SIMFORM

The Enterprise Mobile Application Development Guide:

Strategic lessons from Slack, UPS, & Allscripts.

When Audi was determined to capitalize on the increasing digital mindset of its target audience, it decided to develop a digital platform to empower its sales team to go beyond traditional methods. The company successfully built a Mobile and an iPad app called ‘Sales Assist’ – the industry’s first-ever product of its kind. Packed with 3D visualization and integration with Audi’s CRM tools, it helped the company achieve a massive 42% increase in user engagement and a 15% increase in sales.

Audi got it right! But, it makes you wonder if there is a perfect recipe for building an enterprise mobile application that will hit the right chords every time? Moreover, the software development industry is growing at such an unprecedented pace that what was simply application development a decade ago is now divided into countless application types. However, as a stakeholder in an organization, unraveling these different applications and their styles and adopting the right solution for your business can be no less than a nightmare.

Coming to the main point of discussion, how can you build an enterprise mobile application for your organization? For starters, it is a software application tailored to fit the requirements of a business and support the day-to-day operations of an organization. Such an application must ensure high uptimes (it reflects the quality of the product meted out for customers), scale on-demand, and ensure maximum security for users.

Although enterprise mobile app development finds its foundation in mobile application development, there is an additional focus on target groups, functionalities, and revenue generation. This guide will help you understand the essential best practices and tools you can leverage in your application development to make it fine-grained and genuinely dynamic. We shall now discuss the enterprise mobile application development process in detail.

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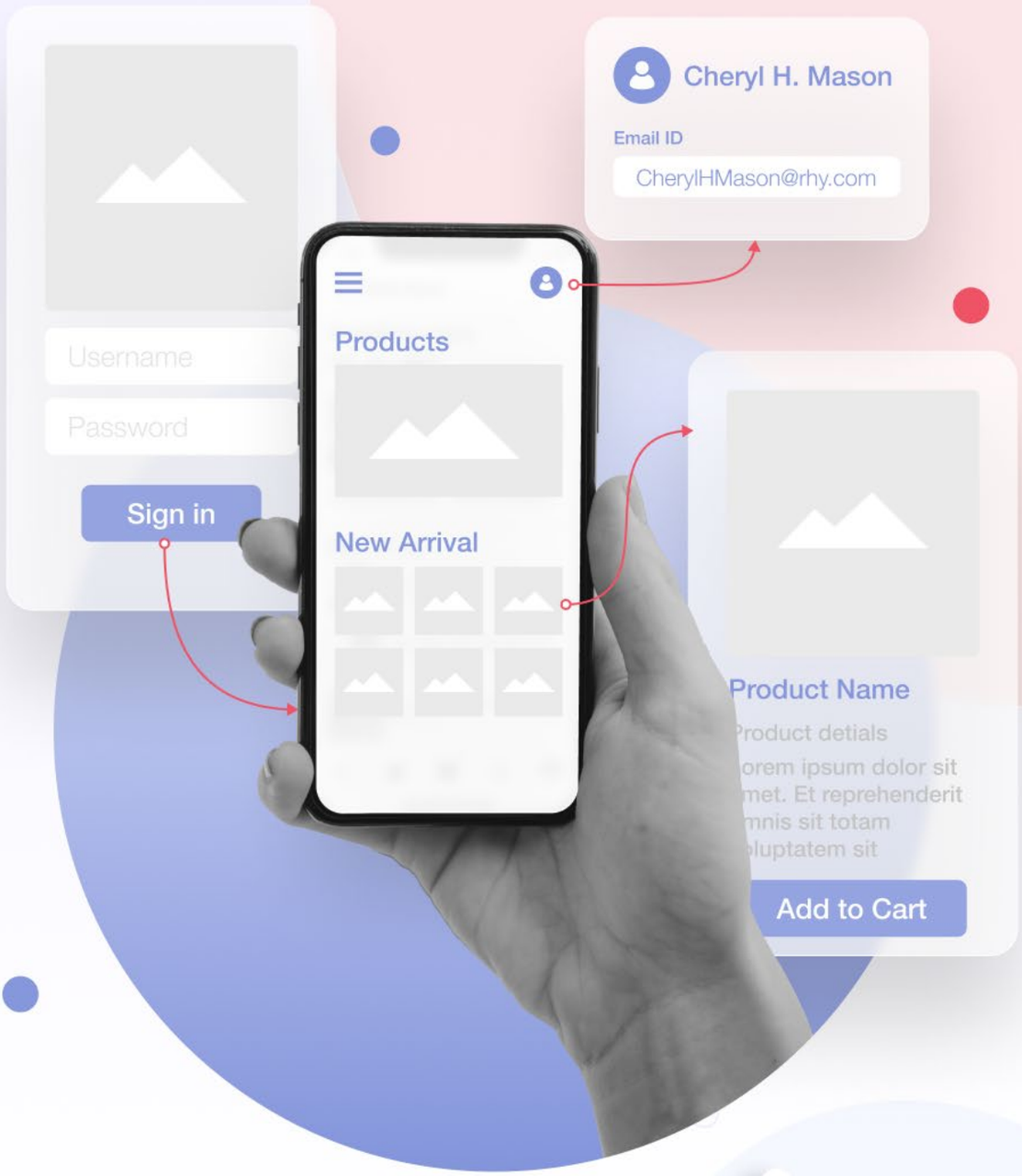


Phase 1:

Build a robust foundation for your application with UX wireframe and app prototype

Wireframing the application

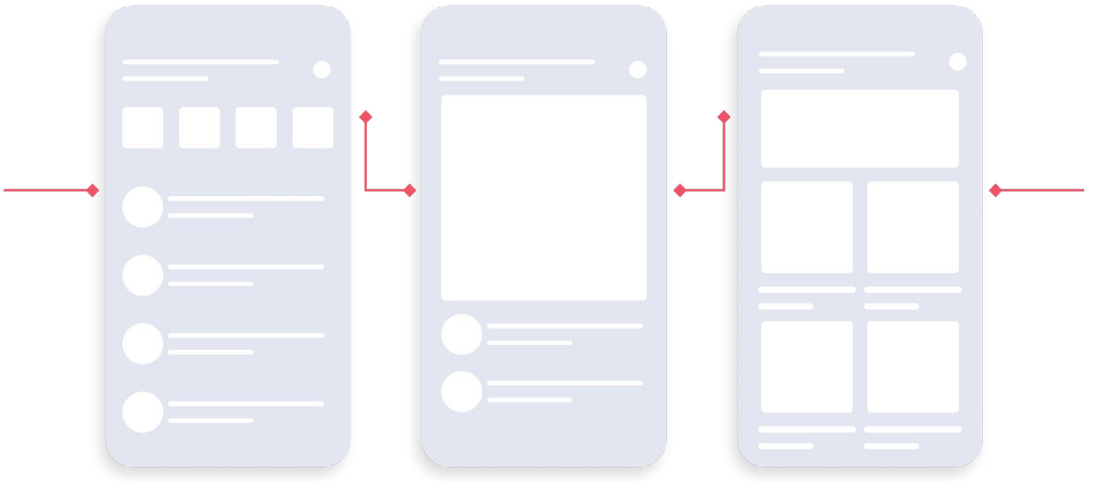
A wireframe for any mobile application is a two-dimensional sketch or a visual guide representing the overall application layout. It displays the flow between the screens and acts as the functional representation on top of your business objectives. While building a mobile enterprise app, a wireframe will help you bridge the gap between designers and developers by acting as a reference before the actual development process begins. As a result, designers and developers can collaborate and modify design ideas without incurring any significant cost to the organization and create a user-centric UI.

