

Everything You Need to Know About Mobile App Development Architecture



Mobility is a new necessity of our era. We're accustomed to the ease of use and on-demand resources. We're entering a phase where "anything is possible". The development of mobility lends smartphones powerful capabilities and provides fertile ground for many mobile apps. We're witnessing rapid growth with new innovations appearing every day.

The Game Has Already Started

In addition to traditional approaches, companies are adopting mobile apps to boost their business value. This year's global mobile market revenue is reportedly expected to reach 77 billion US dollars - a laudable growth from \$58 billion in 2017.

However, heavy competition means not every player can reach their goals. The main reason for failure is gaps in mobile app architecture and development.

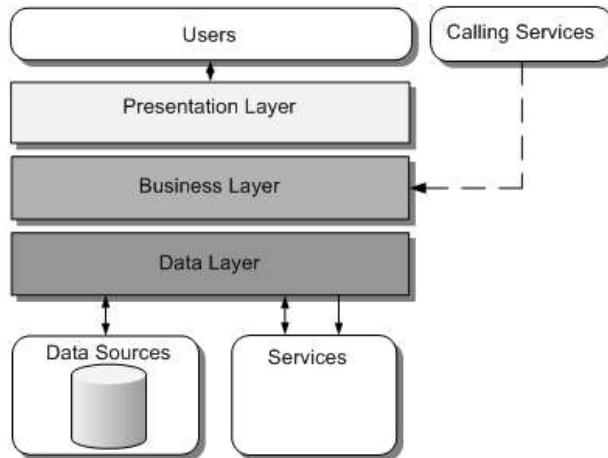


Companies are using mobility to improve employee productivity. This has led to fierce competition among software development companies. As a result, many fall behind.

Often the reason for the failure is ignorance of mobile app development architecture, one of the founding principles of enterprise software development.

What is Mobile App Architecture?

Application architecture is a set of technologies and models for the development of fully-structured mobile programs based on industry and vendor-specific standards. As you develop the architecture of your app, you also consider programs that work on wireless devices such as smartphones and tablets.

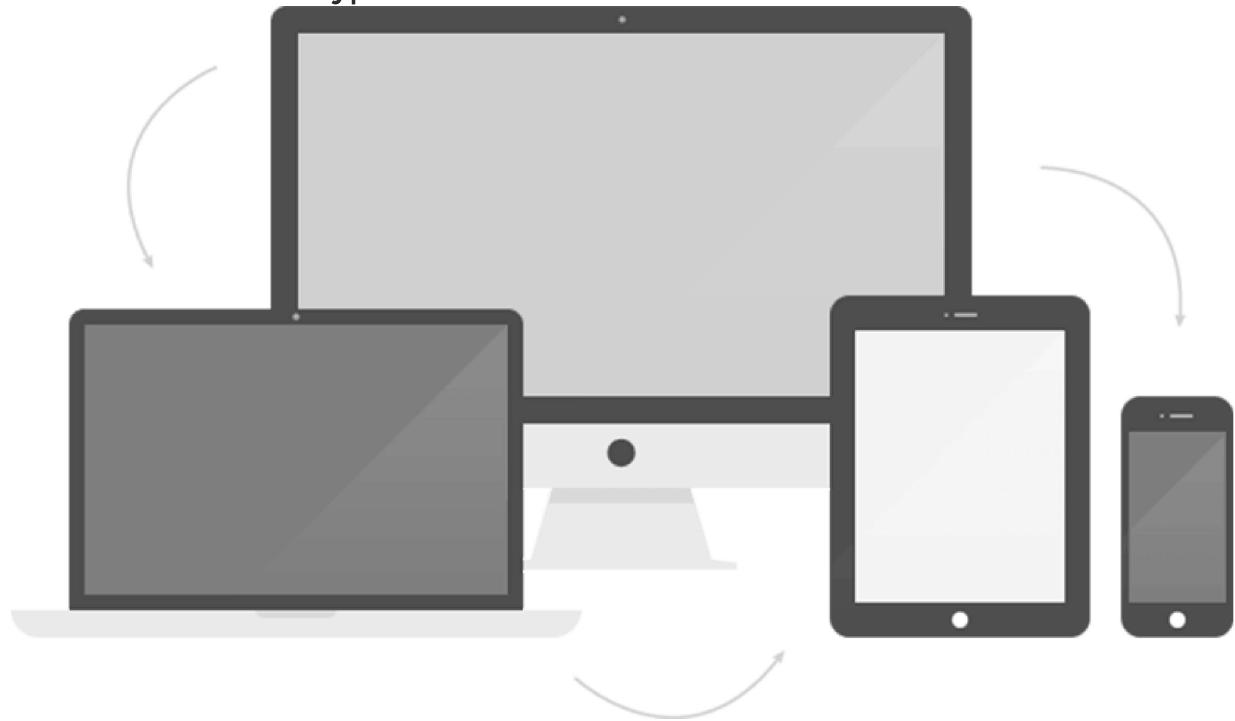


Mobile app architecture design usually consists of multiple layers, including:

- **Presentation Layer** - contains UI components as well as the components processing them.
- **Business Layer** - composed of workflows, business entities and components.
- **Data layer** - comprises data utilities, data access components and service agents.

