



MAHGONIX GAMES

“From idea to reality”

LEXICROSS

PROJECT STATUS REPORT

PREPARED BY

2019510004-MUSAB ALBARGHOOTH

2020510110-SHAKHOBIDDIN URINOV

2020510121-GÜLNAZ HİLMİOĞLU

2020510158-ALİ ÖZGÜR İNEP

2021510082-HALİL İBRAHİM İRAN

May, Izmir

CONTENTS

1.	44
1.1	Project Overview.....4
1.2	Progress4
2.	Error! Bookmark not defined.
2.1	Daily Challenge.....7
2.2	User Progress Tracking.....7
2.3	Authentication System.....7
2.4	Leaderboard.....7
2.5	Premium Membership.....7
2.6	Profile and Settings.....7
2.7	Multi-language Support.....8
2.8	Hint System and Feedback.....8
3.	98
3.1.	User Information (User Data).....9
3.2.	Premium Membership Information (Premium Membership Data).....9
3.3.	Puzzle Progress and Game Data10
3.4.	Security and Verification Data10
3.5	Usage Habits Data.....11
3.6	Data Security and User Rights.....11
4.	1212
4.1	Advertising Revenue (AdMob).....12
4.2	Premium Subscription13
4.3	Sponsors.....14

5. Always Online Resources

Needed.....	Error! Bookmark not defined.	15
5.1 Real-Time Database (Firestore).....		15
5.2 Authentication (Firebase Authentication).....		15
5.3 File Storage (Cloud Storage).....		15
5.4 Notification Service (Firebase Cloud Messaging).....		15
5.5 Usage Tracking (Firebase Analytics).....		16
5.6 Privacy and Data Security.....		16
5.7 Scalability.....		16
5.8. Income and Infrastructure Cost Model.....		16
6. Advertising on Google Ads.....		20
7. SCREENSHOTS OF FIGMA.....		22

1. INTRODUCTION

LexiCross, designed to offer an educational experience for both Android and iOS platforms, and engaging puzzle based mobile application. The application is a mobile game that aims to improve users' vocabulary, general knowledge and daily problem solving skills with well structured and interactive puzzles.

The main purpose of Lexicross is to teach new words and concepts in a fun way by integrating educational content such as famous places, idioms and thematic word groups into the game. Users are exposed to different types of puzzles that serve as both entertainment and mental education.

The project is now complete and all the important functions such as dynamic puzzle engine, daily difficulty system, user authentication, cloud-based data synchronization and premium feature set have been implemented and tested. The user interface has been developed using Figma, adhering to modern mobile design standards and accessibility guidelines. This allows the application to be available to a wide user base, including teenagers, adults.

LexiCross encourages daily participation through a rotating challenge system, tracks user progress with detailed statistics, and provides a secure and synchronized user experience through Google OAuth integration. After all, the application was created not only to provide a fun and competitive environment, but also to provide a meaningful learning experiment for users of all ages.

1.1 Project Overview

LexiCross is a modern and accessible crossword puzzle application developed with the aim of entertainment with education in a mobile environment. The project focuses on delivering an intuitive, engaging, and scalable platform that appeals to wide users, helping them improve their language skills and cognitive performance through structured word challenges.

The primary mission of LexiCross is to support daily vocabulary development and mental

stimulation by an interactive gaming experience. Users are offered a variety of puzzle categories and difficulty levels, all enhanced with educational content. The design is built around the principles of gamification, where users are rewarded through achievements, rankings, and premium content.

From a development perspective, LexiCross was built with scalability, usability, and accessibility as core priorities:

The application backend uses Google Firebase services (Blaze Plan) to manage real-time data storage, user authentication, media content delivery, and push notifications—all with minimal operational overhead.

Cross-platform compatibility has been achieved using technologies that support both Android and iOS, and the design was tested with feedback from multiple user groups, including teenagers and older participants.

Key features such as Daily Challenges, User Progress Tracking, Leaderboard Rankings, and Premium Subscription System have been completed and integrated. The app also supports multi-language operation , broadening its usability and market reach.

1.2 Progress

1.2.1 Interface Design

The user interface of Lexicross was designed entirely in Figma, which allowed us to create a modern, responsive and visually clean layout for mobile devices.

Important screens such as the main puzzle page, daily challenge screen, authentication/login screen, user profile and leaderboard are designed with accessibility and usability in mind. We have implemented consistent color palettes, understandable font styles and smooth transitions between screens. To improve the user experience, we have also added interactive elements such as hint buttons, animated feedback on correct/incorrect answers, and a progress bar.

1.2.2 Functionality

At Lexicross, we have focused on developing features that are both useful and easy to interact with.

The main functions that we implement include:

1. **Daily Challenges:** A new puzzle appears every day. When the user opens the application, he can directly access the "Daily Challenge" section and compete for a high score.
2. **User Progress Tracking:** The application keeps track of completed puzzles, how many mistakes the user made and how much time it took. This helps users to see their development over time.
3. **Authentication System:** Users can log in with Google or register with an email. This way, their progress is saved even if they change their devices.
4. **Leaderboard:** After solving a puzzle, users can see how their scores compare to others. This adds a competitive aspect to the game.
5. **Hint and Error Feedback:** When solving puzzles, the system checks every input. If it is incorrect, the application shows a small feedback animation. Users can also use hints if they get stuck.
6. **Premium Features:** Users who purchase the premium version will not see ads and will not have access to extra tips and visual themes.

