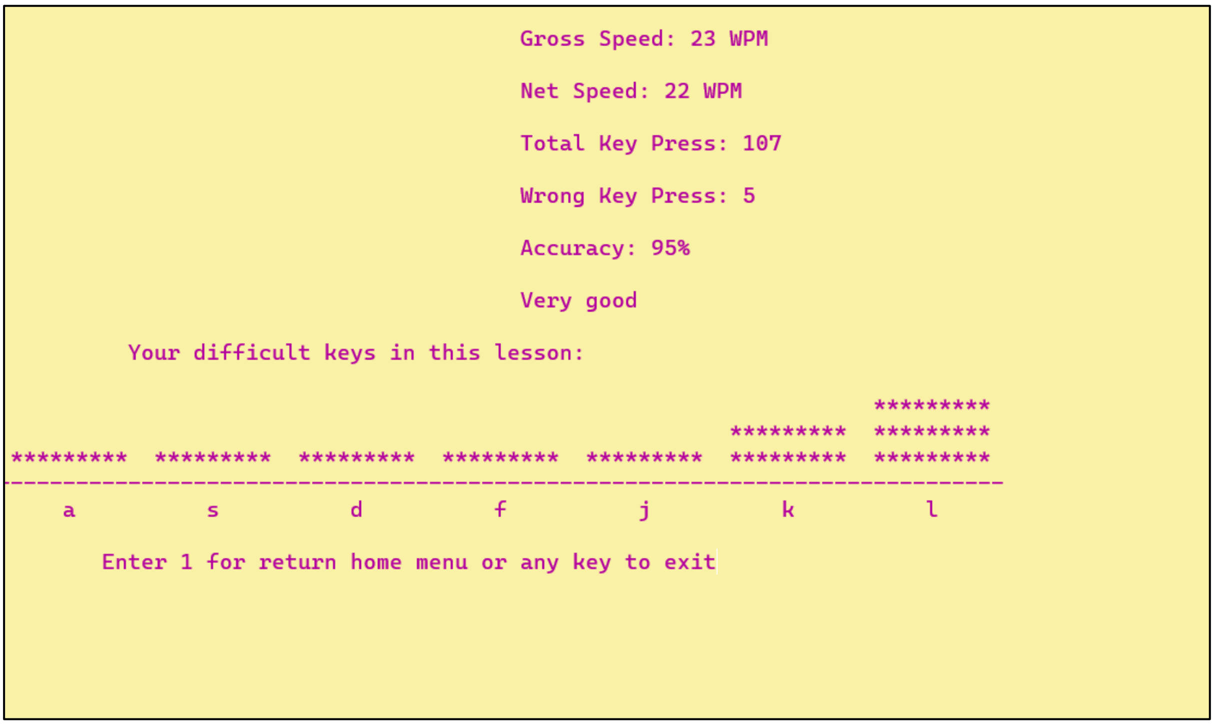
```
                    cwkffp








   Keyboard :
              ,---,---,---,---,---,---,---,---,---,---,---,---,---,-------'
              | ~ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | - | + |   <-  |
              |---'---'---'---'---'---'---'---'---'---'---'---'---'-------|
              | <-> | Q | W | E | R | T | Y | U | I | O | P | { | } | \   |
              |-----'---'---'---'---'---'---'---'---'---'---'---'---'-----|
              | Caps | A | S | D | F | G | H | J | K | L | ; | ' |  Enter |
              |------'---'---'---'---'---'---'---'---'---'---'---'--------|
              | Shift  | Z | X | C | V | B | N | M | , | . | ? |  Shift   |
              |--------'---'---'---'---'---'---'---'---'---'---'----------|
              | Ctrl | Win | Alt |                           | Alt | Ctrl |
              '------'-----'-----'---------------------------'-----'------'
```

Figure 1: Practice Page (English)



```
                              লেখুনঃ      সফল

                                          সফল

                                          সফল


                                   সঠিক   হয়েছে   !





Keyboard :
            ,___,___,___,___,___,___,___,___,___,___,___,___,___,_______'
            | ~ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | - | + |  <-  |
            |___|___|___|___|___|___|___|___|___|___|___|___|___|______|
            | <-> | Q | W | E | R | T | Y | U | I | O | P | { | } | \  |
            |_____|___|___|___|___|___|___|___|___|___|___|___|___|____|
            | Caps | A | S | D | F | G | H | J | K | L | ; | ' | Enter |
            |______|___|___|___|___|___|___|___|___|___|___|___|_______|
            | Shift  | Z | X | C | V | B | N | M | , | . | ? |  Shift  |
            |________|___|___|___|___|___|___|___|___|___|___|_________|
            | Ctrl | Win | Alt |                           | Alt | Ctrl |
            |______|_____|_____|___________________________|_____|______|
```