Why is it important to create a user-centric wireframe?

There are 3 crucial factors that you need to consider while wireframing a mobile application:-

1. Create a target user flow that shows a path users will take while completing a task in an application. This chart will help you understand the number of screens you want to include in the application and how you want the users to interact with them.

2. Form a visual hierarchy system that shows how you want to present your content. This layout represents how you want the users to process the information on every page, and it should be divided among boxes of various sizes accordingly. Simply put, the most important information goes into bigger boxes from top to bottom and left to right to form a common pattern that users follow while scanning an application.



3. Utilize familiar design patterns commonly leveraged by designers for Android and iOS applications. These design patterns are similar to reusable content blocks to deliver a standard UX across different applications.

Which wireframe tools are best suited for enterprise mobile app development?

Sketch is a popular wireframing tool for macOS and is known for its vector editing, prototyping, and collaboration features.

Balsamiq is low-fidelity wireframing software with user-friendly functionality. It comes with a drag-and-drop editor and pre-built templates that make it a hit among designers.

Figma is a cloud-based, all-in-one design tool that allows you to wireframe and prototype on the same platform. It offers real-time collaboration for designers and stakeholders to simultaneously work on the same projects.

> **Figma offers a set of unique features like Auto Layout which creates responsive designs that need minimal manual iterations, making developer handoffs less complicated."**
>
> Hiral Raol
> Lead Designer at Simform

Application prototyping

How is it beneficial for mobile app development?

A mobile app prototype illustrates how the product will function and acts as an interactive yet premature version of a future application. It should include the app's UI design, overall user flow, and planned functionality. By testing an enterprise product with a prototype, you can ensure user-centric design and development and discover errors in the early stages. It's a central stage of the design process and promotes rapid iterations to deliver a product that brings maximum user value.

Prototyping should be a cyclical process where product teams continually review and revise the product concept and return to the start of the prototyping process several times till the concept aligns with business goals and user needs.

Top tools for prototyping enterprise mobile application

InVision Studio offers well-designed tools and features like Freehand for team members to add notes and feedback, repeatable components, and LiveShare to share a prototype with full interactivity.

> **It centralizes our entire workflow, which helps us collaborate at every stage of the process. Plus, Microsoft Teams integration allows us to transform our team meetings into collaborative sessions for teams, especially new members."**
>
> Ravi Chothani
> Design Lead at Simform

Adobe XD is compatible with other Adobe apps like Illustrator and Photoshop and offers tools necessary for processes from conceptualization to creating high-resolution prototypes with monthly updates to improve the output.

Webflow allows users to design and build high-fidelity prototypes while building a live website with HTML, CSS, and JS. It also provides features like a drag-and-drop interface, CMS, and functionality to create advanced animations and micro-interactions.

Phase 2:

Create an intuitive app with an effective UI Design

The golden rules to building an exceptional User Interface

- Create consistent UIs
- Make users your priority
- Enable easy interactions with the products
- Add shortcuts for easy navigation
- Allow reversal of user actions
- Keep memory load to a minimum

Why designing Information Architecture (IA) is beneficial?

Why should you concentrate on Information Architecture?

Like a blueprint, Information Architecture (IA) acts as a visual representation of the product infrastructure, features, navigation, functions, hierarchy, and page flows. Implementing information architecture principles will let your users feel that their interactions with the application are guided by instinct.

Which are the best tools for creating an Information Architecture?

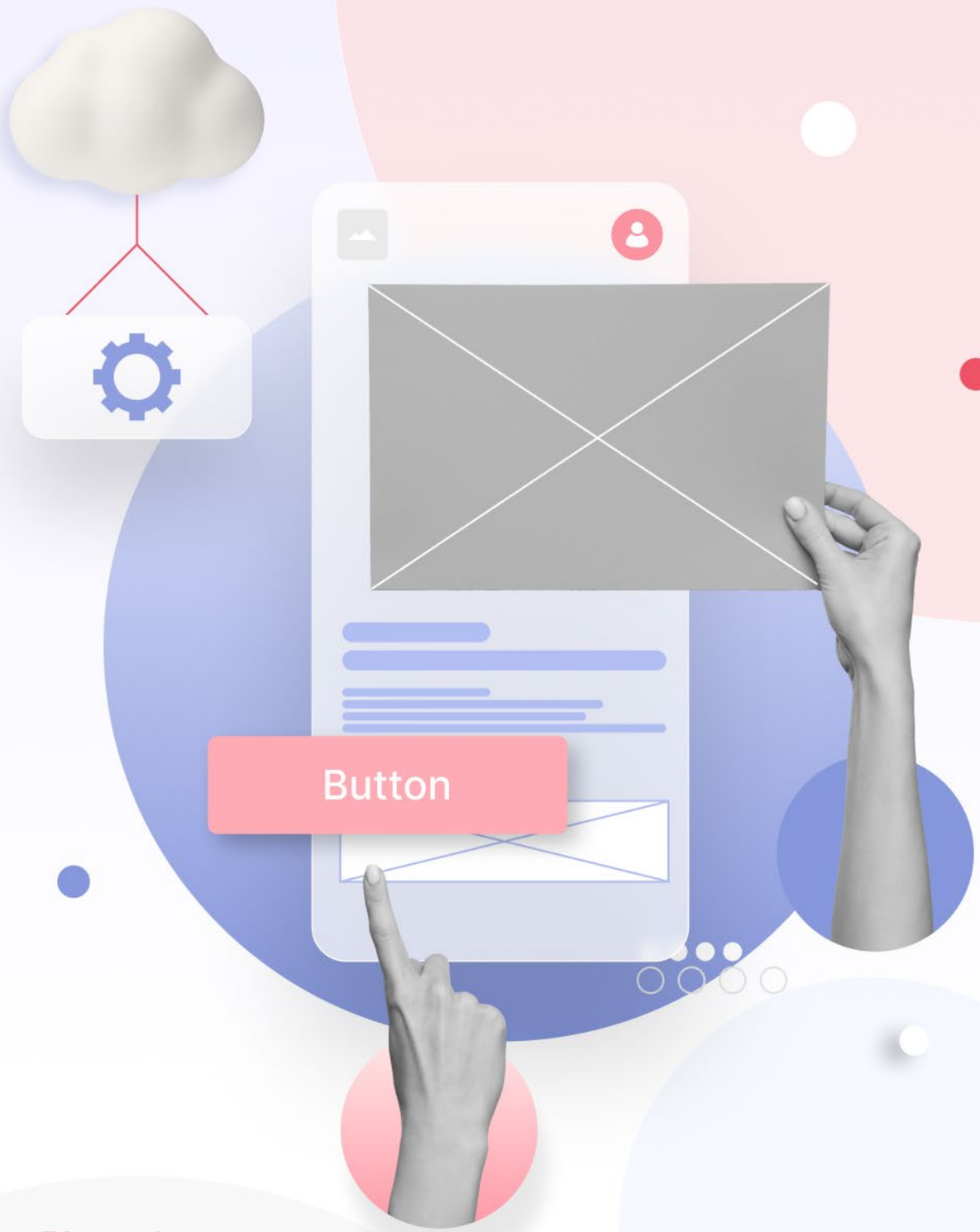
diagrams.net is a simple, open-source tool that helps create flowcharts, process maps, organizational charts, and other diagrams.