All these functions have been carefully planned and tested to make sure that they work smoothly together. We tried to keep everything simple for the user, while making sure that the application is interactive and rewarding.

1.2.3 Internal Testing and Improvements

Since we didn't have the opportunity to do testing with real end users, we focused on internal testing within the development team. During development, we regularly tested the application ourselves to check for usability issues, functional errors and design consistency.

We used Figma prototypes to simulate user interactions and tested various user flows, such as:

Login

Starting and solving a puzzle

Viewing the leaderboard

Accessing the profile and settings screens

Each team member tried the app from a user perspective and shared notes about pieces that felt confusing or could be improved. Based on these internal reviews, we have made the following updates:

- Improved screen transitions for a smoother flow decoupled between menus.
- Balanced color schemes and contrast for better readability, especially on smaller devices.
- These improvements helped us create a cleaner, more functional experience, even without external user feedback. We plan to collect user feedback in future versions after the general release in order to continue developing the application.

1.2.4 Last Controls and touches

When we reached the final stage of the project, we did some general checks and completed the small details that were missing before we completely finished the implementation. Our goal was to make sure that LEXI CROSS works smoothly and offers a smooth experience to the user.

First of all, we tested all the screens of the application one by one. We checked whether each button worked correctly, whether the transitions between pages were smooth, and whether the data was saved decently. We have reviewed all the streams from the login screen to the profile page from start to finish.

2. Feature Set

LexiCross is designed to provide both a fun and meaningful experience to users through various features that support learning, competition, and personalization. Below are the main features we developed as part of the project:

2.1 Daily Challenge

Every day, the app offers a new puzzle that users can solve to earn points and compare their results on the leaderboard. This feature motivates users to come back regularly.

2.2 User Progress Tracking

The app keeps track of how many puzzles the user has completed, how long they took, and how many mistakes they made. Users can view their improvement over time in the profile section.

2.3 Authentication System

Users can sign in using **Google** or create their own account with email. This ensures that their data is saved and synced across devices.

2.4 Leaderboard

After completing a puzzle, users can see how their score compares with others. This adds a competitive element and makes the game more engaging.

2.5 Premium Membership

Premium users can play without ads, get unlimited hints, and access exclusive puzzle themes. The premium system was integrated with in-app purchases through Google Play and App Store.

2.6 Profile and Settings

Each user has a profile page where they can view their achievements, update personal info, and change app settings like language or font size.

2.7 Multi-language Support

The app currently supports both **English and Turkish**, making it more accessible to different users.

2.8 Hint System and Feedback

During puzzle solving, users can ask for hints. The system also shows feedback if the answer is incorrect, helping users learn from their mistakes.

3. Data to be Collected

In the LexiCross application, some data is collected in order to make the gaming experience better, to track the progress of users and to ensure the correct operation of the system. This data is used only to support the functions of the application; it is not shared commercially or without permission in any way.

As stated in the application's SRS document, data security and user privacy are among our first priorities. Therefore:

A Privacy Policy page has been added to the application,

Users now also have the right to permanently delete their data from within the application.

Below, we explain in detail what data we collect, how we get this data, for what purpose we use it, and what these data do in the system.

3.1. User Information (User Data)

How Do We Get It?

When the user first logs in to the application, he/she registers via Google account or email. Using Firebase Authentication: E-mail address, User name, Profile picture (optional), The user ID (UID) given by the system is retrieved.

What Are We Using It For?

To define a special account for each user,

To ensure the synchronization of data between devices decoupling,

To introduce the user on the profile page and leaderboards.

The Value Component:

This information allows us to individualize the personal experience of users. For example, when a user logs in on a different phone, their old data can be restored. In addition, the username appears in the leaderboards, so social competition occurs.

3.2. Premium Membership Information

How Do We Get It?

When the user purchases a premium membership through Google Play or the App Store, the system transmits this information to us and it is written to the Firebase database.

What Are We Collecting?

Information about whether there is a premium

Start and end dates of membership

Membership type (monthly/annual/lifetime)

What Are We Using It For?

Remove ads

Activating premium content such as unlimited tips, special themes

To perform revenue tracking and user satisfaction analysis

The Value Component:

This data ensures the sustainability of the application. At the same time, it provides the user with a more professional and ad-free experience.

3.3. Puzzle Progress and Game Data

How Do We Get It?

As the user solves a puzzle, the system automatically: Solved puzzles, The time spent, The number of errors, The tips used records.

What Are We Using It For?

Showing the user's progress (on the profile screen) , Preparing daily challenge rankings , Creating a leaderboard , Managing the personal reward system,

The Value Component: Thanks to these data, the user can see their own development, become motivated and the desire to return to the application increases. At the same time, the system can offer a fairer competitive environment.

3.4. Security and Verification Data

How Do We Get It?

The system is automatically installed at each entrance: Time and date of entry, Device information used, Login method (Google or email?) receives information such as.

What Are We Using It For?

To use in account recovery operations , Detecting multiple or fake accounts Protecting leaderboards.

The Value Component: This data ensures that the application provides a fair and safe environment. At the same time, the data can be easily restored in case of account loss.

3.5 Usage Habits Data

How Do We Get It?

With Firebase Analytics, user movements within the application are tracked. For example:

Which puzzles are played the most?

Which screen do you spend more time on?

How many entries are made per day?

What Are We Using It For?

Analyzing which features are liked, Improving or removing underused sections, Planning new updates according to user habits.

