AN-NAJAH NATIONAL UNIVERSITY

FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

COMPUTER ENGINEERING DEPARTMENT

Software Graduation Project:

Arabic Touch Typing

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Presented in partial fulfillment of the requirements for the Bachelor's degree in Computer Engineering. January 10, 2023

Acknowledgment

We would like to express our sincere gratitude to our project advisor, Dr.Mona, for their invaluable guidance and support throughout the duration of this project. Their knowledge, expertise and encouragement were instrumental in the successful completion of our graduation project. To our friends and family for their unwavering support and encouragement during the course of this project. to the municipalities who dedicated some of their time and effort to answer our questions, Finally to our beloved An-Najah National University that supported this project to make the country and the community better and to make us the students make a difference.Without them, this project would not have been possible. We are deeply grateful to everyone who has helped us along the way, and this project is dedicated to all of you.

Dedication

With great appreciation and immense gratitude, we express our heartfelt thanks to everyone who has supported us throughout this journey. Our friends and family have been our pillars of strength, and we are deeply grateful for the unwavering love and support they have provided.

We also extend our heartfelt thanks to all the authors, researchers, and experts whose works have been instrumental in guiding us through this project. Their contributions to computer engineering have been invaluable and have played a crucial role in the successful completion of our graduation project.

We are deeply indebted to all of you, and this work would not have been possible without your support. Thank you all for being a part of our journey.

DISCLAIMER

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Abstract

This study aims to develop an innovative Arabic touch typing training program that addresses the growing need for typing proficiency in today's technology-driven culture. The proposed program will utilize a unique approach to enhance the learning experience for individuals who use the Arabic language on a regular basis such as writers, translators, court reporters, and anyone seeking to improve their typing speed and efficiency.

The program will feature interactive games, lessons and exercises, personalized feedback, and progress tracking to keep users engaged and motivated. Additionally, the program will utilize visual demonstrations, such as a marker on the current letter and a region below the paragraph displaying the correct finger movement with each letter, to guide users through the touch typing process.

This approach will provide users with a clear and direct understanding of the touch typing technique, making it easier for them to acquire the skills and improve their typing speed and accuracy. The program will be tested on a sample of participants, and the results will be analyzed to evaluate its effectiveness in improving typing skills.

The proposed program will fill the gap in the market for efficient and user-friendly touch typing training programs for Arabic speakers and could greatly benefit individuals and organizations that rely heavily on typing in their daily operations. The findings of this study could also contribute to the development of similar programs for other languages.

1. Introduction

1.1 Background

Touch typing is a valuable skill that has become increasingly essential in today's digital age, where computers and technology play a significant role in most industries. Touch typing is the practice of typing using all one's fingers and without looking at the keys, which allows for faster and more efficient typing. However, obtaining touch typing skills can be challenging, particularly for those who use languages that are not well-represented in traditional touch typing training programs, such as Arabic.

1.2 Problem Statement

The problem that this study aims to address is the lack of efficient and user-friendly touch typing training programs for Arabic speakers. The Arabic language is written from right to left and has a unique set of characters that are not present in other languages. As a result, traditional touch typing programs may not be suitable for Arabic speakers, and they may struggle to acquire the necessary skills. Furthermore, most of the touch typing programs currently available are not interactive and do not provide personalized feedback, which can make the learning process less engaging and less effective.

1.3 Significance

Touch typing is a skill that can have a significant impact on an individual's productivity, cognitive abilities and mental health, and it's a skill that is becoming increasingly essential in today's society.

1.4 Objectives and Scope

The goal is to develop a program that addresses the lack of efficient and user-friendly touch typing training programs for Arabic speakers and to improve their typing speed and accuracy. The program will be tested on a sample of participants and the results will be analyzed to evaluate its effectiveness in achieving the objective of improving typing skills of Arabic speakers.

1.5 Report Organization

Chapter Two: In this chapter, we delve into the important concepts and knowledge we have acquired during the course of this project. We also explore the external resources and primary challenges we faced while working on the project.

Chapter Three: In this chapter, we present a comprehensive literature review of existing studies and works related to our project. We analyze their strengths and weaknesses, and highlight how our project differentiates from them.

Chapter Four: The Methodology chapter presents an overview of the design and development process of the application. We discuss the mindset, approach and methods used to conceptualize and build the application. We also detail the features and technologies employed in the application.

Chapter Five: In the final chapter, we present the results of our project and the outcomes of our research. We also reflect on the lessons learned and opportunities for future developments. The chapter concludes with a summary of the main contributions of this work.