Lucidchart, in addition to creating diagrams, also allows users to share and invite an entire team of designers to comment, collaborate and view live feedback on the same IA.

While discussing how Lucidchart helped Delta Airlines improve its workflow, Steve Groff says,

> *Process engineering is never complete because processes are constantly changing and evolving. That's why I use Lucidchart—because it's no big deal to move a part of your process or include a little description box or whatever you need. It has been very helpful as far as making sure that everyone is on the same page."*

Adobe Illustrator is another exceptional tool designed by Adobe for creating IA. It has a higher learning curve as compared to diagrams.net and Lucidchart.



Phase 3:

Choose the right application architecture for backend and front-end development

Application architecture

An application architecture represents the patterns and techniques used for designing and building an application. It acts as a roadmap and establishes the best practices that a team should follow while developing a well-structured application. An architecture defines how the application elements are supposed to behave and gives a complete idea of the mobile app structure.

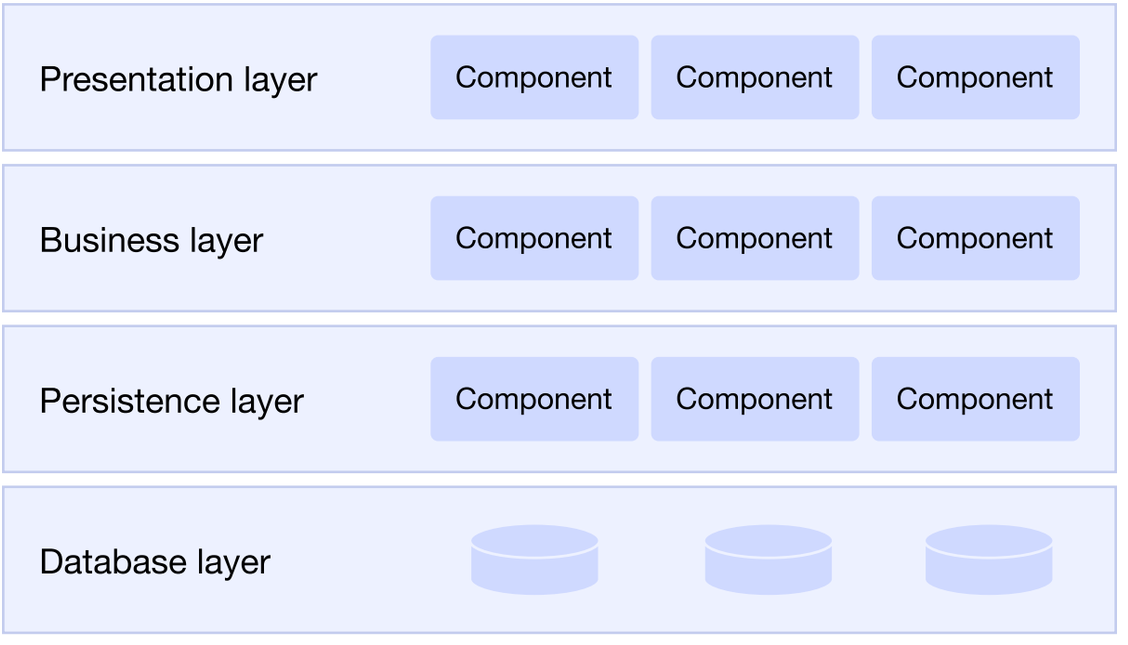
Why is it important to choose the right enterprise software architecture?

For starters, the right application architecture will simplify developers' life. Since debugging requires fewer efforts and time, they can concentrate more on delivering innovative solutions. Moreover, even at advanced stages of the development process, code enhancements are less complicated, which ultimately positively impacts code implementation and project coordination.

Software engineering also allows integrating multiple architecture patterns within a single system for better performance optimization. However, the choice of architecture largely depends on your teams' business needs and skillset.

Which is the correct architecture pattern for your mobile application?

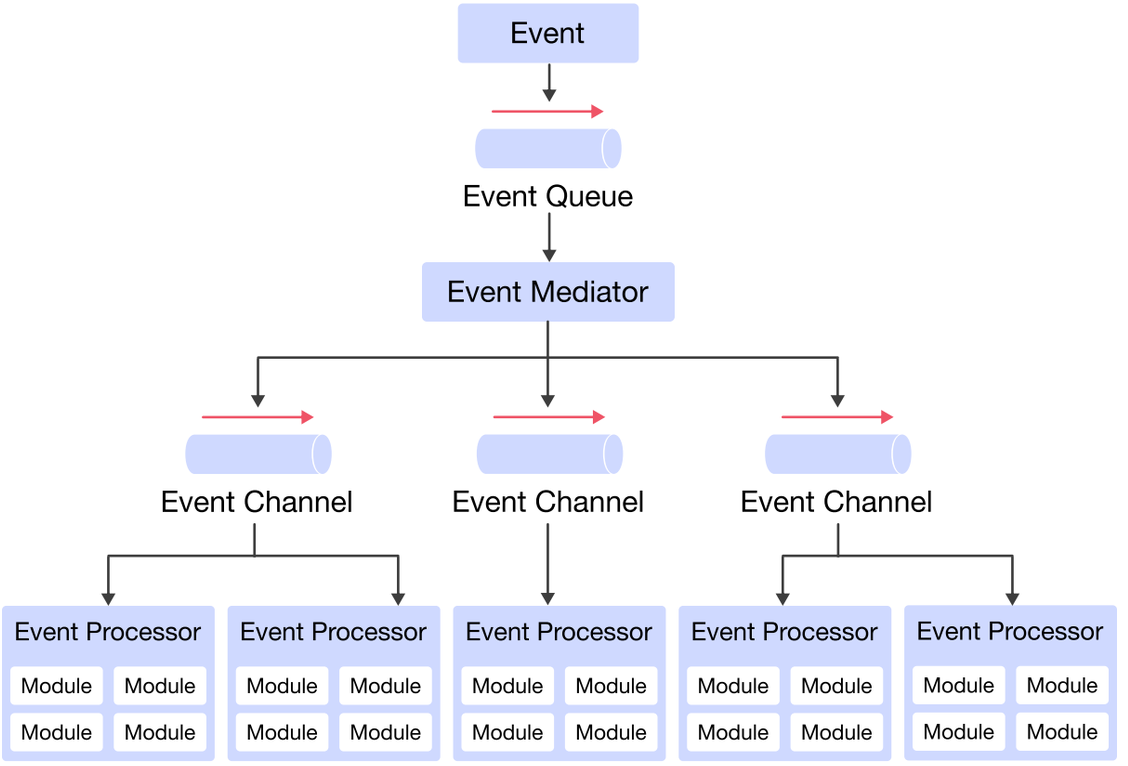
Layered architecture/n-tier architecture



It's a common and traditional approach adopted by organizations for their applications. It is built around the database and binds similar components together horizontally. These components, although interconnected, do not depend on each other. In this architecture type, the code arrangement allows the data to enter the top layer and advance to the bottom, forming the database layer. Every layer performs a specific task, including data consistency verification and reformatting the values to maintain their consistency.