The Value Component: This data directly affects the development of the application. An application that is updated according to user habits is more preferred and loyalty increases.

3.6 Data Security and User Rights

All data is stored in encrypted format in the Firebase Firestore.

Data transfer is made secure with HTTPS/TLS protocol.

User data can only be viewed by authorized services.

Credit card or paying information is never stored in the app; all transactions are made by Google and Apple stores.

The Privacy Policy has been added to the application.

The user can permanently delete his/her account and all data from the application settings.

4. Possible Ways of Revenue

The LexiCross application is designed as both an educational and fun game. However, there are some costs to be able to maintain such a mobile application in the long term. For example, infrastructure services such as server costs, data storage, user login, hosting of media files and notification services require a certain fee every month.

For this reason, instead of offering the application only for free, we have planned some revenue models that do not force the user, but will ensure the continuity of the system.

Our Aim: The application covers its own costs, Supporting the development process,
It provides a more comfortable experience for users who do not want to be exposed to ads.

In this section, we will explain one by one the methods by which LEXICROSS can make money. We have developed different strategies considering both free users and premium users.

4.1 Advertising Revenue (AdMob)

The main revenue model developed for free users in LEXICROSS is the Google AdMob advertising system. In this way, the application can generate revenue through ads on the developer side while providing free service to the user.

Two types of advertising are used in the application:

Interstitial Ads: Short full-screen ads that are shown when each puzzle is completed.

Rewarded Video Ads: Award-winning ads that the user can earn tips by watching on demand.

The user experience is not impaired because ads are shown at convenient times, not during the game. Advertising impressions and revenue calculations will be discussed in detail in the next section.

4.2 Premium Subscription

We have developed a premium membership system for users who do not want to watch ads on LEXICROSS or want to take advantage of more features. Thanks to this system, users can use the application in a more convenient and customized way.

The Advantages of Premium Membership:

Ad-free gaming experience

Unlimited use of tips

Special themes and background music

Access to premium-only puzzles to be added in the future

In this way, both a valuable experience is provided to the user and additional income is provided to the project.

Types of Membership

It was planned to offer 2 different packages to users according to different budgets and usage habits:

Monthly Membership: A short-term premium experience with a low entrance fee

Annual Membership: A more economical package for long-term use

All payments are made securely through Google Play or the Apple App Store. No credit card information is kept on the developer side. When paying is completed, the system saves the user's premium status to the Firebase database and premium features are activated instantly.

The premium membership system was added both to improve the quality of the application and to provide an alternative option for users who do not want advertising.

4.3 Sponsors

Sponsorships or collaborations with brands related to word games can provide additional income opportunities.

5. Always Online Resources Needed

The LexiCross application is a system that works constantly online (always online) so that users can solve puzzles every day, save progress information and keep the leaderboard up to date. In order to meet this need, the entire infrastructure of the application is built on the Firebase platform.

In order for a mobile application to work safely, quickly and sustainably, the following components must necessarily be included in the infrastructure:

5.1 Real-Time Database (Firestore)

In LEXICROSS, data such as puzzles completed by users, mistakes made, time spent on solving and clues are stored in real time in the Firestore database.

Rationale: This structure is mandatory in order for the data to be constantly updated, synchronized with other devices and for the leaderboards to be updated instantly.

5.2 Authentication (Firebase Authentication)

Users log in to the app with a Google account or email. This is done with the Firebase Authentication service.

It is necessary for the protection of the user's personal data, for the provision of synchronization between different devices and for the provision of a special experience for each user.

5.3 File Storage (Cloud Storage)

Media files used in the application, such as background music, audio cues, and themes, are hosted using the Cloud Storage service.

Rationale: It is used to keep the file size of the application light and to present media content to the user quickly.

5.4 Notification Service (Firebase Cloud Messaging)

The notification system is used to remind users that new puzzles are coming every day. This is done with Firebase Cloud Messaging (FCM).

Rationale: It is important to ensure that the user returns to the application regularly in order to increase the number of daily active users.

5.5 Usage Tracking (Firebase Analytics)

Information such as which screens are used more in the application, at which steps users leave the application, is monitored by Firebase Analytics.

By understanding user habits, analysis is performed to improve the application's weaknesses and plan new features.

5.6 Privacy and Data Security

In LexiCross, all data is transferred over secure connections using the HTTPS/TLS protocol and stored with AES-256 encryption. There is also a privacy policy page within the application, and users can completely delete their data if they want.

It is necessary to comply with legal regulations such as GDPR, KVKK and to increase user trust.

5.7 Scalability

Thanks to the Firebase infrastructure, the application can serve a high number of users without installing a server or container.

As the application grows, it should continue to provide services without loss of performance. Firebase provides this automatically.

5.8. Income and Infrastructure Cost Model

Blaze Plan Cost Analysis for LexiCross

Scenario: 15,000 Daily Active Users

In this scenario, it is assumed that the application reaches 15,000 active users per day. At this level of usage, Firebase's free Spark Plan becomes insufficient, and the Blaze Plan must be used.

