

African Journal of Co-operative Development and Technology
Volume 4, No.1 June, 2019

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Serverless Apps: A Google-drive-based Sacco Management System

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Abstract

This paper describes a cloud-based SACCO Management Application System. It provides the design parameters, the programming features and the deployment process of the system. The motivation is to avoid server-based applications which require heavy investments and instead ride on the secure google cloud-based services for the development and deployment of the system. Google Drive was chosen as the hosting web server, where the Google Sheets, Docs, and Forms were customized to provide safe on-site data and templates for data capture and processing. While the system is entirely dependent on google cloud apps, the user is provided with a mobile App which directly connects to the google sheets for individualized reports and formatted member information. The user only needs to use a device which senses gmail login in order to provide SACCO information at a click of a button. Both data capturing and visualization processes are managed in a single web interface, bringing easy-to-use benefits to end users. The concept has been implemented with an existing SACCO and has provided adequate level of automation to the SACCO management. The SACCO management board is now able to track in real time the activities of the SACCO and retrieve ready-made reports at a click of a button. The system developed in this research has potential applications in helping upcoming SACCOs implement secure Information Systems for Data capturing, client management and instant provision of reports without being worried about server space and domain name costs.

Keywords: SACCOs, Serverless, Google Apps, management, data capture

AJCDT, Vol. 4 No. 1 (June, 2019), pp. 36 – 40, © 2019 The Co-operative University of Kenya

INTRODUCTION

With technology advancement, Google has provided the globe with several applications that include Google Drive which acts more like the operating system/storage pocket for; Google Docs, Google Spreadsheets and Google Forms. These applications are offered for free, with the drive having upto 15GB of free disk space for ordinary uses that is expandable though subscription. Some of these limits in ordinary accounts are increased for google education bundle and business bundle. Services are also provided by google including API services that enable

passing and exchange of data from google apps to external apps and back. In addition, Google provides a Scripting language known as Google Apps Script (GAS) that has enhanced additional functionalities in various Google Applications (Ferreira, 2014). GAS enables manipulation of data within an application, movement of data across applications, sharing of Google apps, display of information in web Apps, Permission changes among others. By exploiting and combining the power brought to us by Google in all these apps and services, it was possible to develop a Management System

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for SACCO and with combination with other technologies developed a mobile application for members' access. This paper therefore discusses the technologies involved and describe how to collectively use them in realization of this System.

The **objectives** of the paper are threefold: (1) to analyse the technologies and services available from Google; (2) to design a SACCO management system; and (3) to Implement the SACCO Management system.

Technology Developments: The tradition for Management Systems has been centered on a client - server architecture that utilize resources like server for hosting. This involves development of the system using a server-side language like Java, Python, PHP etc and client-side technologies like Css, Javascript etc. Developed system is then hosted in private hosting or using the hosting companies to make it accessible to the public. This hosting is expensive to maintain especially when it is done privately as cyber security and other threats are increasing rapidly. Procuring a server, maintaining power and bandwidth is another nightmare that companies face when adopting this approach. Google has been in the market for quite some years now. During this period, the developers have developed applications and services that can help companies, especially SACCOs. The most significant application that was of great use in this project was Google Spreadsheet. This resembles microsoft excel document with a few variations. The beauty with its use is realized in the transparency, security and ease of use it brings. When combined with other apps and services using GAS, it brings out a complete system.

DESIGN METHOD

Google spreadsheet offer different access levels based on user permissions. The rights ranges from owner to viewer. These access levels ensure that different users have/acquire different authorization based on their role in the system. The system can be accessed by many users using these levels, but the

spreadsheet is majorly for administrative use. It is used to provide the following functions by administrators:

- Loan form generation with the necessary system recommendation for the applied loan;
- Member progress status review in form of loan and deposit payments;
- Reports Generation (Trial Balance, Sacco Summary etc.);
- Users Management;
- Sending Invitations, Members Financial Status in the SACCO, Warning on Defaulting and Underpayment to members registered emails etc;
- Auditor's reports.