This architecture allows different development teams to work independently on separate layers. A properly layered architecture has isolated layers unaffected by any changes made in other layers and facilitates simple refactoring. The primary reason this architecture fits mobile enterprise applications is the ease of testing layers separately, enabling the effortless implementation of upgraded versions. However, this architecture also makes scaling a system challenging owing to the decoupled layers.

Event-driven architecture:



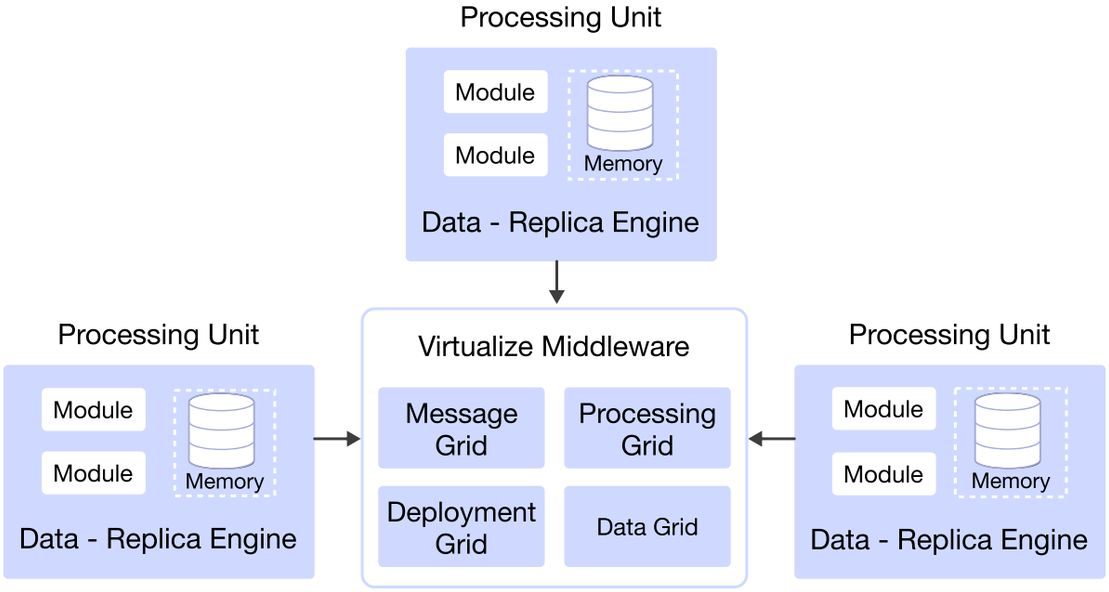
An event-driven architecture is the most popular architecture and design for building enterprise applications that need to implement instant data communication and require on-demand scaling. This architecture leverages events to trigger and communicate between decoupled services where an event can be a change in state or an update.

An event-driven architecture has 3 components: event producers, event routers, and event consumers. A producer is responsible for publishing an event to the router, which filters it and pushes it to the consumers. This architecture is better explained with an activity performed on a web page – when a user clicks a button, the browser interprets an event and presents the programmed action.

This architecture is highly adaptable to real-time changes and works best with asynchronous systems that manage asymmetric data flow. It is also a suitable choice for applications that tend to scale. The event-driven architecture transforms the application's response time, leading to improved business outcomes.

Microservices follow an event-driven approach consisting of loosely coupled services where each service is responsible for implementing its associated business logic. These services are divided from one another based on their domains and form a mini-microservice pool. It allows developers to release multiple software versions by automating development, testing, and deployment – a significant differentiator between microservices and monolithic applications.

Space-based architecture:



Enterprises can leverage this architecture pattern to manage the high load by dividing the processing and the storage between multiple servers. It consists of two primary components – the processing unit and the virtualized middleware. This architecture is best explained with the example of a virtual auction site. When the user places a bid on the site via a browser request, the site receives the request and records the bid with a particular timestamp.

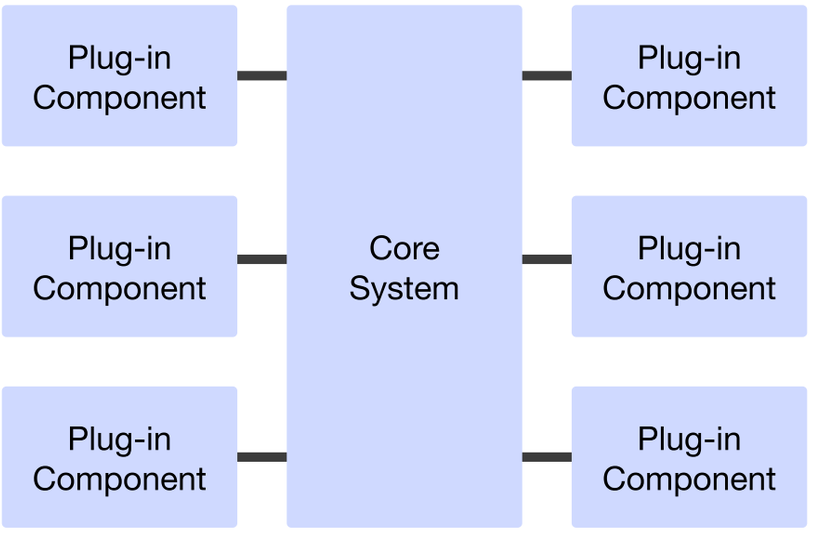
Next, it updates the information related to the recent bid and ships the data back to the browser.