Usage Assumptions (15,000 Daily Users)

- Each user:
 - Solves 1 puzzle per day
 - Performs 20 database reads and 10 writes
 - Logs in and updates their progress
- 1 GB of media content (music, sounds) is hosted in the app
- Push notifications are sent daily

Estimated Monthly Cost (Firebase Blaze Plan)

Service	Monthly Usage	Pricing	Estimated Cost
Firestore Reads	$15,000 \times 20 \times 30 = 9,000,000$ reads	\$0.06 / 100,000 reads	\$5.40
Firestore Writes	$15,000 \times 10 \times 30 = 4,500,000$ writes	\$0.18 / 100,000 writes	\$8.10
Cloud Storage	$15,000 \text{ users} \times 0.1 \text{ MB} \times 30 = 45 \text{ GB}$	\$0.12 / GB	\$5.40
Authentication	$90,000 \text{ sessions} - 10,000 \text{ free} = 80,000$	\$0.01 / 1,000 verifications	\$0.80
Push Notifications	$15,000 \text{ users} \times 30 \text{ days} = 450,000 \text{ msgs}$	Free and unlimited	\$0.00
Total			\$19.70

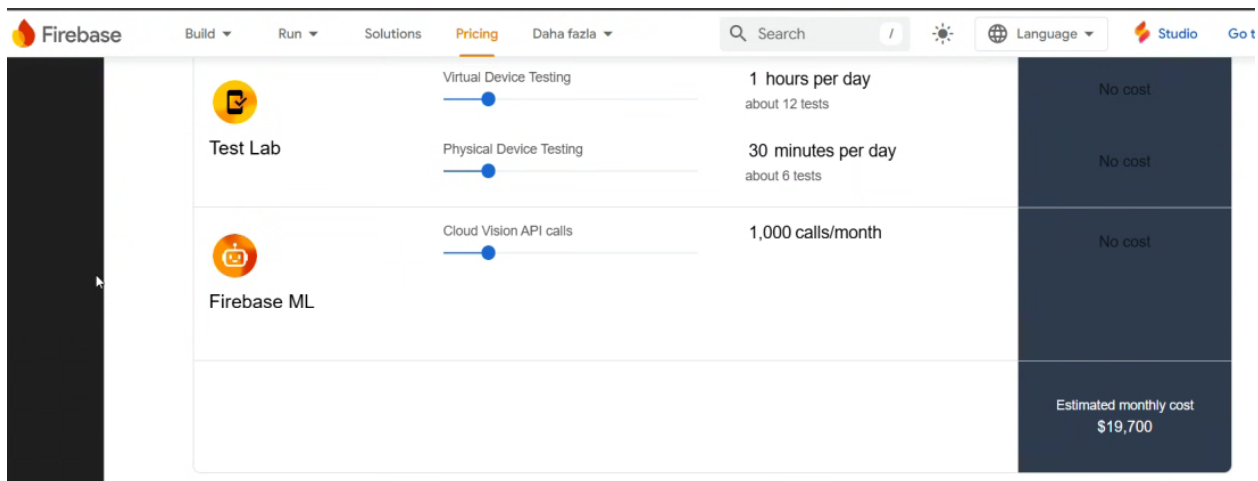


Figure 1: Firebase Pricing for Google Ads Integration

Evaluation

- Firestore and Authentication are charged per usage but remain affordable.
- The 45 GB download scenario assumes that the app uses sound and music files.
- Push Notifications are completely free regardless of user count.
- Despite the high activity, total cost remains under \$20/month.

LexiCross is Ready to Scale with Blaze Plan!

Even with 15,000 daily active users, LexiCross operates at a sustainable cost of approximately \$19.70/month using the Blaze Plan.

With this setup, real-time database operations, authentication, media handling, and notifications can run reliably and efficiently.

This scenario demonstrates that LexiCross is technically and economically scalable and ready for growth.

LexiCross – AdMob Revenue Model (Based on 15,000 Daily Users)

LexiCross uses Google AdMob as its revenue model. A realistic scenario was created using the two most common ad formats in mobile games.

Ad Types and Impressions

In LexiCross, two types of advertisements are used to generate revenue from non-premium users:

a) **Interstitial Ads:**

These are full-screen ads that appear at the end of a puzzle. On average, each user views 1 interstitial ad per day.

b) **Rewarded Video Ads:**

These are optional video ads that users can choose to watch in exchange for hints during gameplay. On average, each user watches 0.3 rewarded videos per day.

Based on 15,000 daily active users, the estimated total number of ad impressions per day is as follows:

Interstitial Ads: $15,000 \text{ users} \times 1 \text{ ad} = 15,000 \text{ impressions per day}$

Rewarded Video Ads: $15,000 \text{ users} \times 0.3 \text{ ad} = 4,500 \text{ impressions per day}$

These impression numbers are used to calculate monthly ad revenue using AdMob eCPM values in the revenue model.

AdMob eCPM Values

In LexiCross, two ad formats are monetized: **interstitial ads** and **rewarded video ads**. Based on average eCPM rates in Türkiye, we calculated the monthly revenue as follows:

Interstitial Ads: These full-screen ads appear at the end of each puzzle. The average eCPM (earnings per 1,000 impressions) for this ad type in Türkiye is between \$1.50 and \$3.00.

With 15,000 impressions per day, the monthly estimate is:

$$15,000 \text{ impressions} \times 30 \text{ days} \div 1,000 \times \$2.00 \text{ eCPM} = \$900$$

Rewarded Video Ads: These are optional videos shown to users in exchange for in-game hints. Their average eCPM is higher, around \$4.00 to \$6.00.

With 4,500 impressions per day, the monthly estimate is:

$$4,500 \text{ impressions} \times 30 \text{ days} \div 1,000 \times \$5.00 \text{ eCPM} = \$675$$

Note: eCPM means the expected revenue per 1,000 ad impressions.

