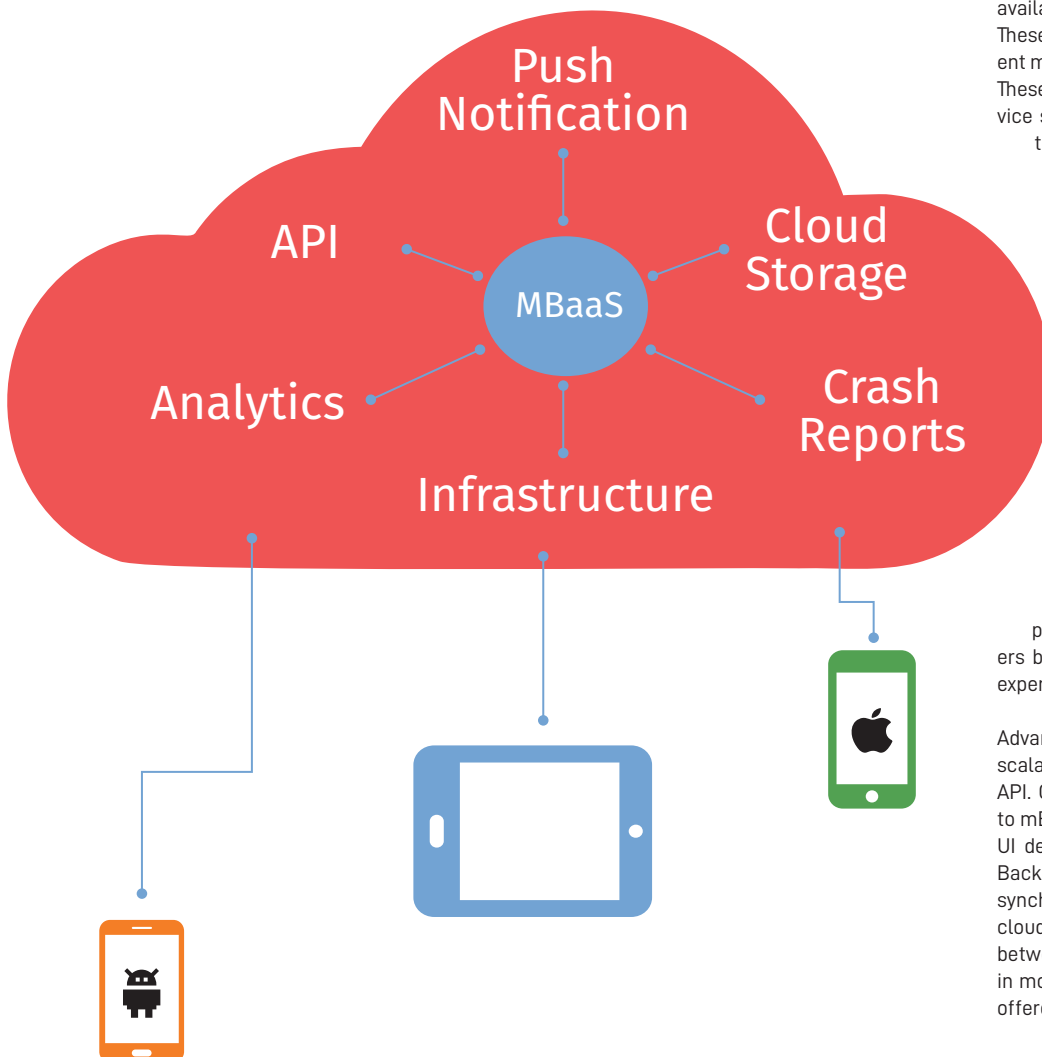# Cloud based Mobile App Development

Digital India initiative of government promises service delivery at doorstep of the beneficiary and mobile first approach is helping to achieve the same goal. Whole paradigm of application development is moving towards mobile first concept which first provides essential services on mobile devices and build further based on priority and usability. NIC is developing mobile applications on iOS as well as Android platform. Many of these apps make use of functionalities like notification services, data synchronization and analytics which are cloud based services provided by the backend service providers like Google, Apple, Microsoft and Amazon.