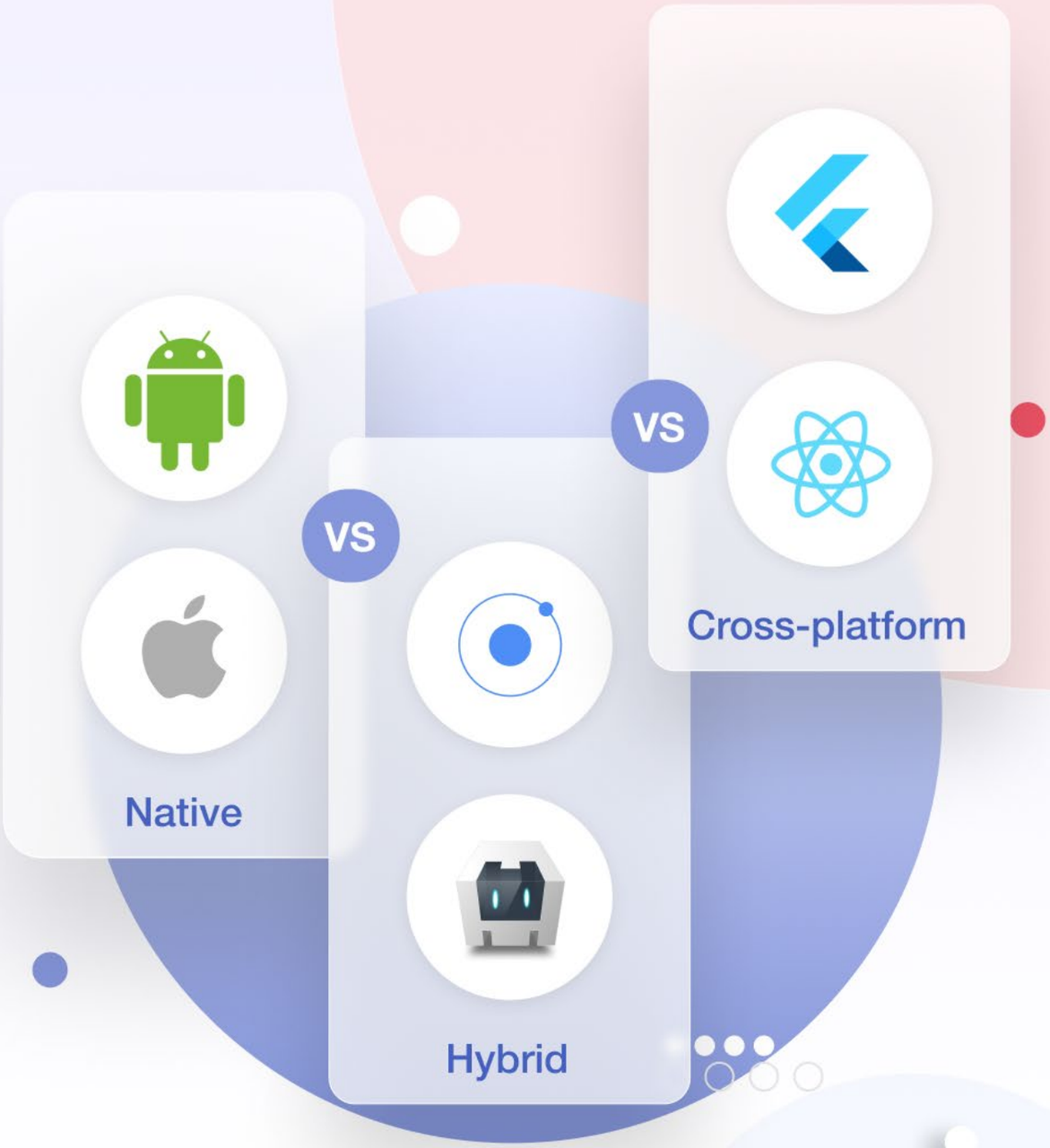
This architecture is ideal for enterprises burdened with concurrency and scalability issues. It can effectively control unpredictable and fluctuating user volumes with a constant load of requests on top of a large user base.

Microkernel architecture

Every application has a specific set of operations with repeated uses in different patterns based on the data and task at hand. This architecture pattern is especially suitable for third-party applications that offer software packages as downloadable plug-ins. As a result, the microkernel architecture is also known as the plug-in architecture pattern.

The architecture consists of two sections – one is dedicated to the core system and the other to the plug-ins. The core of the architecture is minimal to include only the correct quantity of components that lends effectiveness to the system. However, modifying this architecture can be tricky as a large number of plug-ins depend upon it, and as a result, it requires modifying the plug-ins.





Phase 4:

Native vs. Hybrid vs. Cross-platform: Choosing the correct application type for your enterprise

Adopting a suitable application type enables you to adopt standard software development practices in the appropriate developmental stages. It facilitates accelerated development and sets up a concrete path for data flow. Such a mobile application is flexible and can implement Agile methodologies and efficient testing and debugging processes.

Native mobile app development

A native mobile application is built to cater to a single platform and leverages programming languages and tools specific to this platform. Android mobile apps support languages like Kotlin and Java and are most compatible with Clean Architecture.

Native iOS apps use Objective-C and Swift languages. Apple provides a set of best practices for app architecture with the MVC (Model–View–Controller) model that supports parallel development with the functionality to build multiple views.

Apple provides a set of best practices for app architecture with the MVC model that supports parallel development with the functionality to construct multiple views. An alternative to this model is VIPER (View, Interactor, Presenter, Entity, Router) – used for iOS application development. It is known for generating layers of abstraction and separation of concerns, creating clean code, and ensuring better maintainability.

Why did Slack choose to replace its monolith with a Native mobile application?

As Slack grew, the team realized that the mobile codebases for Android and iOS apps had grown organically over the years and did not undergo a rewrite since their launch. As a result, the design patterns had become outdated and inconsistent, legacy code was affecting the overall speed and reliability of the application, and the technical debt was massive.

The company adopted a common approach for both platforms that prioritized – Stabilization, Modularization, and Modernization.

For iOS app development, Slack migrated 100% of its Objective-C code to a Swift app. It gave its developers the liberty to use new language features and adopt other frameworks like Combine.

The Android app mainly required splitting the monolith reserved for networking and database access to adopting SQLDelight and adopting the repository pattern for better caching and performance. Through modularization, Slack aimed to abstract components from the two existing monoliths that decreased interdependencies and development times, allowing the teams to work more independently.

FOR IOS

Swift

FOR ANDROID

Java

Kotlin

BACKEND

PHP

DATABASE

MySQL

CACHING

Memcached

LOGGING AND METRICS

Kubernetes

Terraform

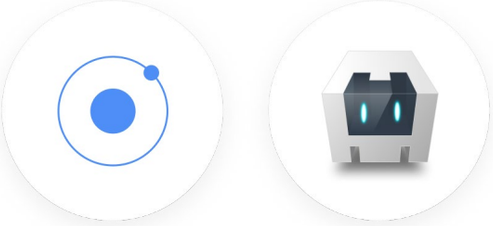
Chef

CLOUD HOSTING

Amazon Cloudfront

Hybrid mobile app development

Hybrid mobile apps leverage both native and web solutions and are the fastest apps to build across different platforms, and are easy to update. They are, however, not recommended for feature-rich applications that are complex and highly interactive.



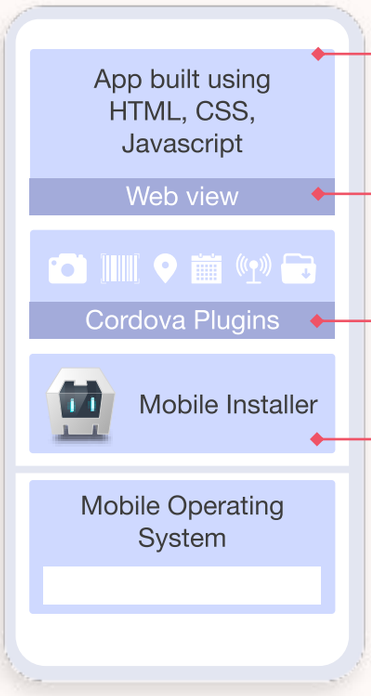
How did UPS transform its Mobile App with a cross-platform app development approach?

UPS receives 192 million customer-tracking requests every day with its UPS Mobile App. Its development teams had to ensure information delivery to users irrespective of the device type. These teams had to develop and maintain multiple versions of the app, with iOS in Objective-C and Android in Java. The versions also required pushing new features separately across different device platforms, causing delays in the development schedule.