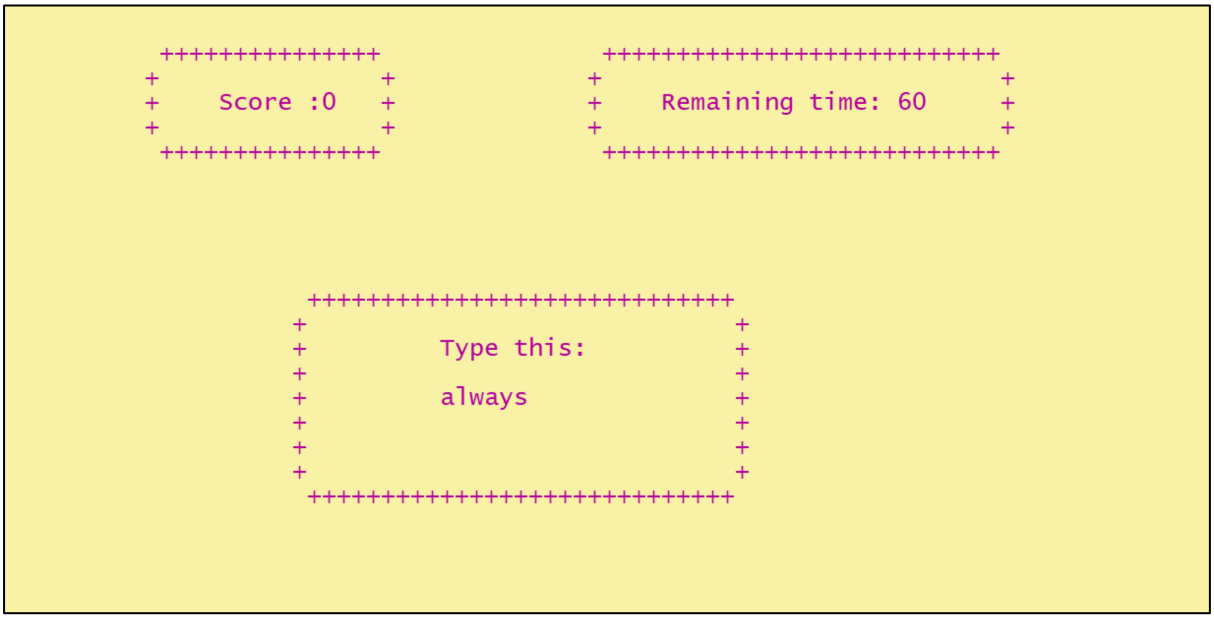
Figure 1: Practice Page (Bangla)



```
                                        Gross Speed: 23 WPM

                                        Net Speed: 22 WPM

                                        Total Key Press: 107

                                        Wrong Key Press: 5

                                        Accuracy: 95%

                                        Very good

         Your difficult keys in this lesson:

                                                                                   *********
                                                                       *********   *********
*********  *********  *********  *********  *********  *********   *********
----------------------------------------------------------------------------
    a          s          d          f          j          k           l

       Enter 1 for return home menu or any key to exit
```