2. Constraints and Earlier Coursework

2.1 Constraints

2.1.1 Language support

Arabic text requires specific font support, Additionally, many web browsers do not support Arabic text by default, which can make it difficult for users to read the content.

2.1.2 Language-specific features:

The Arabic language has a unique set of characters and diacritical marks that are not present in other languages. Especially ligatures.

2.1.2 Lack Of Domain Knowledge

The development of certain functionalities required extensive search and consultation with experts in the field of front-end development and UI/UX design. As this knowledge is not always readily available, it adds an additional

layer of complexity to the development process, making it important to have a dedicated team with the necessary skills and experience to handle these challenges.

2.1.3 Inexperience

As this project involved designing an app from scratch for both front-end and back-end, it presented the challenge of working in a new domain and using new technologies. This led to the discovery of many unknowns and unexpected detours during the development process. We found ourselves experimenting with different approaches and solutions, some of which ultimately proved to be ineffective.

2.1.4 Lack of Data

Given the scarcity of resources pertaining to touch typing in the Arabic language, we were compelled to resort to studying and analyzing sample lessons from other languages, with the objective of adapting them to the Arabic context. This necessitated supplementary research and due diligence, to guarantee that the resultant material is both applicable and efficacious for Arabic speakers.

2.1.5 Lack of time

Time is a crucial element in any project, and its efficient management is crucial to the success of the project. The various aspects of the project such as research, testing, development, requirement gathering, planning and the time lost due to inexperience, all require time, and these time expenditures, regardless of how small they may seem, tend to accumulate rapidly. Therefore, the management of time is an essential aspect of the project, and its efficient use is vital to the successful completion of the project.

2.2 Standards and Code Practices

Some of the standards used in building this project are: REST Api , HTTP , GIT , Microservices arch and communication.

Code practices and design patterns: repository , Null object, observer , constructor injection

2.3 Earlier coursework

2.3.1 Object Oriented Programming

This course focuses on imparting the principles of Object Oriented Programming using Java. The knowledge and skills acquired through the course were applied in the backend development of this project, where Java was utilized. Additionally, the principles learned were also applied to C#, the programming language used in the .NET framework for backend development.

2.3.2 Database Design

Given that a vast majority of web and mobile applications rely on databases, the design and management of the databases played a crucial role in the project. This was particularly important in ensuring seamless communication between the various services within the application.

2.3.3 Distributed Operating Systems

The back-end of our system was designed as a distributed system, utilizing REST APIs and event-driven architecture. The web front-end was developed using the React Library. Some of these technologies and principles were studied and implemented in the course, specifically in the final project.

2.3.4 Software Engineering & Advanced Software Engineering

The concepts and principles acquired through these courses have a long-term value, as they are fundamental to software development. In this project, the code was version controlled using git and written in accordance with the principles of clean code and client-server architecture. We made sure to design the codebase with high cohesion and low coupling, which ensures that the code is easy to understand, maintain and scale.

2.3.5 Critical Thinking and Research Skills

The research and writing of this report were an integral part of the course, and it's one of the non-technical aspects that are essential in professional life, as it prepares students to present their ideas in a clear, concise and convincing manner. It is a skill that will have a long-term value and can be applied in various aspects of professional life.

3. Literature Review

Arabic Touch Typing is designed with the motive of providing a ca user-friendly and comfortable user experience, and of course there was applications that provide similar functionality, and we list them as follows :

3.1 Typing Club

Typing Club is a web-based application designed to help users improve their typing speed and accuracy through the technique of touch typing.

Advantages:

1. Interactive and engaging typing lessons and games.
2. Personalized lesson plans and progress tracking.
3. Regularly updated with new content and features.
4. Suitable for users of all skill levels, from beginners to advanced typists.
5. Have support for 13 different languages.

Disadvantages:

1. The free version may have limited features and access.
2. There is no support for the Arabic language.
3. You don't have full access to all their features with the free version.

3.2 Typing.com

Typing.com is a web-based typing tutor and an online keyboarding application that offers typing lessons and practice exercises for the users.

Advantages:

1. Available in multiple languages.
2. Regularly updated with new content and features.
3. Offers detailed and informative reports and typing certification.
4. Suitable for both personal and professional use, and widely used in schools and businesses.

Disadvantages:

1. Limited features and access on the free version
2. Ads on the free version
3. difficult typing certification process
4. Overwhelming or hard to understand reports
5. No support for the Arabic lunges.