UPS decided to build a cross-platform application with Visual Studio Tools for Xamarin that leveraged one language and development platform.

It provided higher code reuse and better integration with other native services on the device, including their unique hardware and capabilities.

Moreover, UPS successfully rewrote all App versions with Visual Studio Tools for Xamarin. After eight months of its decision to migrate, it released its new version of the app. It increased developers' productivity and allowed the organization to add new features across all devices in weeks or even days instead of months.



Hybird Mobile App

Mobile App
- UI and interaction buikt using HTML and Javascript (using framework like Angular)
- Allows re-use of exsiting components, including UI & services integration

Web View
- Browser Component with a HTML rendering engine and JavaScript engine run in full-screen mode within mobile

Cordova Plugins
- Access to device capabilitis like Camera, Geo-location, Contacts etc. using Javascript based Cordova plugins

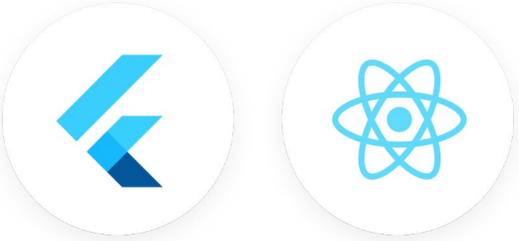
Installer
- Cross-platform installer built using Cordova build tools using Android, IOS SDKs

Cross-platform mobile app development

Cross-platform application functions on several platforms and can be deployed on both Android and iOS. It uses tools like React Native, Xamarin, Flutter and delivers a user experience similar to native apps. It can facilitate faster development and is created using a single codebase. However, this approach is not recommended for enterprise applications that need on-demand scaling and flexibility.

In 2018, eBay Motors started building a cross-platform app for Android and iOS. The team chose Flutter for development due to its ability to build faster than other native apps and its advanced testing support.

Moreover, the team was able to share code for almost everything–including UI, business logic, analytics, CI pipeline, and more. By effectively using Flutter as its cross-platform solution, eBay motors ships a new version to both the app stores every week and has successfully added features like live chat, escrow, and community boards for both apps simultaneously.



How Allscripts developed a hybrid application with platform-agnostic common mobile app code

The company aimed at streamlining and centralizing platform-agnostic mobile app development across different internal product teams. The Allscripts Common Components Mobility Team aimed to build a common code base for all mobile platforms called Enterprise Mobility Framework. This framework was customizable and could be used by each product team to build apps. It provided a common UX, features, and functionalities across all the company's apps.

The company then developed a common set of code for entire app development– across iOS, Android, and UWP–that eliminated duplicative work and met all mobile demands. It leveraged Xamarin.Forms to automatically incorporate subtle differences between iOS and Android UIs without any need to write custom code. By providing basic UI functionality and an appearance and feel, business units at Allscripts can concentrate on creating new and better features.

Backend development

As we are aware, the backend of a mobile application is responsible for storing, securing, and processing data. However, every application may not require building a backend.

Do all mobile apps require backend development?

If your application can work completely offline, it will function without a backend. It will naturally require the internet to download on a device, but not to carry out any functionality. Some common mobile apps that are built without a backend include Calculator, Camera, Voice recorder, Measure, Compass, Notes, et al.

However, if your application requires a login or registration and uses a location to save data, it will need a backend. While building a backend from scratch can be extremely time-consuming and expensive, using an MBaaS–a pre-existing backend– to build an enterprise mobile application can prove advantageous. For starters, this service can self-host, is cost-effective, and facilitates quick deployments and updates. More importantly, it can easily integrate with third-party services, like Twitter, Facebook, and Slack, and reduces the need for duplication of functionality across multiple systems.

What MBaaS functions can be used in enterprise mobile app development?

Infrastructure management

For applications that undergo constant growth, maintaining a server infrastructure can be inefficient and costly. For instance, an MBaaS platform like Backendless takes care of server provisioning, security configuration, data storage, user authentication, and a lot more.

API Management

A standard approach to API construction and management involves building and testing new APIs on a local machine and then accessing or importing them using the MBaaS platform. MBaaS providers may even offer a set of pre-built APIs, and they can be used as they are or even modified with other logic to leverage new APIs that fit developers' needs.

User Management

A majority of MBaaS platforms provide user management functionality that lets users register, log in, or manage their accounts. User authentication is another key feature of user management and can be handled with a simple combination of username/password or with a third-party authentication. It can include social media services like Facebook and Twitter or tech services such as GitHub or Fitbit.

Top mBaaS platforms for Android and iOS

Firebase

It is a Google-backed app development software to build iOS, Android, and Web apps. It provides tools that enable developers to track analytics, effectively report and fix app crashes, and create product experiments. In addition, it also offers authentication, cloud messaging, real-time database, crash reporter, and cloud-based testing infrastructure.

Parse

It is one of the most popular open-source frameworks for backends for mobile, web, and IoT applications. Parse is preferred for automating the development of repetitive tasks, including data modeling, building and generating APIs, integrating the backend with mobile SDKs and sending push notifications, etc.

Back4App

It is a Backend-as-a-Service solution that includes a database similar to a spreadsheet, REST, and GraphQL APIs, Push and Email Notifications, and scalable hosting. Back4App works with open-source technologies, follows GDPR requirements, and provides effective documentation for quicker development cycles.

Joren Winge, CTO at VantageBP, shares his opinions on using Back4App at his organization,

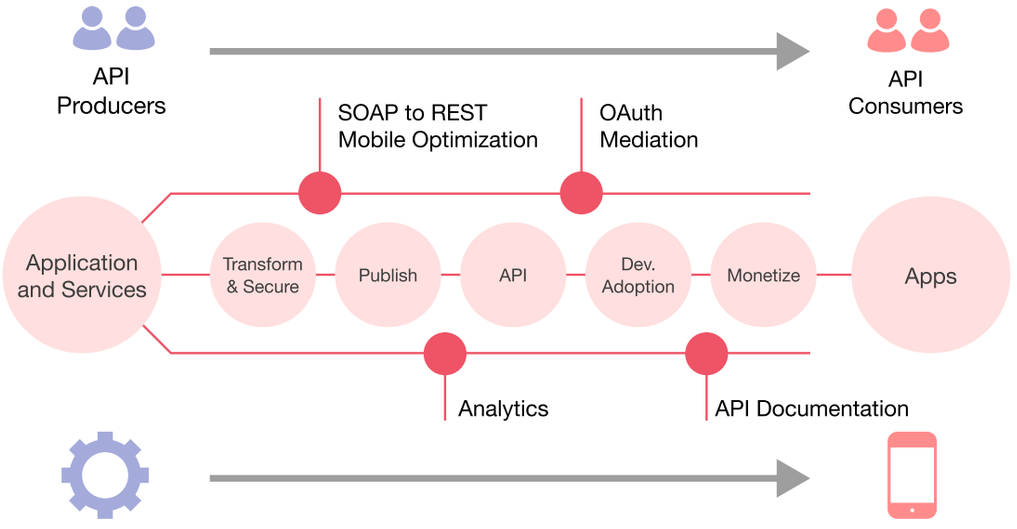
> *"The nice thing is that I don't have to worry about uptime, scalability, or DevOps issues. Without Back4App, everything would have taken much longer. Back4App is like having a custom dev team that I don't have to pay for."*

API integration

Why do you need a mobile API strategy for enterprise app development?