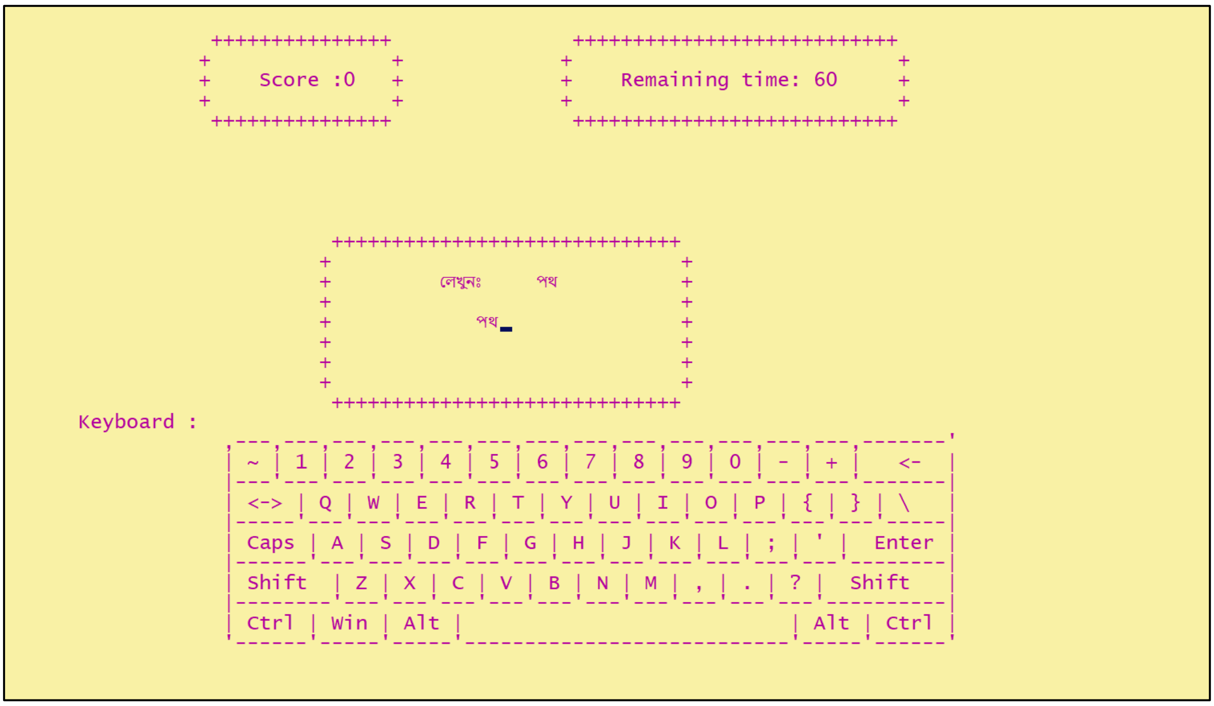
Figure 1: Performance Result Analysis

5.6 Typing Game Page



```
     +++++++++++++++             ++++++++++++++++++++++++++
    +               +           +                          +
    +    Score :0   +           +    Remaining time: 60    +
    +               +           +                          +
     +++++++++++++++             ++++++++++++++++++++++++++



              ++++++++++++++++++++++++++++
             +                            +
             +         Type this:         +
             +                            +
             +         always             +
             +                            +
             +                            +
             +                            +
              ++++++++++++++++++++++++++++
```

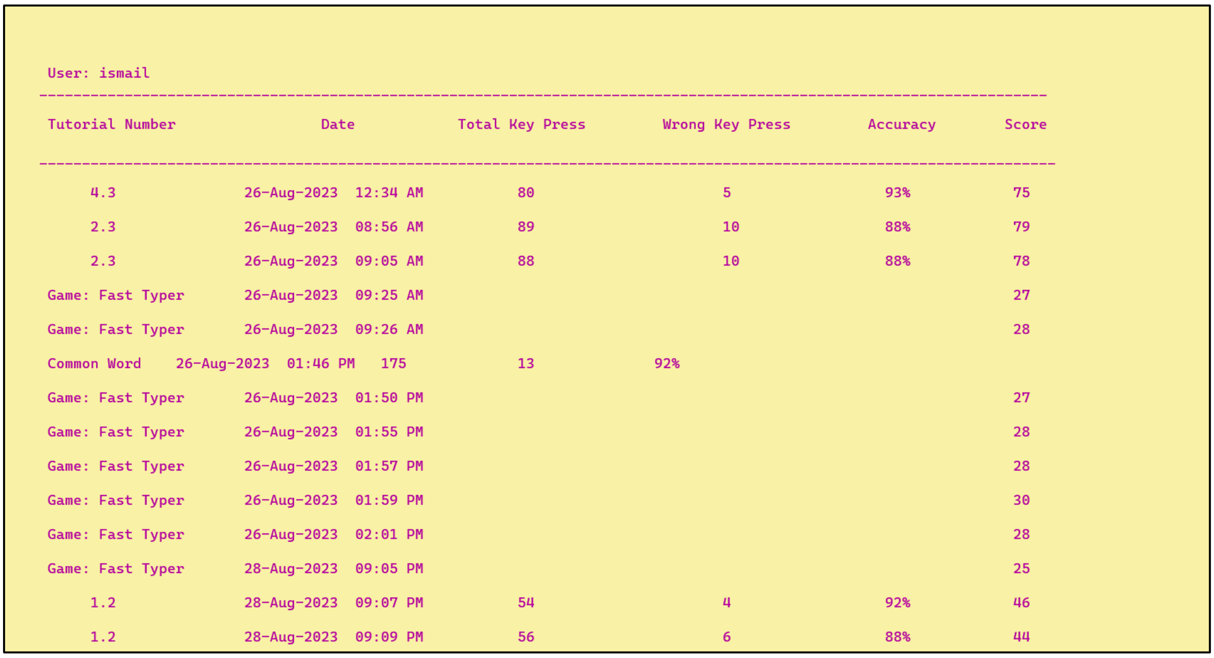
Figure 1: Game page (English)



```
          +++++++++++++++            ++++++++++++++++++++++++++
         +               +          +                          +
         +    Score :0   +          +    Remaining time: 60    +
         +               +          +                          +
          +++++++++++++++            ++++++++++++++++++++++++++



                  ++++++++++++++++++++++++++++
                 +                            +
                 +         লেখুনঃ      পথ         +
                 +                            +
                 +            পথ_              +
                 +                            +
                 +                            +
                 +                            +
                  ++++++++++++++++++++++++++++
   Keyboard :
              ,---,---,---,---,---,---,---,---,---,---,---,---,---,-------,
              | ~ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | - | + |  <-   |
              |---'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-------|
              | <-> | Q | W | E | R | T | Y | U | I | O | P | { | } | \   |
              |-----'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-----|
              | Caps | A | S | D | F | G | H | J | K | L | ; | ' |  Enter |
              |------'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'-,-'--------|
              | Shift   | Z | X | C | V | B | N | M | , | . | ? |  Shift  |
              |------,--'-,-'---'---'---'---'---'---'---'-,-'---'-,-------|
              | Ctrl | Win | Alt |                        | Alt | Ctrl |
              '------'-----'-----'------------------------'-----'------'
```