3.3 What Distinguishes Arabic Touch Typing From Previous Examples?

Arabic Touch Typing as the name suggests was built with the main reason of introducing typing lessons for the Arabic language to increase the speed and accuracy of the users, and to create a small community where people can chat, post, comment ,create their own lesson, share it and learn from each other experiences.

4. Methodology

This section outlines the process and methodology employed in the selection of the project idea, the design of the logo, and the various stages of application development, culminating in the final product. It provides an overview of the steps taken and the decisions made during the course of the project, including the rationale behind them.

4.1 Choosing the idea

The idea for this project was chosen because of its relevance to the current need of Arabic users. Touch typing skills are becoming increasingly important in today's technology-driven society, especially for those who use the Arabic language on a regular basis. However, touch typing in Arabic is not as easily obtained as in other languages, mainly because of the unique characteristics of the Arabic language such as its writing direction and the presence of diacritical marks. Additionally, we found that there is a lack of resources and software specifically designed for teaching touch typing in Arabic. This inspired us to develop a tool that eases the learning process for Arabic speakers and improves their typing speed and efficiency. Furthermore, the project aligns with our interests and skill set as a team, which made it an ideal choice for us. The opportunity to apply the concepts learned in class and to develop a practical solution that addresses a real-world problem was an attractive prospect.

In summary, the idea for this project was chosen due to its relevance to the current need of Arabic users, the lack of resources available, and our team's interest and skill set.

4.2 Choosing the Architecture

4.2.3 the backend architecture

In this project, we decided to adopt a microservices architecture. This approach allows for flexibility, scalability, and increased fault tolerance. However, it also comes with its own set of challenges, such as increased complexity, latency, and security risks. In this section, we will discuss the advantages and challenges of using a distributed system with microservices architecture for the backend of this project.

