Utilizing Firebase for Application Development

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Abstract— For the development of user applications that require internet based datastore and authentication functionality, Google Firebase serves as a flexible, highly abstracted solution. This paper analyses the various services Firebase offers and their effectiveness in realizing a solution to common features required in today’s user applications.

Keywords— Firebase; Google; Database;Real-Time;Authentication;Internet;JSON

1. Introduction

With the fast-paced and ever changing nature of application development, producing flexible, scalable software is an essential factor in lasting success. As of recent years, there has been a growing trend of developing consumer software as a web based application which consequently has created an increased demand on robust backend solutions.

While developing one’s own backend services for their intended application is a viable option, it requires significant up-front effort and frequent maintenance - both of which inhibit development teams from placing their focus on the functionality of the application at hand. For start-ups and development teams with limited resources, Firebase makes integrating backend features into an application quick and simple by providing developers with a plethora of tools and services to help them develop high-quality apps, grow their user base, and increase profit [1]. This prevents the need to build many of these common tools from scratch, allocating development resources to craft a great user experience.

Additionally, it has technologies that can be integrated into the application that will help its growth through referrals, linking, and more. It has an easy-to-use Advertising API that can be dropped into the application to start earning, and importantly, the whole platform is tied together by analytics [2]. Firebase services can be divided into three pillars: Develop, Grow and Earn as shown in Fig. 1.



Fig. 1 A chart illustrating the various services that Firebase offers and the pillars they are grouped under

This paper will focus heavily on the Develop pillar, as its goal is to provide a comprehensive outline on how to leverage these various tools and services for application development. It will be organized into four main sections: Authentication, Real Time Database, Storage, and Crash Reporting. Each of these main sections will contain a detailed overview and guidelines to integrating these features into the application. Finally, there will be a Conclusion section that ties everything together.

1. Authentication

Writing a custom authentication system is a task that requires extensive development resources, as it must be extremely secure, handle all edge cases, conform to industry standards, and subsequently thoroughly tested. Firebase Authentication abstracts all of these implementation details through an API that supports OAuth 2.0 and provides both login and sign up services via (email/phone)/password, Google, Facebook, Twitter, GitHub, and others. It integrates directly with the Realtime Database service so data access can be restricted to authenticated users.

The state of a user can also be monitored by attaching a listener to the current user of the application, which allows authentication state to persist across application terminations and launches. This eliminates the repetitive task of requiring the user to log in every time the application is launched. Firebase Authentication also provides additional convenient services such as email/text verification, password resets, and user credential management – all of which can be implemented directly into the application.

1. Sign Up

As mentioned previously, creating new Firebase users can be accomplished in a multitude of ways, but for the sake of simplicity we will look at the traditional approach of creating a user via email and password. The typical workflow involves collecting the email and password information from the user interface and then passing it into the code snippet displayed in Fig. 2.

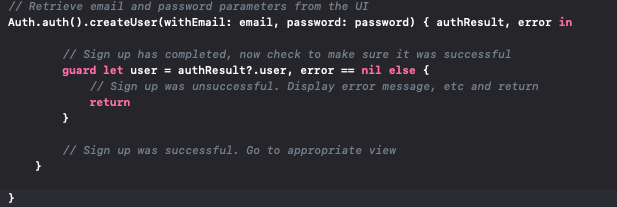


Fig. 2 SignUpViewController.swift: A code snippet highlighting the user sign up procedure

1. Sign In

Users can be authenticated via any of the credentials that they specified during sign up, but again for the sake of simplicity we will use email and password verification. The workflow to sign in is nearly identical to that of sign up, the only difference being that a Firebase user object is returned in the callback illustrated in Fig. 3.

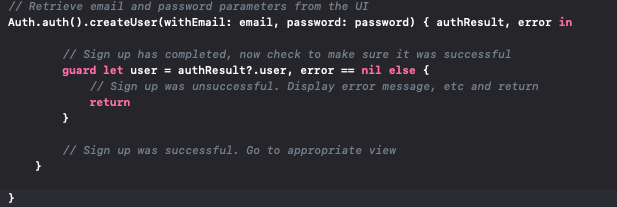


Fig. 3 SignInViewController.swift: A code snippet highlighting the user sign in procedure

1. Authentication State Persistence

Firebase listeners allow the application to be notified of any events that take place at a certain location. Using this feature we can listen for any changes to the authentication state of the current user and then act accordingly. In iOS applications, the AppDelegate essentially serves as the highest level of logic for the application and executes whenever the application is launched. A simple approach shown in Fig. 4 is to create this listener in the AppDelegate, and then segue to the sign in view if the current user logs out/doesn’t exist, or segue to the initial view if the user exists and is logged in.

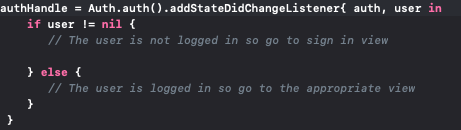


Fig. 4 AppDelegate.swift: A code snippet depicting attaching a listener to perist authentication state across app launches/terminations

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TABLE I  
Font Sizes for Papers

|  |  |  |  |
| --- | --- | --- | --- |
| Font Size | Appearance (in Time New Roman or Times) | | |
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| 8 | table caption (in Small Caps),  figure caption,  reference item |  | reference item (partial) |
| 9 | author email address (in Courier),  cell in a table | abstract body | abstract heading (also in Bold) |
| 10 | level-1 heading (in Small Caps),  paragraph |  | level-2 heading,  level-3 heading,  author affiliation |
| 11 | author name |  |  |
| 24 | title |  |  |

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Fig. 1 A sample line graph using colors which contrast well both on screen and on a black-and-white hardcopy

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Fig. 2 Example of an unacceptable low-resolution image



Fig. 3 Example of an image with acceptable resolution

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* example of a web page in [7]
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1. Conclusions

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Causal Productions wishes to acknowledge Michael Shell and other contributors for developing and maintaining the IEEE LaTeX style files which have been used in the preparation of this template. To see the list of contributors, please refer to the top of file IEEETran.cls in the IEEE LaTeX distribution.

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1. Geeky Ants, “An Introduction to Firebase,” *Hackernoon*, Dec. 2017.
2. L. Moroney, “An Introduction to Firebase,” *The Definitive Guide to Firebase*, pp. 1–24, 2017.