

# Management Information System

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**Abstract:** This research paper is about the modelling and construction of Management Information System with the help of MERN stack. The MERN stack consist of MongoDB, Express.js, React and Node.js. This MIS (Management Information System) is specially designed for IMOs and the Govt. of India. The schema modelling is flexible and it can be used by almost every loan providing govt. agency. For deploying the application, the database used is MongoDB and the server used is Heroku. The entire system can be integrated with Docker to reduce the development setup time. The application comes with built in feature that allows the admin to send messages to the loan-bearing group.

**Keywords:** Management Information System, React MIS.

## 1. Introduction

In this paper, we will explain the reasons, methods and models used to create the Management Information System with the help of MERN stack. The technologies used are selected after doing some research about their performance and the mentioned technologies are well documented. Let's discuss the reason to develop this application.

Since we all know that India is going through its worst economic growth phase due to corona pandemic. The Govt. of India has announced relief package to pull the country out from this slowdown. There is a need for a platform where people of medium and small enterprises can come and ask for loan from the Govt. The proposed solutions will not only capture information related to loan beneficiaries, but it will also provide a robust document verification mechanism. The application will help in reducing a lot of paper work time by integrating Database of registered NGOs. Proposed application will come with a friendly user interface along with a data dashboard and will have following features:

1. The application will capture all necessary information as mention in the problem statement like Aadhaar details, Bank Account information, Demographic details, Age, Income Level and Literacy level. This information will be saved and further displayed on the data dashboard.
2. The Document verification process will be done by integrating sample data in the application. This will not only help in keeping a proper track record of the loan bearing groups but also decrease the total paperwork time for the Governing body.
3. The verification of the (Intermediary Organisations) can be done by using sample Database.

4. The sanctioned amount detail, instalment details and the transaction Id will be properly saved and displayed on the dashboard.
5. Facility of informing the beneficiaries through SMS will also be provided.

The document proof images should be uploaded in the MongoDB and the conversion of image to string should be done by a node package called formidable.

The server side framework used is called Express.js and is clubbed with the MongoDB for the database management.

- The schema definition should be done in such an order so that the form filled can have multiple level of validation and checks.
- The code backup and the version control management is done through the GitHub.
- The deployment of server code and the frontend should be done in separate containers.
- The password should be encrypted before saving and the encryption tool should have good community support on NPM.
- The POST request should have validation function inside it.
- The API should be locked properly, to prevent unauthorized access.
- The Keys used in application should not be uploaded anywhere and there should be a separate .env file to manage it.

The technological stack used in building this application are given table 1.

Table 1

Technology	Use Case
Mongo DB	Handling DB Services
Express.Js & Essential NPM Packages	Application Server
Git and Heroku	Build and Deploy tools
HTML, CSS, JS	Desktop browser extension design
Mentioned APIs (Digi Locker & ngodarpan.gov.in)	For Document Verification process
Parse Dashboard	For Data Visualization.

List of NPM packages

- Express.Js
- Body-Parser
- Cookie-parser

- dotenv
- Express JWT
- CORS
- Twilio
- Nodemon
- Formidable
- Mongoose
- Express-validator

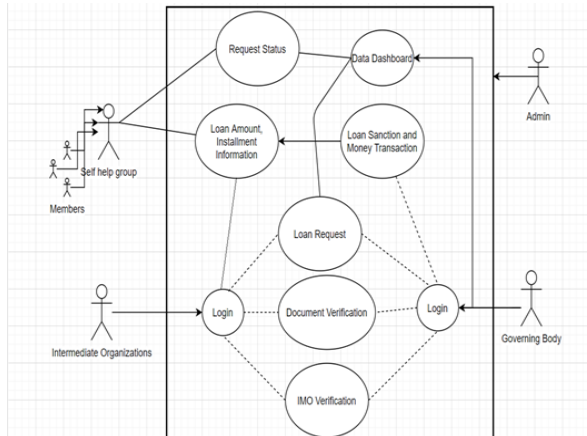


Fig. 1. Usecase diagram

#### Use Case:

The use case diagram given below explains the relation between the intermediate organizations, Governing body, Self Help Groups and Admin of the application.

- The Loan Sanctioning process, IMO verification and the transaction of the amount will be managed by the governing body.
- The verification process will be done by the mentioned APIs during the review period.
- People of the self-help groups can see the request status and loan amount sanctioning information on the portal without any issues.
- The admin will have all the controls of the application.
- The data Dashboard will be only visible to the Admin as well as the Governing Body.

#### A. Node vs. PHP

*Same Language across the Stack:* Node.js will be the correct choice to use if your project involves software stacks such as MEAN stack (MongoDB, ExpressJs, AngularJs.), dynamic single page applications, server side technologies and Front end technologies like Angular Js, Backbone.Js or React Js. This makes it easier to have the same language (Javascript) across your whole stack.