Cloud based mobile app development utilizes the cloud data store and compute resources for development and operation of mobile apps. This technique allows development of user-friendly mobile applications, which can be used without being bound to the operating system of the devices. Mobile cloud refers to a set of services designed to provide cloud based data store, applications and other backend services. In cloud based mobile apps a part of data-processing and data storage task is performed by cloud, which is outside the mobile devices. A cloud-first data model is capable of persisting data even when the device is offline, it allows low-latency access to media anywhere in the world, and real-time data synchronisation across all mobile platforms

To utilize cloud infrastructure for mobile applications various backend services are created and are available as "Mobile Backend as a Service" mBaaS. These services are repeatedly consumed by different mobile apps to cater to same kind of use cases. These backend services are provided through service specific APIs/SDKs and reduce development time. Typical services which are available as "Mobile Backend as a Service" mBaaS are Push Notification, Cloud storage integration and Analytics.

Push notifications allows applications server to send information to mobile application without a request to application server. The information is displayed to user inside or outside of application based on mobile app is currently active or not. Push notifications may also be sent using websocket but there are limitations on scalability and performance with limited infrastructure as compared with mBaaS which offer multi dimensional services for mobile applications. Analytics allows to understand users behaviour, which further provides better user experience.

Advantages of mBaaS includes cost effectiveness, scalability, easy integration and well documented API. Offloading part of application business logic to mBaaS allows developer to put more efforts for UI design and to provide better user experience. Back end services enables mobile applications to synchronize data between internal storage and cloud. These services provides synchronization between different devices and offline capabilities in mobile application. Although many benefits are offered by mBaaS, they should be used after due

Crime Free Himachal

Crime Free Himachal mobile app has been developed with the aim to reduce rate of crime in the state of Himachal Pradesh by engaging citizens, and the ultimate objective to make the State free of any kind of crime. This citizen-friendly app has been developed for the HP Police Department by the Centre of Competency for Mobile App Development, Shimla.

Shri Jai Ram Thakur, Hon'ble Chief Minister of Himachal Pradesh has launched the app on 11th February 2020. Using this app, the citizens, without disclosing their identity can inform the Police Department about any crime which has taken place or is likely to happen.

App Features ⇒ Citizen identity kept secret, no questions asked ⇒ Police control room analyses and processes information for taking further action ⇒ In case the informing person provide his/ her phone number, they are informed telephonically about the action taken ⇒ Bilingual, simple and short interface for citizens, with back-end interface for Police Department
⇒ App is available in both Android and iOS

https://play.google.comstore/apps/details?id=nic.hp.crimefreehimachal&hl=en

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Ease of Living (EOL) App

EOL Survey aligns with the Sustainable Development Goals (17 SDGs) for achieving rural India's sustainable development. Universe of the survey includes automatically included and deprived households identified under SECC totaling to approximately 8.87 Crore households out of 17.97 Crore of total rural households in the country. SECC database ensures that the deprived getting the benefits of developmental programmes.

EOL Mobile App is an android application developed by the SECC-RGI-ECI Division of NIC for collecting information from deprived households. The base data (automatically included and deprived households of SECC 2011) will be available on the enumerator device to search and find household.

The EOL App was inaugurated by the Hon'ble Minister of Rural Development, Agriculture and Farmers Welfare & Panchayati Raj, Shri Narendra Singh Tomar on 19th December 2019.

App Features ⇒ Both online & offline facility available to collect survey data ⇒ OTP & E-mail based authentication ⇒ Multilingual user interface, GPS Capture & Feedback Mechanism

https://play.google.com/store/apps/details?id=in.nic.ease_of_living.gp
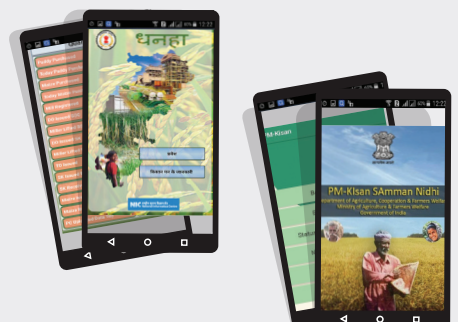
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DHANHA

Dhanha is a Mobile app developed for the Department of Food Civil Supplies and Consumer Protection, Government of Chhattisgarh by National Informatics Centre, Chhattisgarh State Centre.