Total Estimated Monthly AdMob Revenue

By combining both ad formats:

Interstitial Ads generate approximately \$900/month

Rewarded Video Ads generate approximately \$675/month

Total estimated monthly ad revenue: \$1,575

Firebase Blaze Plan Cost (for 15,000 Users)

To support 15,000 daily active users on Firebase Blaze Plan, the infrastructure cost is calculated to be approximately \$19.70 per month.

Net Monthly Profit (Ad-Based Model)

When we subtract the infrastructure cost from the ad revenue: \$1,575 (AdMob revenue) – \$19.70 (Firebase cost) = \approx \$1,555.30 net monthly profit

LexiCross can earn **over** \$1,500 per month in profit using just AdMob advertisements with 15,000 daily users.

Rewarded video ads, in particular, offer high monetization potential while maintaining a positive user experience since they are optional.

6. Advertising on Google Ads

A promotional campaign has been launched via Google Ads to increase the number of users of LEXICROSS. The following titles have been selected to reach people looking for word games in the campaign: mobile puzzle game, word game download, brain developer games, offline puzzle game etc.

Ads are automatically displayed in Google Search, YouTube, Gmail and mobile applications. The system works "conversion-oriented", that is, ads are directed to users who are likely to upload.

The recommended daily budget is between 197₺ – 295₺ . The campaign optimization score is currently at 94%. In the first stage, the goal is to increase the awareness of the application and provide more downloads.

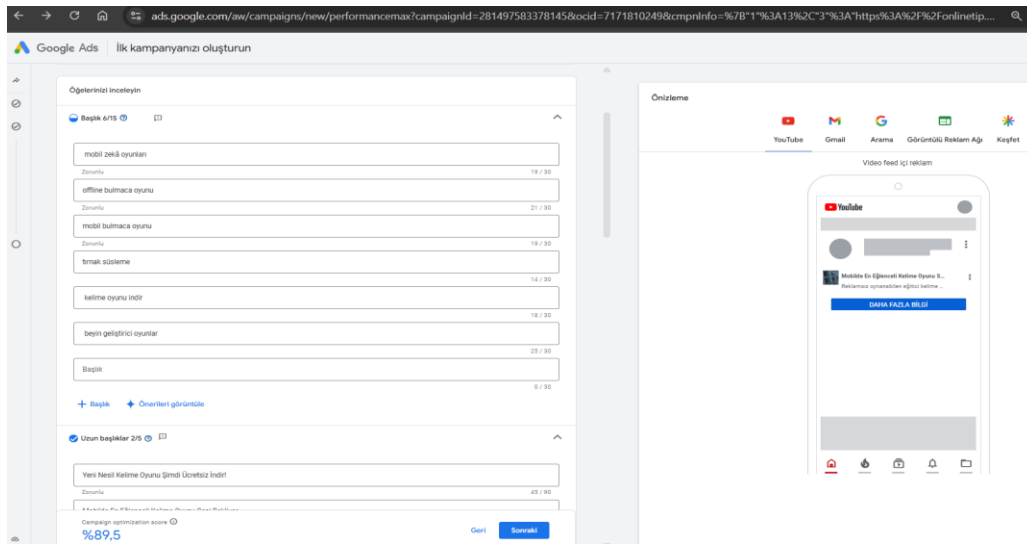


Figure 2: Google Ads – Ad content and preview screen

Google Ads | İlk kampanyanızı oluşturun

Maks. Performans

İşletme bilgisi ekle

Kampanyanızı oluşturun

Hedef seçin

Arama temaları ekle

Reklam oluşturun

Teklif stratejisi belirleyin

Bütçe belirleyin

Ödeme ayrıntılarını girin

Günlük ne kadar harcama yapmak istersiniz?

Bütçeyi aşmadan kampanya hedefinize ulaşın

Bütçe belirleyin

Zorunlu

Hesabın türü	Ortalama günlük bütçe	Hesabın türü
Hesabın türü	Ortalama günlük bütçe	Hesabın türü
265	4295.54	42.068.78

☐ 4246.28 Önerilen
 ☐ 8197.02
 ☐ Özel bütçe ayarlayın

Aylık olarak, günlük bütçenizin bir ayın ortalama gün sayısı ile çarpımından daha fazla harcama yapamazsınız. Bazı günlerde günlük bütçenizden daha az, bazı günlerde ise günlük bütçenizin iki katı kadar harcama yapabilirsiniz. [Ortalama günlük bütçe hakkında daha fazla bilgi](#)

Geri Sonraki

Figure 3: Google Ads – Daily budget setup screen.