4.2.3.1 The Call Graph
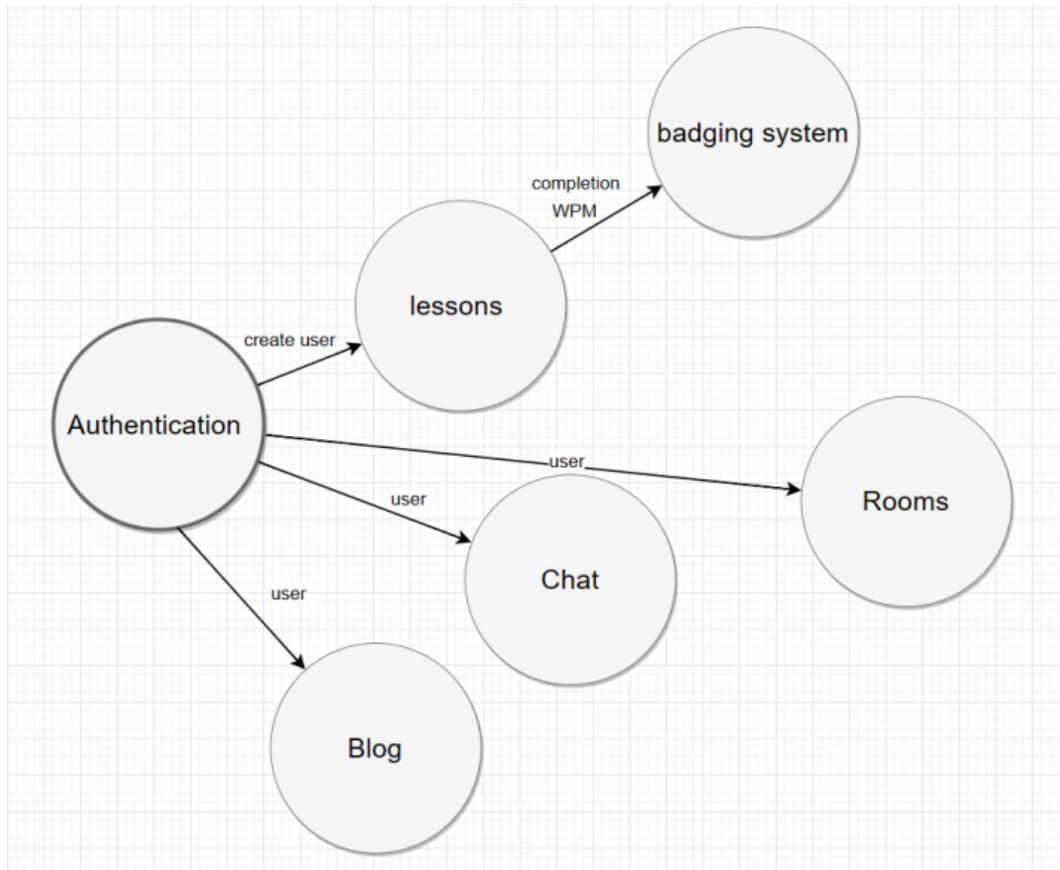
4.2.3 the frontend architecture

The component-based architecture in React development offers several benefits such as reusability, maintainability, testability, scalability, and flexibility. It can also improve performance by using a virtual DOM, and better organization of the codebase. Additionally, it allows for better collaboration among team members by breaking down the application into manageable parts.

4.3 Database Design

In our microservices architecture, each service utilizes its own individual database. This approach offers flexibility in terms of the type of databases used. For the Authentication, Lessons, and Rooms services, we chose to use SQL databases due to the nature of the data and its relationships. In contrast, we decided that NoSQL databases would be more suitable for the Chat and Blog services. Additionally, we utilized local storage to store the token.

4.4 System Features and Implementation

The app offers a wide range of features designed to maximize efficiency for the user. These features include:

4.4.1 Sign Up Page

 In this page 4.1, the user is prompted to provide basic information in order to create an account and gain access to the features offered by the application.

4.4.2 Sign In Page
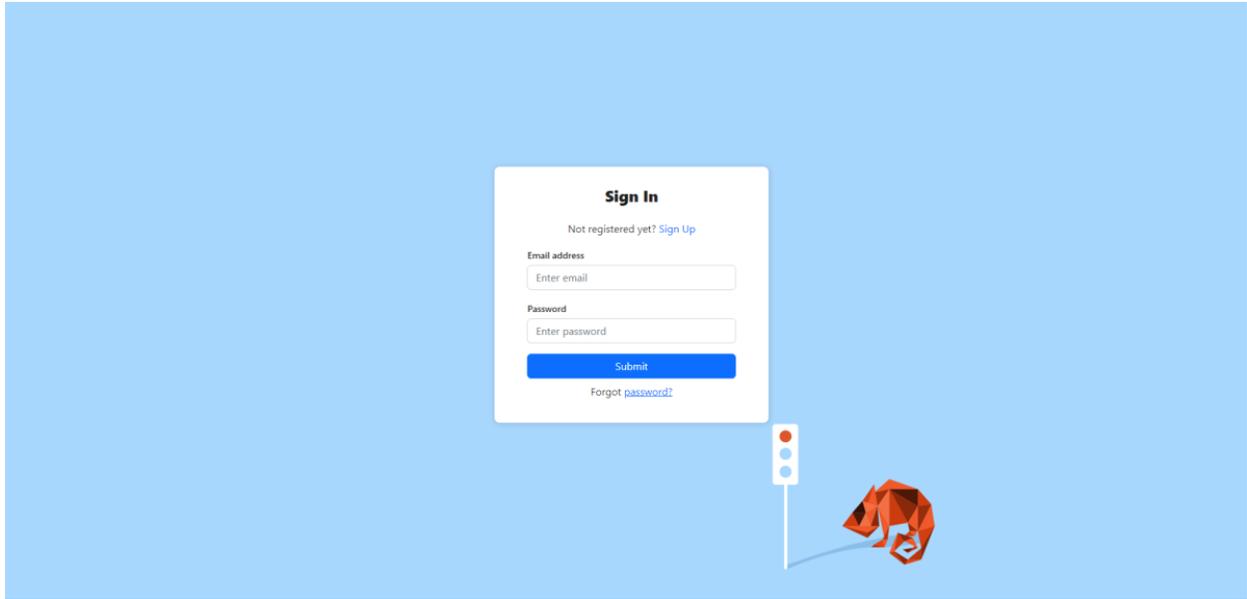
The login page serves as the entry point for the application. Users enter their username and password, or sign in to access the next page of the application.