Figure 1: Game page (Bangla)

5.7 Statistics: Performance History



```
 User: ismail
----------------------------------------------------------------------------------------------------------------------
 Tutorial Number                 Date            Total Key Press         Wrong Key Press         Accuracy        Score

-----------------------------------------------------------------------------------------------------------------------
      4.3               26-Aug-2023  12:34 AM           80                      5                  93%            75
      2.3               26-Aug-2023  08:56 AM           89                      10                 88%            79
      2.3               26-Aug-2023  09:05 AM           88                      10                 88%            78
 Game: Fast Typer       26-Aug-2023  09:25 AM                                                                     27
 Game: Fast Typer       26-Aug-2023  09:26 AM                                                                     28
 Common Word    26-Aug-2023  01:46 PM   175             13              92%
 Game: Fast Typer       26-Aug-2023  01:50 PM                                                                     27
 Game: Fast Typer       26-Aug-2023  01:55 PM                                                                     28
 Game: Fast Typer       26-Aug-2023  01:57 PM                                                                     28
 Game: Fast Typer       26-Aug-2023  01:59 PM                                                                     30
 Game: Fast Typer       26-Aug-2023  02:01 PM                                                                     28
 Game: Fast Typer       28-Aug-2023  09:05 PM                                                                     25
      1.2               28-Aug-2023  09:07 PM           54                      4                  92%            46
      1.2               28-Aug-2023  09:09 PM           56                      6                  88%            44
```

Figure 1 Previous Performance Result

6. Challenges Faced

Developing a whole software project is never easy for someone who is doing it for the first time. A lot of challenges and obstacle I've faced during the project. Here are some important in the project that I have faced:

1. Learning C++: During this project I had to learn C++ more deeply. I have to use some complex syntax which was previously unknow to me.

2. Handling a Large Project: At the beginning I was clueless about where to start from, how to design the project, connect all the small parts of my project with one another. I had no experience on building such big projects. Then I divide my whole project into some modules. I was thinking about the process of connecting all the modules with a root module. Then I made a single C++ header files which defines all the modules. The header file can be accessed by any function that belonged to that project. Thus I have connect all the modules with each other.

3. File Handling Operations: In my project I have used text file for many cases. Users' performance, users' info like username and password is stored in text file. Also typing practice exercise are taken from text file. That's why

handling the files read write operation was a significant challenge for me.

4. Bangla Language Support: As C++ doesn't support Bangla language directly, it was not an easy task to add Bangla language support. But it supports Unicode. Then I try to use appropriate encoding standards between Unicode to Bangla character and thus I can effectively work with Bangla. Besides there are different keyboard layout for Bangla language. To keep Bangla typing easier to the beginner, here I used Avro Phonetic Keyboard.

5. Creating timer and time calculation: When user try typing exercises, he can set a specific time duration to practice. So I have to make a timer so that after that time the exercise is closed. That was initially looking hard task to me as I never worked with timer related task before. Then I tried to use C++ standard library <chrono> to work with time related operations. It's not so much complex but it required a good understanding of C++ concepts.

7. Conclusion

In this project I tried to make a system which will help to improve typing skill especially to beginners. I tried to implement a well designed interface on the console and give a good user experience. Throughout the project, I learnt a lot of things. Most importantly, I have learnt to manage a big project. I have also gain a deep understanding on C++ language, learnt some new syntax and operation of C++.

In future I can extend this project with more functionalities. Some of functionalities are described here:

- Enhanced User Interface: Improve the user interface design to make it more visually appealing and intuitive, providing a more immersive and enjoyable experience for users.
- Multiplayer Functionality: Implement multiplayer functionality to allow users to compete against each other in typing challenges, fostering a sense of competition and motivation.

- Cross-platform Compatibility: Adapt the game for compatibility with different platforms, including mobile devices, to reach a broader user base.
- Additional Game Modes: Introduce different game modes to provide a variety of typing challenges.

Reference

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