SCREENSHOTS OF FIGMA



Figure 1 Logo Page

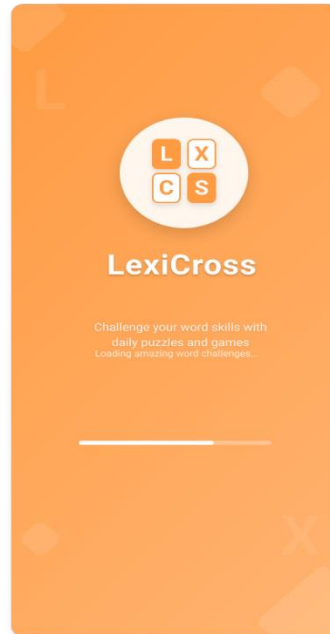


Figure 2 Game Page

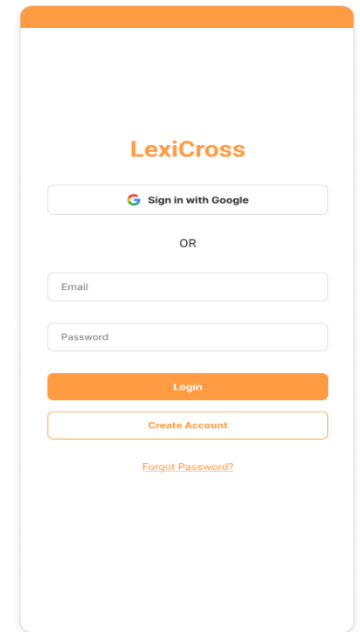


Figure 6 Login Page

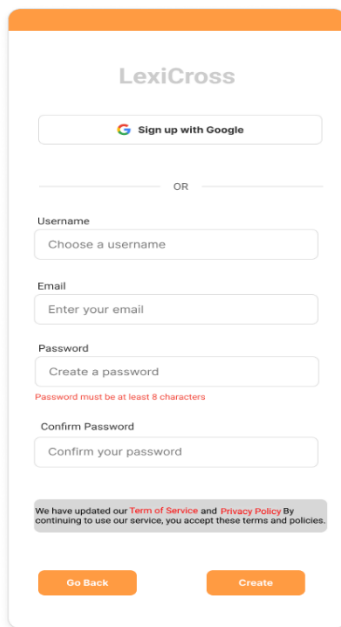


Figure 4 Create account Page

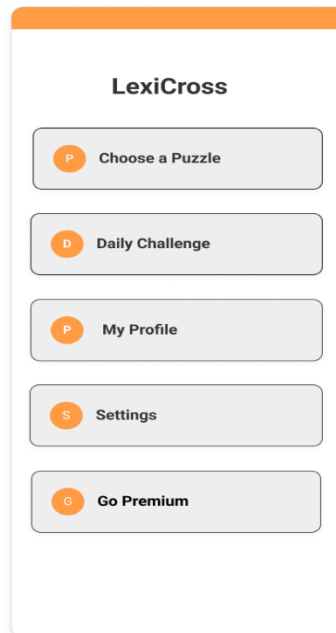


Figure 5 Main Page

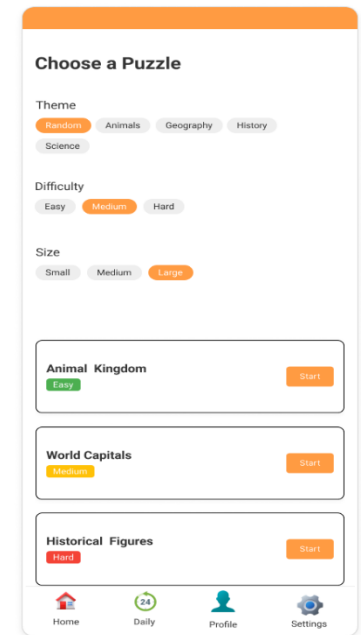


Figure 6 Game board Page

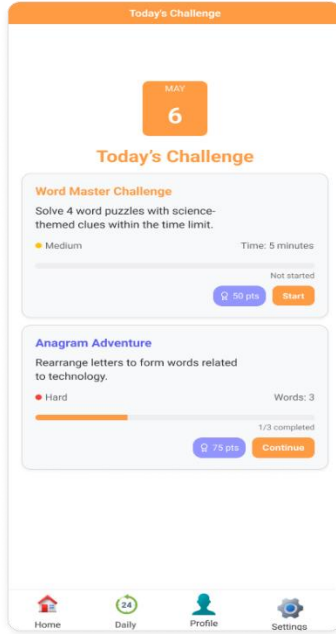


Figure 7 Today Challenge Page

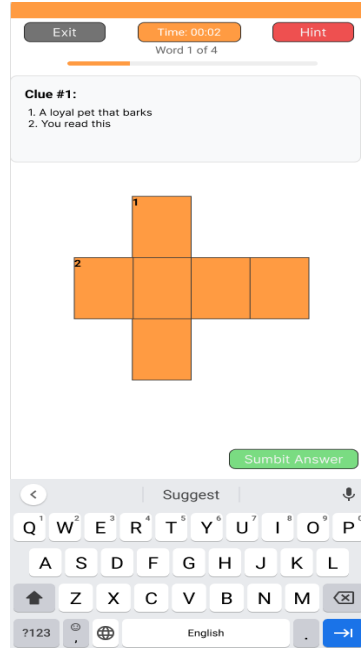


Figure 8 1.Level Game Page