4.4.3 Lessons Page
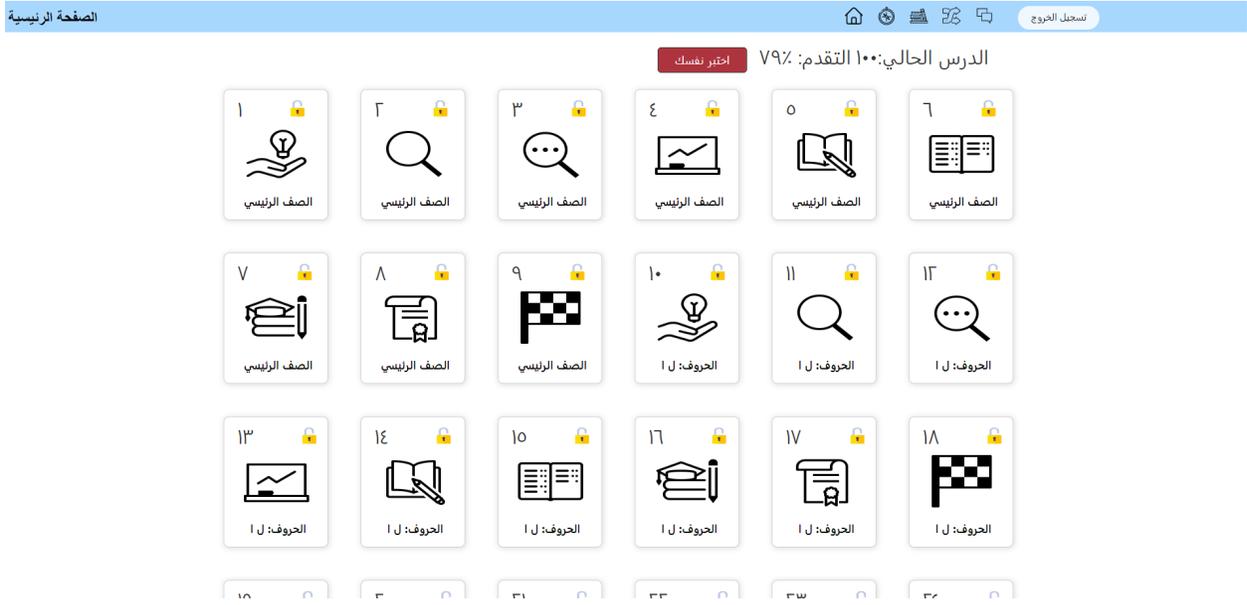
The lessons page displays a list of lessons, with only the first one available for the user to begin with. As the user completes each lesson, the next one becomes unlocked, allowing the user to progress in a specific order.theres an exam you could take to better measure your skill and open lessons according to it.

4.4.4 Lesson Example Page

شش سس يي بب تت نن مم كك

٩٠ ث
السرعة(كلمة بالثانية): 0

90 60 30 15
حرف كلمة

On the lessons page, the user is presented with a sentence to type and is shown a visual guide for finger placement on the keyboard. The page displays the user's words per minute (WPM) and the time remaining to complete the lesson. Additionally, an audio feedback is played for each correct input. There are three sound options to choose from, as well as the ability to select a theme and cursor style.

4.4.5 The Stats Page

شش سس يي بب تت نن مم كك

٩٠ ث
السرعة(كلمة بالثانية): 3
الدقة: % 44
الاحرف الصحيحة:7
الاحرف الخاطئة:6
الاحرف المفقودة:3
الاحرف كلها:16
السرعة(حرف بالدقيقة): 36

The stats page provides the user with a detailed breakdown of their typing performance including overall WPM, precision, number of correctly typed letters, number of incorrect letters and number of missed letters.

4.4.6 The LessonCompletionPopup
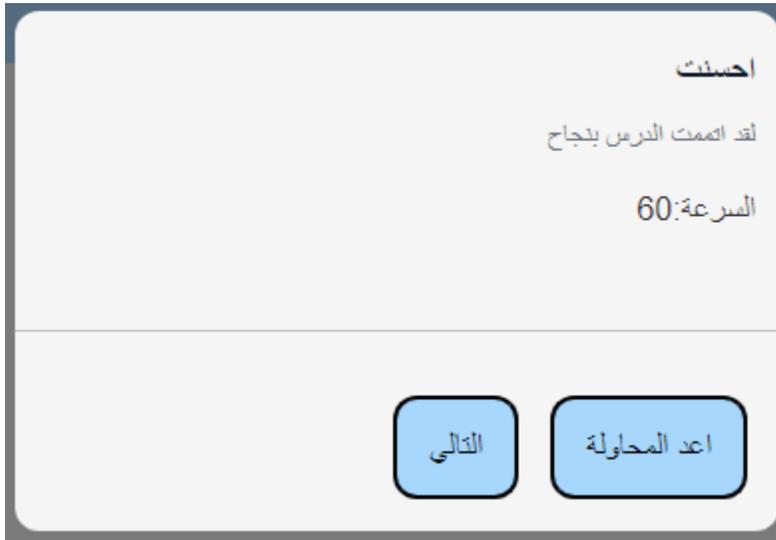
The LessonCompletionPopup component is triggered when the user successfully completes a lesson within the given time and without errors. It presents the user with the option to either stay on the current lesson or proceed to the next one.