DHANHA is a multi-featured, Android based app which has user-centric information:

App Features ⇒ Farmer's Land Record, Token Issued, Paddy Sold and Payment Status. It displays district-wise total quantity of paddy purchased. ⇒ Quantity of rice received in NAN and FCI Centre ⇒ District-wise total paddy lifted by miller from purchase centre and Sangrahan Kendra ⇒ Issued to Sangaran Kendra. District- wise total paddy lifted by transporter from purchase centre. ⇒ Society-wise summary of paddy purchased, paddy issued to miller/ transporter and stock in society ⇒ Contact No. of DMO, Society Manager and Asst. Programmer ⇒ Map to find Sangrahan Kendra, mill and purchase centre ⇒ Display route map from the user's current location or any location chosen to selected purchase centre, mill and Sangrahan Kendra

https://play.google.com/store/apps/details?id=com.nic.cgmarkfedapp

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Campus Suite

Campus Suite mobile app is an Android based application developed by NIC-Kozhikode for the students of nine Government Medical Colleges of Kerala university of health sciences (KUHS) under Dept. of Medical Education, GoK. A student can install the app by selecting college, course and batch from the list with KUHS Registration No. It provides details of Student's Leave, Attendance, Clinical Posting Schedule, Stipend, Confidential Reports etc. Interface customization for UG, PG, House sergeants is available.

Features for House sergeant students
⇒ **Clinical posting schedule,** Department-wise, for ensuring timely attendance ⇒ **Stipend Register,** to check discrepancy in the calculations.
⇒ **Leave register,** Department-wise, for additional duty days assigned ⇒ **Confidential Report,** Department wise for awarded grades for clinical postings

Features for Other categories
⇒ **Time table:** Duty assignment to the staff by HOD, topic-wise ⇒ **Internal marks & Attendance:** Based on subject attended

https://play.google.com/store/apps/details?id=dme_ecampus.nic.in

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JanSamiksha HP

The Planning Dept. of Himachal Pradesh (HP) designs schemes to carry out development works at the grass root level and the funds are routed from head office to the respective district. The district planning development committee (DPDC) receives proposals from individuals, groups and Panchayati Raj Institutions under the defined framework of various schemes. DPDC sanctions new works and agencies are assigned to execute the works.

JanSamiksha is an initiative to empower the citizens of Himachal Pradesh so that they can send feedback on the status of any work carried out under these schemes at the field level. The citizen can rate the work and provide textual feedback along with the photograph of the work/ asset.

Features
⇒ Data of all schemes being executed through Dy. Commissioner Offices ⇒ Citizens can rate the works which are executed in their areas so that Planning dept. can take appropriate action ⇒ Inspecting authorities get lists of all works under different schemes ⇒ Available, both on Android and iOS platform

https://play.google.com/store/apps/details?id=nic.hp.Jansamiksha

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PMKISAN GoI

In order to augment the income of the small and marginal farmers, in February 2019, Government of India has launched the "Pradhan Mantri KIsan SAmman Nidhi (PM-KISAN)". In June 2019, the scheme coverage was expanded to all farmers, except those defined under non-eligibility criteria. Under the Scheme, a direct payment of Rs.6000 per year is transferred in three equal instalments of Rs.2000 each every 4 months to the bank account of eligible landholding families.

PMKISAN is an Android based App designed and developed for Ministry of Agriculture & Farmers Welfare, GoI by the Agricultural Informatics Division of National Informatics Centre (NIC) to help the Government to reach all eligible beneficiaries under PM-KISAN, and enable the farmers to check payment status, correct the name as per Aadhaar, check registration status, know the scheme and find helpline numbers.

Hon'ble Union Minister of Agriculture & Farmers Welfare, Shri Narendra Singh Tomar has launched this Mobile App for Pradhan Mantri Kisan Samman Nidhi on 24th February 2020.

https://play.google.com/store/apps/details?id=com.nic.project.pmkisan

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HPSLSA

The Himachal Pradesh State Legal Service Authority (HPSLSA) mobile app supplements the website of the HPSLSA. Developed by the NIC Centre at Himachal Pradesh High Court, Shimla under guidance of Centre of Competency for Mobile App Development, Shimla, this user-friendly app provides information to needy litigants on various services by HPSLSA. HPSLSA Mobile App was launched by the Hon'ble Mr. Justice L. Narayana Swamy, Chief Justice, High Court of Himachal Pradesh & Patron-in-Chief, HPSLA launched the. This Android based App is helpful for citizens who can't afford to engage lawyers and needed information as well as support for their court cases.