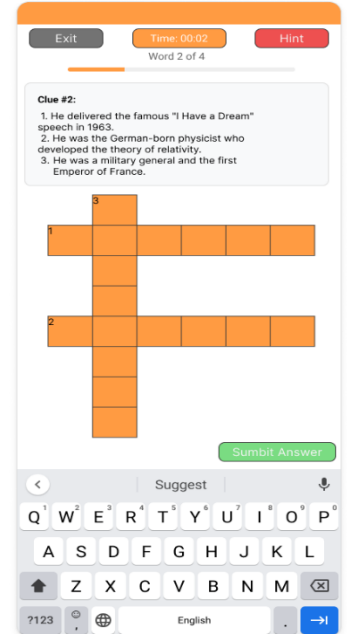


Figure 9 2.Level Game Page

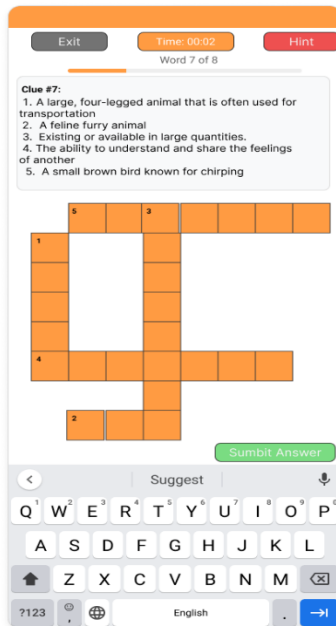


Figure 10 3.Level Game Page

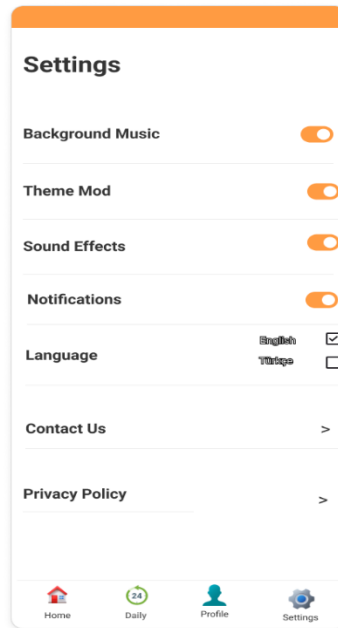


Figure 11 Setting Page

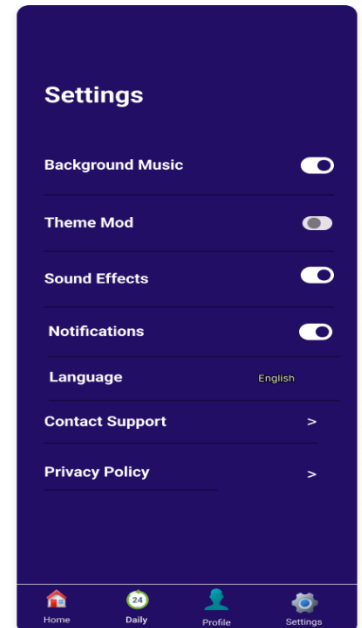


Figure 12 Dark Mode Page

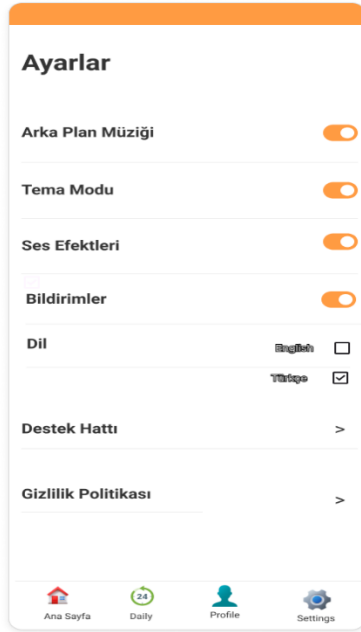


Figure 13 Turkish language Page

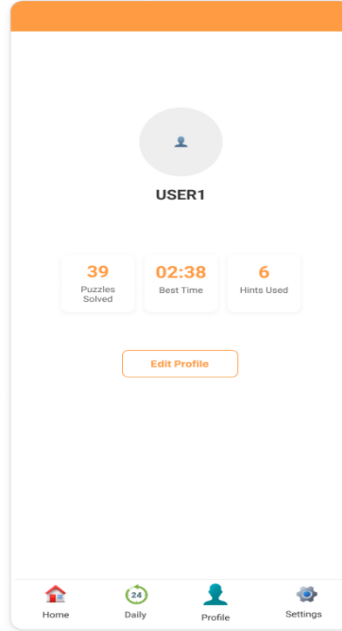


Figure 14 Profile Page

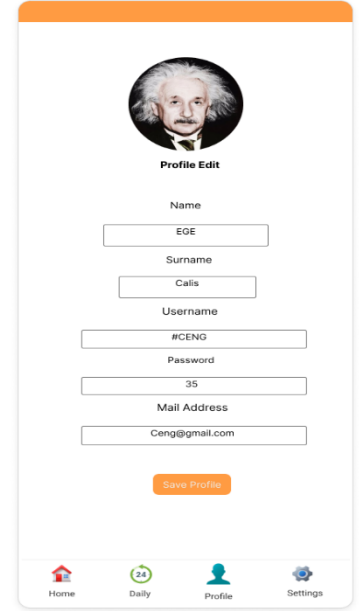


Figure 15 Edit Profile Page

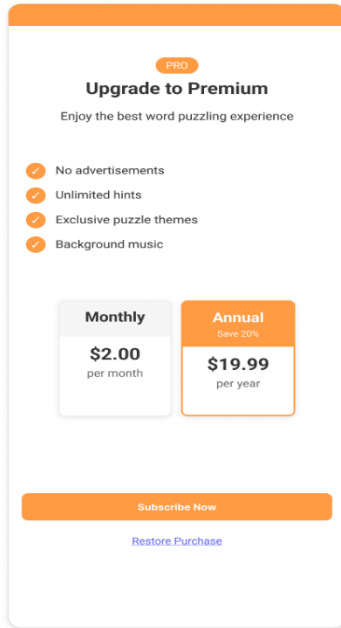