*Realtime Data:* Node.js is great for applications that require real time data, however I would be skeptical about using Node.js for financial applications as Javascript itself is not reliable when it comes to numbers as everything is integer or float and not much separation is done between the types. A more type safe language is recommended when working on financial applications that require lot of computing or a library

that is reliable enough.

*Speed:* Node.js is much faster than PHP when it comes to execution speed, if speed is what you require for your application, such as a browser based multiplayer game or a chat application, Node.js is a great choice than PHP.

#### B. Why to use React

Now, the main question arises in front of us is why one should use React. There are so many open-source platforms for making the front-end web application development easier, like Angular. Let us take a quick look on the benefits of React over other competitive technologies or frameworks. With the front-end world-changing on a daily basis, it's hard to devote time to learning a new framework – especially when that framework could ultimately become a dead end. So, if you're looking for the next best thing but you're feeling a little bit lost in the framework jungle, I suggest checking out React.

#### C. Simplicity

ReactJS is just simpler to grasp right away. The component-based approach, well-defined lifecycle, and use of just plain JavaScript make React very simple to learn, build a professional web (and mobile applications), and support it. React uses a special syntax called JSX which allows you to mix HTML with JavaScript. This is not a requirement; Developer can still write in plain JavaScript but JSX is much easier to use.

##### 1) Easy to learn

Anyone with a basic previous knowledge in programming can easily understand React while Angular and Ember are referred to as 'Domain-specific Language', implying that it is difficult to learn them. To react, you just need basic knowledge of CSS and HTML.

##### 2) Native Approach

React can be used to create mobile applications (React Native). And React is a diehard fan of reusability, meaning extensive code reusability is supported. So at the same time, we can make IOS, Android and Web applications.

##### 3) Data Binding

React uses one-way data binding and an application architecture called Flux controls the flow of data to components through one control point – the dispatcher. It's easier to debug self-contained components of large ReactJS apps.

##### 4) Performance

React does not offer any concept of a built-in container for dependency. You can use Browserify, Require JS, EcmaScript 6 modules which we can use via Babel, ReactJS-di to inject dependencies automatically.

##### 5) Testability

ReactJS applications are super easy to test. React views can be treated as functions of the state, so we can manipulate with the state we pass to the ReactJS view and take a look at the output and triggered actions, events, functions, etc.

#### D. Why to use mongo DB

##### 1) Highly and easily scalable

Relational database or RDBMS databases are vertically Scalable When load increase on RDBMS database then we scale database by increasing server hardware power, need to by

expensive and bigger servers and NoSQL databases are designed to expand horizontally and in Horizontal scaling means that you scale by adding more machines into your pool of resources.

## 2) *Maintaining NoSQL Servers is Less Expensive*

Maintaining high-end RDBMS systems is expensive and need trained manpower for database management but NoSQL databases require less management. it supports many Features like automatic repair, easier data distribution, and simpler data models make administration and tuning requirements lesser in NoSQL.

### *E. Lesser Server Cost and Open-Source*

NoSQL databases are cheap and open source. NoSQL database implementation is easy and typically uses cheap servers to manage the exploding data and transaction while RDBMS databases are expensive and it uses big servers and storage systems. So the storing and processing data cost per gigabyte in the case of NoSQL can be many times lesser than the cost of RDBMS.

No Schema or Fixed Data model NoSQL database is schema less so Data can be inserted in a NoSQL database without any predefined schema. So the format or data model can be changed any time, without application disruption. And change management is a big headache in SQL. Support Integrated Caching NoSQL database support caching in system memory so it increases data output performance and SQL database where this has to be done using separate infrastructure. [6] Decision making is an integral part of the functioning of any business oriented organization. To facilitate decision making in this competitive world it is imperative that we should have the right information at the right time to bridge the gap between need and expectation between the loan bearer and loan giving organisation. To facilitate better flow of information in Management Information Systems (MIS). This help's management in order to take effective decisions. [7] How choices are made in an association utilizing MIS, what

difficulties are looked by the association in this measure and a couple of proposals to check these difficulties. It gives a short comprehension of why MIS improves choice making. [8] ReactJS is a section based library which is passed on for the progression of wise UIs. By and by it is the most well-known front-end JS library. It solidifies the view (V) layer in M-V-C (Model View Controller) plan. It is supported by Facebook, Instagram and an organization of individual architects also, affiliations. React on a very basic level engages progression of gigantic and complex online applications which can change its data without resulting page restores.

## 2. Conclusion

This paper presented modelling and construction of Management Information System with the help of MERN stack.

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