Google app script together with other client-side technologies are used to implement a web application that allow members to access their accounts using their registered emails. This access requires that the member login to their browser user to access using their Gmail accounts submitted to the sacco. This serves as the authentication and authorization for the user accessing the service. The mobile app implemented combine the use of react native and javascript to embed the web application. This enable development of the android mobile application that is used by sacco members (Snyder, Myer, & Southwell, 2010).

Hardware requirements: No Host is required as everything settles at Google drive.

Software requirements:

- Browser preferable google chrome
- Node.js
- Editor (Sublime text, Atom, Android studio, SDK etc)
- Google Apps (Email, Drive, Docs, Forms, APIs etc)
- Languages (Google App Script, React native, Javascript, Html, Css, JQuery, JSON, Google sheet functions etc.)

EXPERIMENTAL RESULTS

Below is an image of the mobile app interfaces from the developed prototype (Figures 1 to 4).

SYSTEM ARCHITECTURE

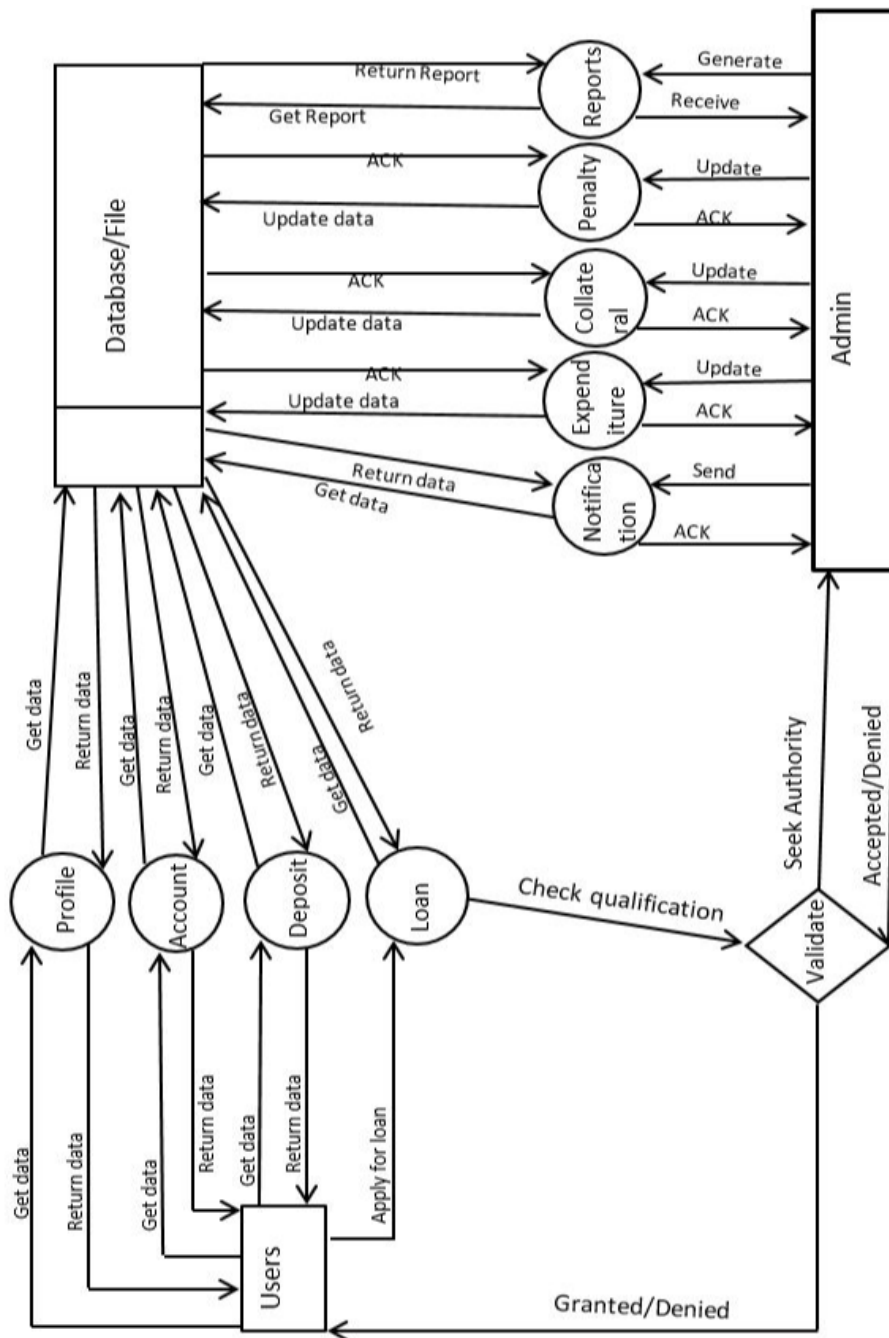


Figure 1: Data Flow Diagram of the Sacco System

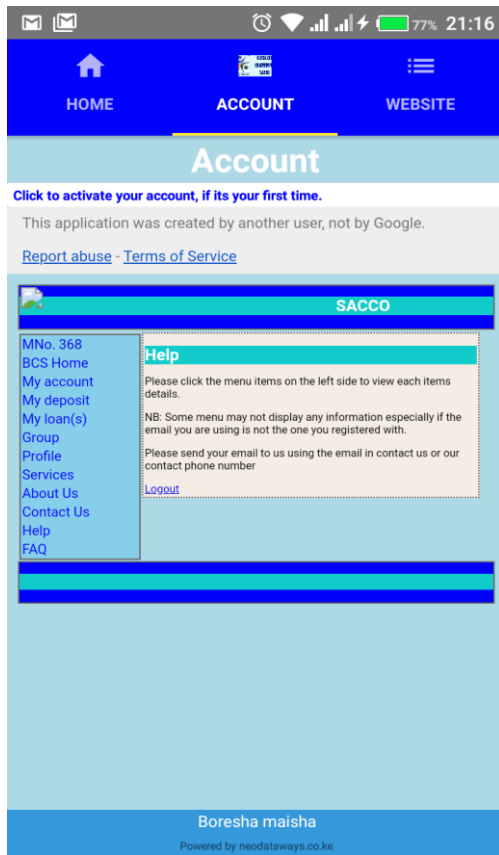


Figure 2: Mobile Interface my Account Help page

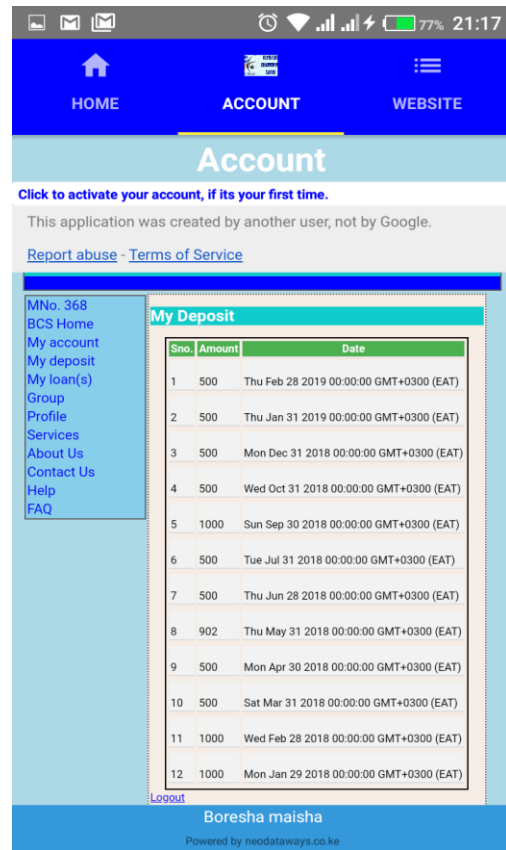


Figure 3: Mobile Interface my Account Deposit page

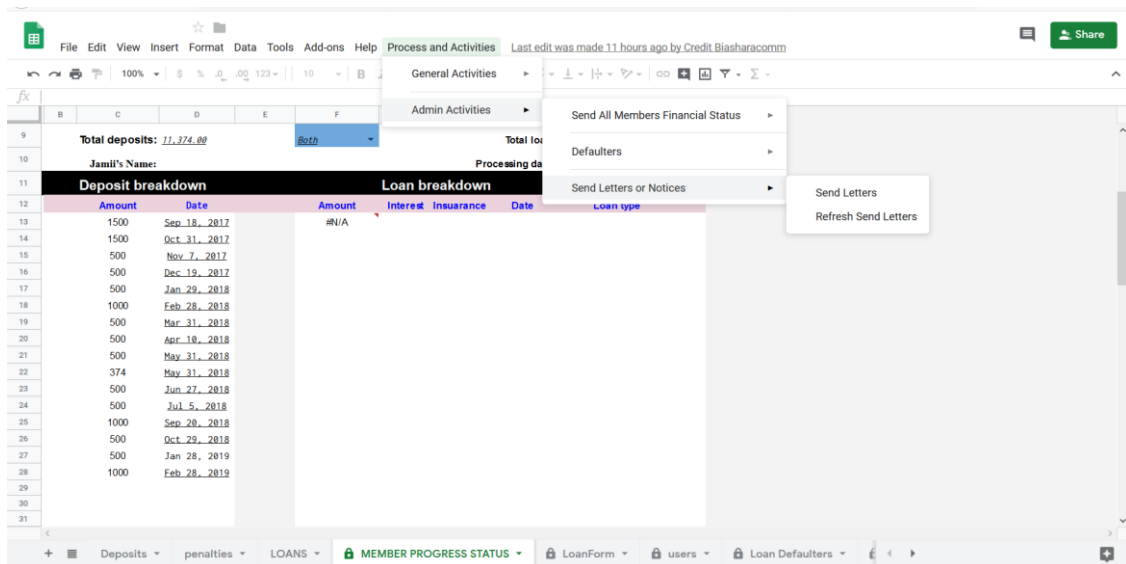


Figure 4: The google spreadsheet template.

DISCUSSION