4.4.7 Press The Button Game
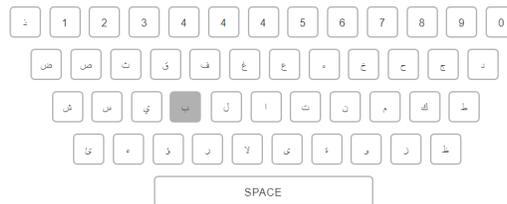
The ButtonGame component presents the user with random letters to type on the keyboard. When the correct letter is pressed, it turns green and an incorrect letter turns red. The user's performance stats, including accuracy and speed, are displayed below the keyboard along with a restart button.

4.4.8 User Page
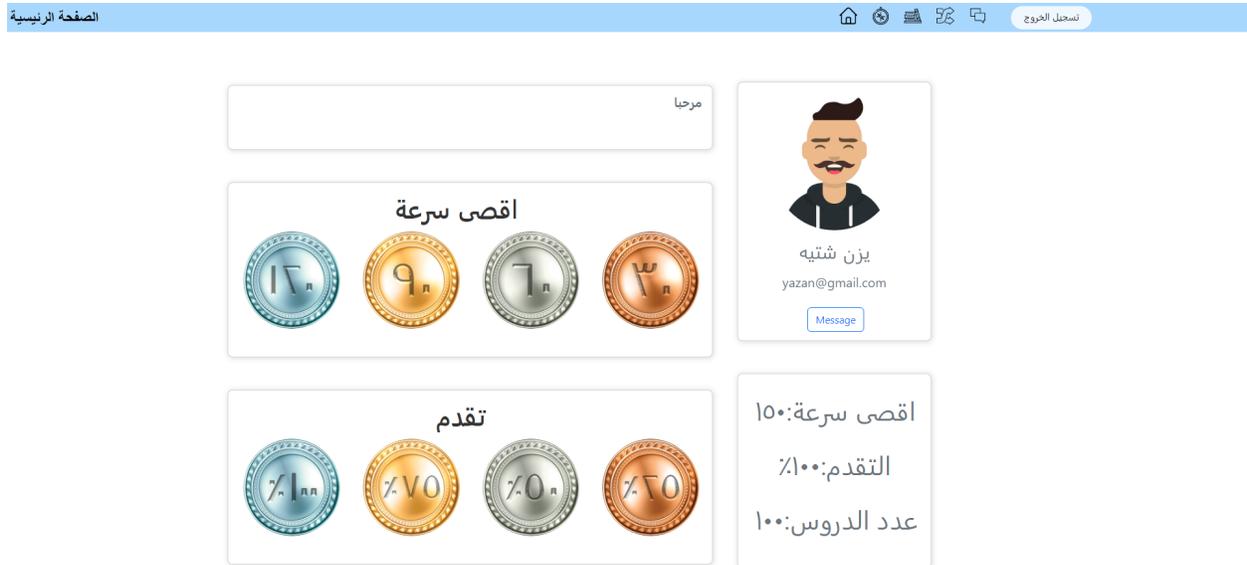
The Progress page offers the user an overview of their badges earned, their overall progress, and a signature status that includes WPM and the number of lessons completed.

4.4.9 Chat Page

The Chat component utilizes Firebase to enable real-time communication between users.