Figure 16 Premium Page

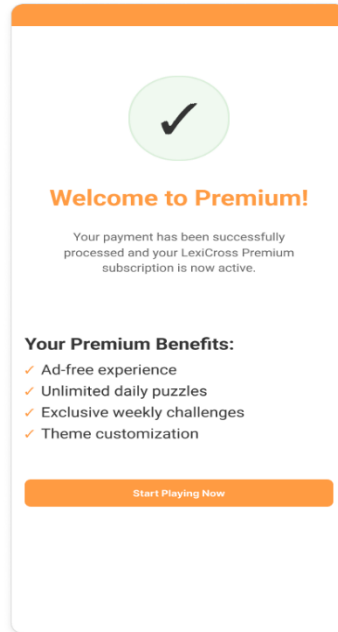


Figure 17 Premium 2 Page

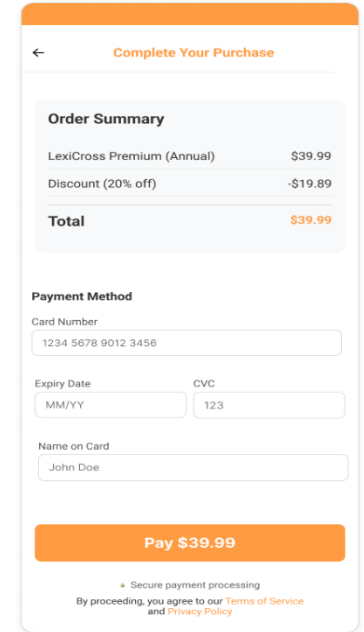


Figure 18 Payment Page



Figure 19 ADS Page

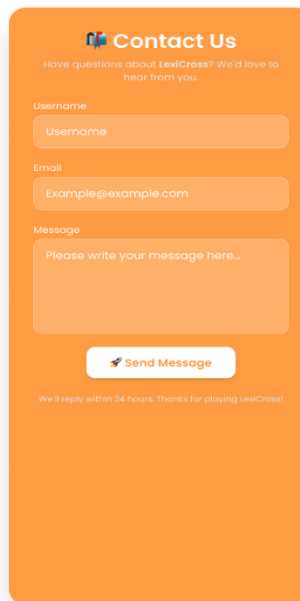


Figure 20 Contact Page

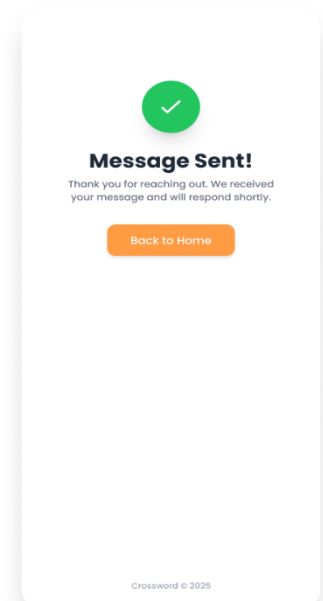


Figure 21 Confirmation Page

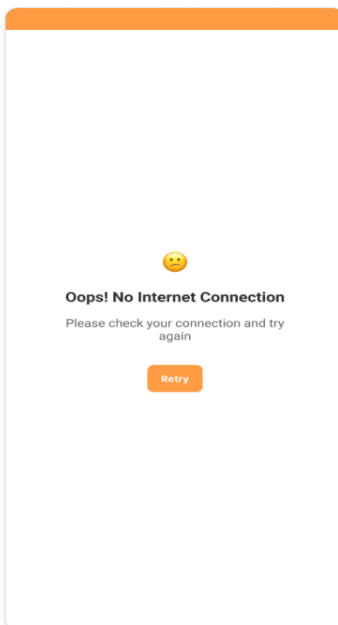


Figure 22 Error Page

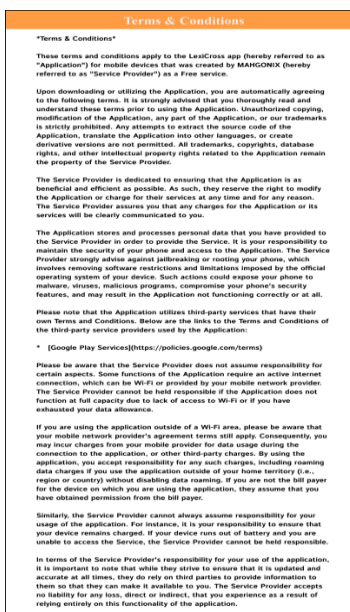


Figure 23 Term & Conditions Page

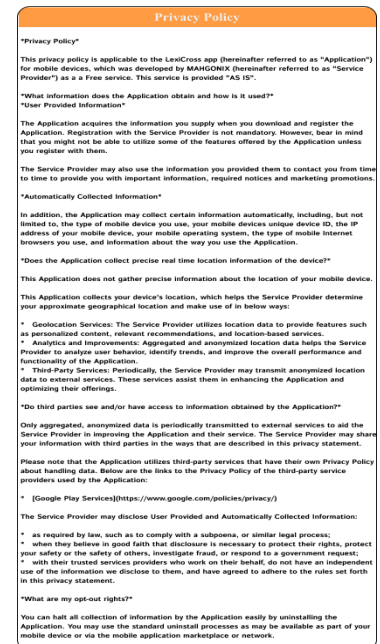


Figure 24 Privacy Policy Page