App Features ➡ Directly linked to the CMS based HPSLSA website ➡ Automatic update of data synchronised with the HPSLA website ➡ Information on welfare schemes being executed for the benefit of citizens, Legal Literacy camps, legal aid counsels, panel of lawyers, para legal volunteers, Support Centres available in the app

https://play.google.com/store/apps/details?id=nichp.in.hpslsa

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iHRMS-Punjab

Integrated Human Resource Management System (iHRMS) (https://hrms.punjab.gov.in) is an integrated application for managing HR activities of employees in Punjab. The system updates data of 3.60 Lakh employees regarding their Service, Salary, General Provident fund, GIS, Arrears, Increment, Property Return, ACR, Leave management etc. Government of Punjab uses this data for various administrative & financial decisions.

iHRMS Punjab App, developed by NIC- Punjab is an Android based mobile application in addition to the iHRMS system, using which the employees can view their Service details, Pay Slip, TDS, Annual Salary Statement (current and projected), requests for increasing / decreasing income tax deductions, apply GPF withdrawals, viewing GPF Ledger & Statement, GIS Statement, apply leave & view leave approval status and viewing Leave Ledger. Additionally, the employee can request updating of mobile number, email, address etc. Apart from government notifications, the other facilities available are Telephone and Email Directory of various departments, colleagues birthdays, display of government holidays etc.

https://play.google.com/store/apps/details?id=com.project.manavsampada.hrms.bab

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GeoRurban

The GeoRurban mobile app has been developed for evidence based monitoring of the physical progress of the works under Shyama Prasad Mukherjee Rurban Mission (SPMRM), Dept. of Rural Development, MRD, GoI. It provides updates on the physical status of the works being executed in the clusters at regular interval with the facility of capture geo-tag enabled images of the works in progress, enabling analysis along the development cycle.

Developed jointly by NIC (Guwahati, Assam) and NIC-DRD (DRD informatics, Delhi), this app was launched on 24th February 2020 by Hon'ble Minister of Rural Development, Shri Narendra Singh Tomar.

Features: ➡ Account based login for the Centre, State, District and Cluster program functionaries ➡ Listing of works based on selected location ➡ Capturing and uploading multiple geo tag embedded images under each stage for monitoring, enabling detection of fraud and forgery ➡ Access to all works data, with evidence allowing easy reviews and audit

https://play.google.com/store/apps/details?id=in.gov.georurban.georurban&hl=en

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e-Granthalaya

e-Granthalaya provides a digital platform on NIC-Cloud to transform traditional libraries into e-Libraries with the help of ICT tools, services and cloud-based hosting environment.

e-Granthalaya Mobile app is an additional facilitation, which has been developed by National Informatics Centre. The app provides new features to access the collection in the e-Library such as e-Books, e-Articles and other digital objects uploaded by member libraries. The app also has the search facility to find e-Catalogs and other information materials. Further, members can also view the list of books issued to his/ her name.

Besides various user-friendly experiences, the ae-Granthalaya mobile app has numerous exclusive features which include easy installation and connectivity with the instance of e-Granthalaya, discover local e-resources and news items that matter to the members, request the librarian through email for issuing a books of member choice, request for inter-library loan from other libraries etc., to name a few.

https://play.google.com/store/apps/details?id=com.nic.eg4mobile&hl=en

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diligence. Different services like push notification requires passing information to mBaaS infrastructure.

Many mobile apps developed in NIC handle critical data, and information has to be passed only after due consideration its sensitivity. Mobile App developer has little or no control over mBaaS infrastructure, developers interact with provided APIs and fixed protocols which cannot be changed as per convenience.

There are many service providers to choose from while developing a Mobile App with backend services. Factors which effect the choice between various service providers are support for services, ease of integration and scalability. Mobile app developer may choose the best suitable service provider for their application. Some of the more popular service providers are:

• **Firebase** provides various tools to develop high-quality apps, It was acquired by Google in 2014. Firebase has support for android as well as iOS. It has well documented API and provides easy integration with mobile app. Some of the services offered by Filebase are Analytics, Cloud Messaging (FCM), Crashlytics, and Storage.

• **CloudKit** is a framework by Apple to transfer data between iCloud and devices. Apple CloudKit iOS backend as a service and early integrate with other iOS apps when CloudKit is used.

• **Microsoft's Azure Mobile App Service**- MS Azure mBaaS allows Databases integration, Push notifications, Social media integration as well as Offline synchronisation capabilities.

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