4.4.10 Blog Page
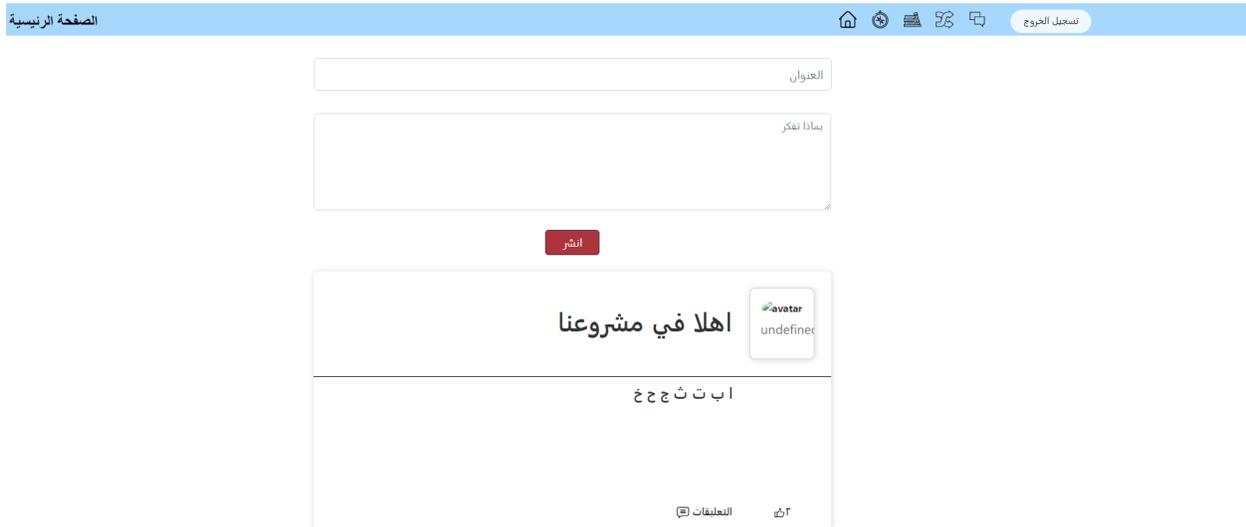
Creating a blog for the website can be important for a number of reasons. One of the main benefits is that it can serve as a platform for sharing valuable information and resources with users. This can help to establish the website as a credible source of information and can also help to attract and retain users.

4.4.11 Rooms Page

تسجيل الخروج

درس جديد	دروسي		فلتر: الأقدم
يزن شتيه	التكرار:١		١:السباحة
مجاهد محمد	التكرار:٢	٢:لسنحيمتنشيبتلنشكتبي لسبنميا حش تنبحت شجت شجتبيحخت حشبيال تحخ	
يزن شتيه	التكرار:٤		٤:بردان
يزن شتيه	التكرار:٥		٥:شسبشيب
يزن شتيه	التكرار:٦		٦:شسبشيب

The "User-generated Lessons" component displays a list of lessons created by other users that the current user can participate in.

4.4.12 Create Room Page

أضافة درس
اسم الدرس

النص الخاص بالدرس

الخصوصية: عام

تخزين   الرجوع

The "generate Lesson" component allows the user to generate a lesson by adding the topic and the body of the lesson and specifying its privacy.

4.5 Project Technology stack

4.5.1 Backend

The backend used is described in the methodology section, as for the technologies used
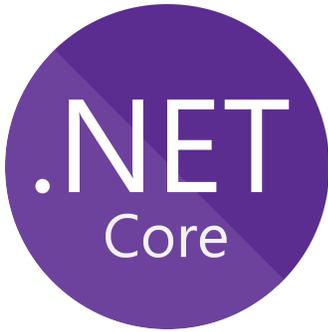
4.5.2 Frontend

The front used is described in the methodology section, as for the technologies used
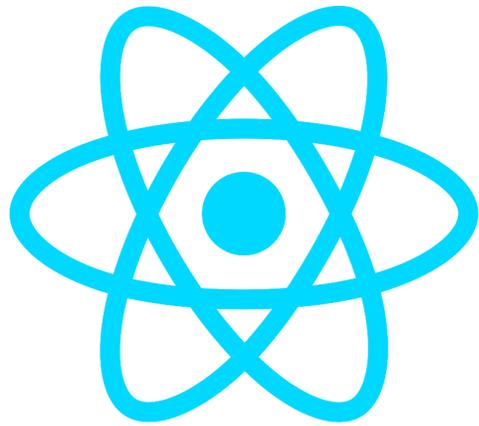
5. Results And Discussions

5.1 Data and Analysis

Creating this project required extensive data gathering and research. We utilized resources from other languages to create a set of lessons that are compatible with the Arabic language.