Mobile APIs are essential to convert an enterprise's enormous amounts of data into a usable framework on a mobile device. They act as a preliminary resource and a facilitator to expand an organization's reach beyond its existing limitations. With easy integration and faster delivery, APIs enable enterprises to bundle their assets with those of their partners to deliver a combination for their users via a fast and intuitive mobile application.

Moreover, as user flow increases, mobile apps rely more and more on integrated data collected from multiple sources. As a result, enterprises need to consider API management as a core function of their development process to achieve data delivery to more users and encourage improved interaction.



- Simform helped a cross-platform SaaS company engaged in integrating Salesforce CRM tools with an email to build a mobile app to expand its Salesforce integration capabilities to iOS. We helped them build a private API to enable maintaining existing features and optimizing the additional features. It is also responsible for connecting the native app with Salesforce integrated platform.

There are various third-party APIs such as Google Maps API, Twitter API, AccuWeather API, YouTube Data API, Facebook API that are commonly used in mobile applications to offer a complete user experience.

Front-end development

A mobile app's front-end is normally the user interface and focuses mainly on interface design and user experiences by adding engaging visual and interactive elements. These user experiences are typically delivered using a backend and an API for data management.

However, some applications may also leverage local data storage to allow users to carry out functions without an internet connection. It goes without saying that determining the right technologies for every development type is key to building an impactful front-end.

Choose the right framework for Android, iOS, and Native app development


Flutter


React Native


Solar2D


Xamarin

Swiftic

Programming languages for mobile app development

Java

HTML

Javascript


Kotlin


Swift

- Simform partnered with a global financial institution to build a mobile platform to boost its sales and customer acquisition process. The primary challenge was information collaboration for all employees and building an all-inclusive platform to access the enormous amount of available data. We decided to leverage state-of-the-art Mobile and Cloud technology to build a Sales CRM that enabled the employees to access clients' information in real-time.

Phase 5:

Create a comprehensive test strategy with a suitable toolset

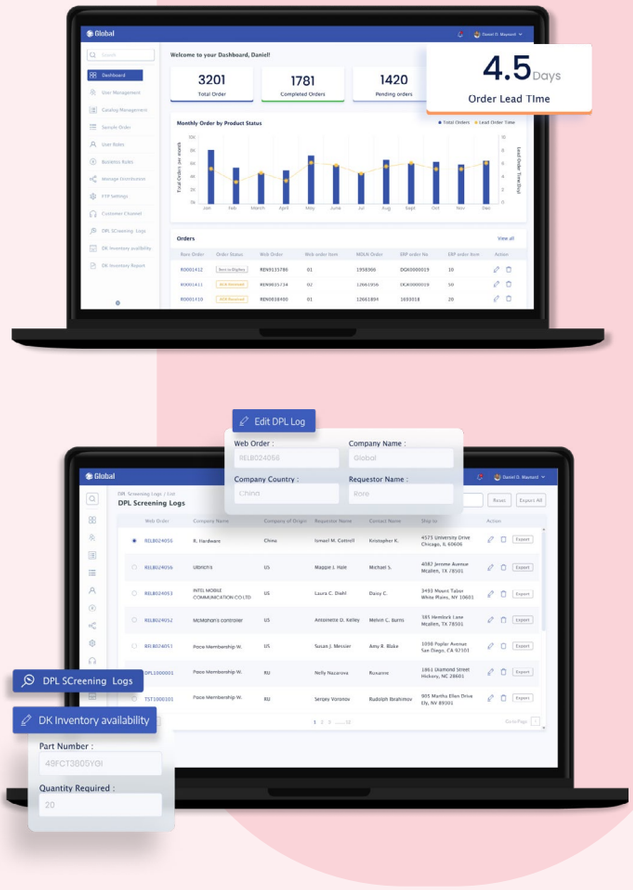
The primary responsibility of mobile app testing is to deliver a safe, error-free, and effective product that caters to customers' needs. For mobile applications, in addition to finding bugs and errors, testing features and functionalities before rolling out the application is equally crucial. There are a unique set of challenges that organizations face while executing a mobile app testing strategy. Some of these challenges may include -

- **Device fragmentation** demands creating test cases for a variety of devices, browsers, and platforms used at any particular time.
- **Security parameters** must be carefully considered to avoid malware, hackers, or other malicious elements attacking the system.
- **User preferences** and demands that undergo frequent changes and keeping up with them has to be prioritized.
- **Network issues**, including low internet speeds, can affect the user experience of the app, and testing the app in different network conditions is vital.

Which tests are essential for your mobile application?

- A/B testing
- Functional and non-functional testing
- Compatibility testing
- Documentation testing
- Certification testing
- Security testing
- Provisioning testing

- One of our clients–a leading semiconductors manufacturer–required building an enterprise application equipped with an automated and secure delivery system. Our development teams prioritized and included periodical Application Vulnerability Tests that ensured zero potential loopholes in the application servers and back-end services that were vulnerable to intruder attacks. We also implemented DevSecOps principles that helped find any vulnerabilities associated with 3rd party packages used in the application and OWASP Top 10 critical security risks. Ultimately, we successfully delivered an enterprise application that processes 1000s of daily orders via multiple sales channels and funnels them to the right fulfillment partner spread anywhere in the world after vital business validations.