Google has provided the development world with various technological tools and services that developers can heavily utilize. Our research discovered this power and made use

in development of the sacco system. Google has always offered more secure services that are reliable and transparent being the most used service provider for Google Maps, Emails etc. Availability of google Drive

offers some free online space that is used by users to store their documents in a safe online space. Google Spreadsheet is fully furnished with functions that facilitate storage of data, computation, and reporting. These technologies served as a propeller to development of our system. Google spreadsheet is used to capture all data and transactions made, in it there are several sheets that serve different roles like holding data for deposit, loan, penalties etc; computing and reporting like members status report, trial balance, defaulters etc. This spreadsheet forms the baseline for the system as all information is derived from the data contained here. Loan application form is generated here, this does the necessary computation to determine if the loanee qualify for the amount applied for based on the group savings and saving culture. The backbone for the access to resources by members, processing invitation and other notifications and provision of flexibility has been the use of a scripting language called Google App Script. This language sits at the backend of the spreadsheet and offers access to data contained is based on the specified parameters in this case to the members, the email address is used. This language is used in the sending of notifications, status and invitations to members' emails based on various reports on the system. Google app script in combination with HTML, JSON, Css, Javascript and JQuery are used to develop a web app for the system (Phang, 2015). This is accessible by members using ordinary browsers.

The mobile app is made using React native and Javascript to implement a mobile application for the members. This is an android version though the language can still be used to generate an IOS app.

This system requires no local hosting, this gives us a free, secure and reliable serverless system. The entire set it may be looked at as Platform as a Service (PaaS) (Krintz, 2017) because Google equipped us as developers with proprietary APIs to make the SACCO application which is managed by their environment.

CONCLUSION

Google technologies and services are free, secure and reliable. The system developed using them have such benefits and therefore offer equivalent if not better services. Using google spreadsheet and other technologies mentioned, it is possible to come up with a suitable Sacco system that is publicly accessible, secure, verifiable and transparent. The system developed from these technologies combination a serverless system is archived which offers efficient and effective services.

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