1	https://cdn.discordapp.com/att...	الصف الرئيسي	شش سس يي بب تت نن مم كك
2	https://cdn.discordapp.com/att...	الصف الرئيسي	تشنب شششسب كبيب ستتك
3	https://cdn.discordapp.com/att...	الصف الرئيسي	بستي كتيب نمكس شمكش
4	https://cdn.discordapp.com/att...	الصف الرئيسي	تنكبتي تنكبتي تشبيب تشبب
5	https://cdn.discordapp.com/att...	الصف الرئيسي	يكتتم يكتتم تسبين تسبين
6	https://cdn.discordapp.com/att...	الصف الرئيسي	تمتي تكمنين تكنسين كممت يشتت شنبت
7	https://cdn.discordapp.com/att...	الصف الرئيسي	منسكب يسكب سبتت نكشت تنسين تكشش
8	https://cdn.discordapp.com/att...	الصف الرئيسي	شمسي كيتت سبنت بيب
9	https://cdn.discordapp.com/att...	الصف الرئيسي	تنكمشين تمتسكن تيتسمين شنبت تنسمي تمسكتن
10	https://cdn.discordapp.com/att...	الحروف: ل ا	لل اا لل اا
11	https://cdn.discordapp.com/att...	الحروف: ل ا	ايام تاتب كيتب ااما
12	https://cdn.discordapp.com/att...	الحروف: ل ا	تامي سمشي متيس اشلا
13	https://cdn.discordapp.com/att...	الحروف: ل ا	لمست لمست انشلنان انشلنان
14	https://cdn.discordapp.com/att...	الحروف: ل ا	تماستا تماستا تكاسلتن تكاسلتن
15	https://cdn.discordapp.com/att...	الحروف: ل ا	لبنتم يكتال تمسلمتن تليسنان اشتيكتن امتلكي
16	https://cdn.discordapp.com/att...	الحروف: ل ا	كتلنا يتكالبن البسا يشلشلنان اكمن يشللنان
17	https://cdn.discordapp.com/att...	الحروف: ل ا	التباين الشمسي بلاي ستيشن الين الياباني
18	https://cdn.discordapp.com/att...	الحروف: ل ا	سايلتما بللتن استكتبت تماسكتم يتنابلان كاميالا
19	https://cdn.discordapp.com/att...	الحروف : ر ة	رر ةة رر ةة
20	https://cdn.discordapp.com/att...	الحروف : ر ة	بشرة ةتشر يسةر ةةرت
21	https://cdn.discordapp.com/att...	الحروف : ر ة	ررسل كريم ةلاا ةمةل
22	https://cdn.discordapp.com/att...	الحروف : ر ة	سرية سرية مكانة مكانة
23	https://cdn.discordapp.com/att...	الحروف : ر ة	مسية مسية مكران مكران
24	https://cdn.discordapp.com/att...	الحروف : ر ة	بسالة مباركة تشتية متبنة بكاة اسمررتن
25	https://cdn.discordapp.com/att...	الحروف : ر ة	سبابة سلامة ترتبلنان ترسبين تربكنان رممي

The figure above illustrates the diverse data collected and organized in a way that optimizes the learning process of touch typing.

6. Conclusion

  The project was successfully completed and all of the initial objectives were achieved,for the next stage, we will listen to the feedback of users and add new features such as a warning function and the ability to file complaints for posts. Overall, the application is now a valuable tool that can help users improve their touch typing skills in the Arabic language.

6.1 Summary

This project is an application designed to help users improve their touch typing skills in the Arabic language. The project features multiple visual demonstrations, such as a marker on the current letter and a region below the paragraph displaying the correct finger movement for each letter. Additionally, the application has been developed as a distributed system using REST APIs and event-driven style, and using React Library for the front-end. The application provides many varied features that have been structured to maximize the user's experience.

6.2 Improvements

The user experience could be further enhanced by incorporating additional lessons and games. User feedback post-launch would allow for continued improvement of the application.

6.3 Future Work

The user experience could be further enhanced by incorporating additional lessons and games. User feedback post-launch would allow for continued improvement of the application.

6.3.1 Text to Speech service lesson Type

Different types of lessons lead to more user engagement.

6.3.2 One handed typing

To users who can't type with both hands a visual representation for one hand.

6.4 Outcome

The outcome of this project was the development of a user-friendly application that helps users improve their touch typing skills in the Arabic language. The application features multiple visual demonstrations, such as a marker on the current letter and a region below the paragraph displaying the correct finger movement for each letter. Additionally, the application has been developed as a distributed system using REST APIs and event-driven style, and using React Library for the front-end. The application provides many varied features that have been structured to maximize the user's experience. The team also intends to incorporate user feedback to improve the application post-launch. Overall, the outcome of this project is a valuable tool that can help users improve their touch typing skills in the Arabic language.