Top tools you can leverage for effective mobile app testing

For Android

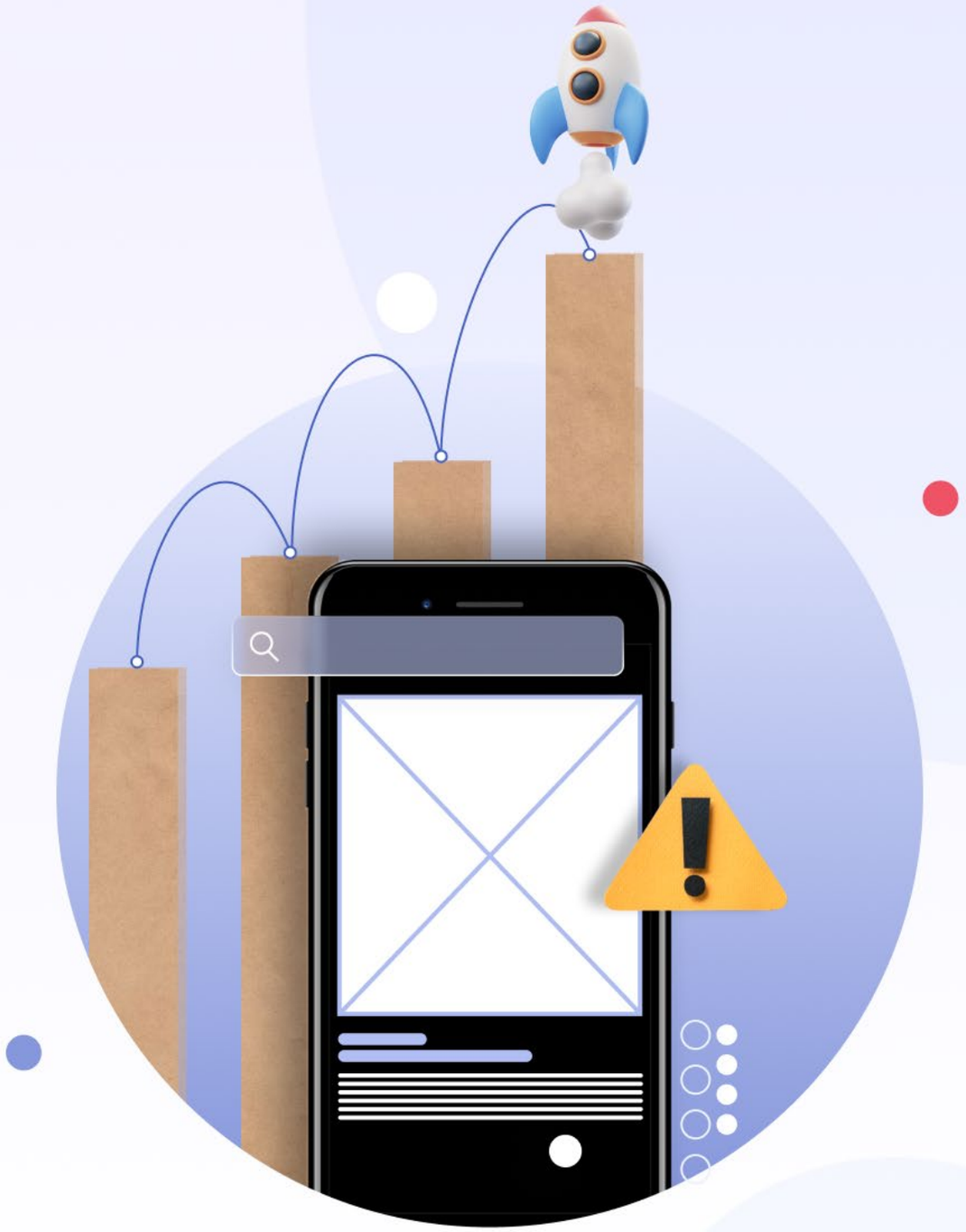
i. Espresso
ii. TestComplete
iii. monkeyrunner

For iOS

i. XCTest
ii. KIF (Keep It Functional)

Android and iOS

i. Appium
ii. Calabash
iii. testRigor



Phase 6:

Prepare your applications for quick and error-free deployments

How to prepare and publish your application on App Store and Play Store?

After successfully designing, developing, and testing your mobile application,it's time to deploy it. Here's a quick checklist to help you make sure everything is in place before publishing your application:-

01. Conduct a detailed analysis of technical and legal prerequisites before submitting your application to App Store and iOS app store. For instance, App Store requires creating a Developer Account at an annual cost that includes access to the beta version of Apple software.

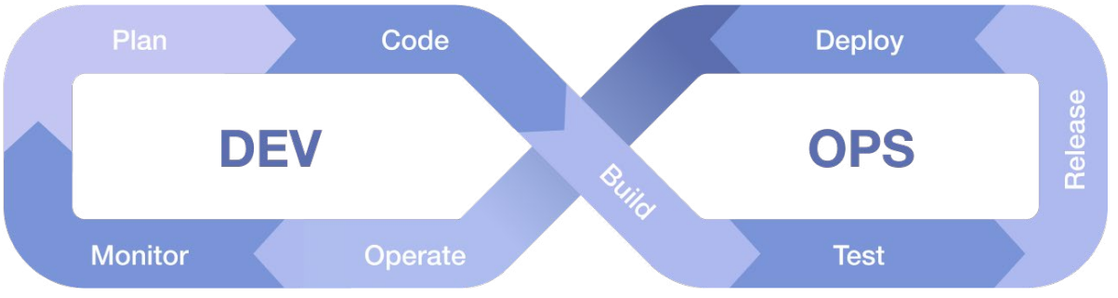
02. Learn the official guidelines of the platform and include resources like Privacy Policy URL, promotional graphics, test accounts, app screenshots, and more. Once you are well-acquainted with the requirements, you can move ahead with creating a New App in App Store Connect, including a Product Page, and sending it for final review.

03. Perform a thorough security audit to ensure that all the sensitive data is encrypted before it can be stored locally in the database, shared preferences, or a file.

04. Enable easy user feedback and add FAQs in the feedback section that can resolve some of the queries users may face. In addition, you can also share access to the public issue tracker, so your users can report bugs that they find and may also be visible to other users.

How to leverage DevOps automation and CI/CD pipelines to make deployments faster?

Any enterprise mobile application today requires cloud services. And implementing DevOps and CI/CD pipelines will help you make the most of the flexibility and scalability that the cloud offers.



These are some of the DevOps practices that you can leverage while developing your application:

- ☑ Adopt a plan and track everything to help your teams manage the existing processes more efficiently.
- ☑ Leverage dashboards to control development progress
- ☑ Implement version control to track the frequent updates
- ☑ Maximize automation to streamline your workflow
- ☑ Increase your testing to repair issues that might occur at the early stages of development.
- ☑ Ensure continuous monitoring of processes to prevent failed deployments.

- One of our clients approached us to revamp a fitness app that had become slow, outdated, and unable to handle increasing traffic. Eventually, the organization suffered significant damage to its overall growth and capacity to handle its multiplying user base. Moreover, the client was looking to achieve zero downtime while migrating from their legacy application to a new one.

  We delivered a solution that leveraged Docker, Semaphore, and Cloudflare that could become a solid foundation for upgrades and version releases in the future. Additionally, we designed a mobile app architecture that could handle unprecedented scaling with minimal downtime and deliver the final product in only 12 months.

How to select an enterprise mobile app development company for your next project?

Enterprise mobile application development involves making the right decisions in terms of architecture, methodologies, tools, frameworks, and much more. It can be daunting for a development team to find the relevant solutions and leverage them to ensure success. A development partner with expertise in enterprise app development will be able to provide the right services and tools that align with your business needs. That said, selecting the right partner is no cakewalk, and things can go south real quickly with a wrong choice.

Here's what to look for in a potential partner in your app development process:-

- Check for development methodology (KISS, DRY, SOLID for mobile application development.)
- Review total years of experience
- Understand the latest trends in enterprise application development (Blockchain, AI, omnichannel strategies.)

Simform, with its **10+ years** of experience, has successfully delivered state-of-the-art applications to our multiple clients to help them achieve their business goals and reach users faster. We update our tech stacks and best practices to align them with current trends to build software solutions that are future-ready and meet the evolving needs of enterprises. **Connect with us to know more about our services!**

We are Simform!

With over 10+ years of experience under our belt, we are more than ready to supercharge your project with extraordinary code. 10 years ago, Simform was one person. Today, we're over 600+ people strong and growing.

Simform is a custom software development powerhouse. Let's get in touch to discuss your next project!

Contact Us

- Managed software engineering teams
- Quality Engineering and Testing
- Cloud native development and modernization
- DevOps