Things to consider before attempting mobile app architecture development

Determine the device type



There are different types of smartphones and it is important to evaluate the device type and its characteristics before choosing a specific app architecture. You should keep in mind the following device features:

- Screen resolution
- Screen size
- CPU Features
- Storage Space
- Memory
- Availability of the development framework

Wondering why we should determine the device type when choosing the architecture of the application? Because an app's intended features may have some specific software and hardware requirements.

Consider the bandwidth situation

It is important to consider the web scenes in those regions where your target audience lives, such as fluctuations in internet speed, which have a negative impact on user experience. Your client may not be able to connect to the internet all the time. So, when creating a program, you should be thinking about the worst of internet conditions.

Think about power consumption and speed when choosing software and hardware protocols. Also create a caching, state management and data access mechanism that can be tuned to slow and intermittent web connections.

interact intuitively. Also, keep in mind that a messy user interface can make your app fail.

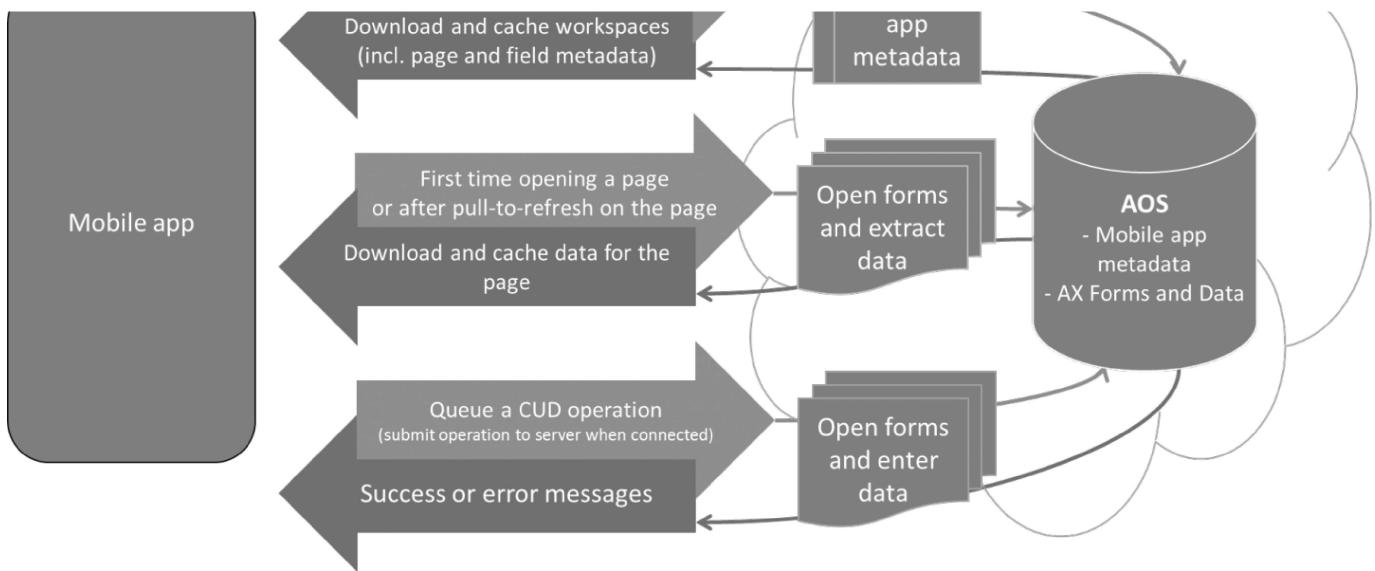
Choose the correct navigation method



Software navigation is a crucial aspect, including front-end and back-end. When choosing a navigation strategy, you should bear in mind both your preferences and the needs of the app. This is crucial because it will have a huge impact on the user experience. Of the various navigation means available, you should analyse and select those most appropriate for your case. Some of the most popular include:

- Stacked navigation bar
- Tag driver
- Modular controller
- Single view
- Scroll view
- Gesture-based navigation
- Search driven navigation

The next question is how to make sure your application meets your target audience's needs. For this, you need to follow specific guidelines when building your app for efficient execution in different situations.



Any program can be divided into three different levels, as described above. Let's look at the following guidelines at each level.

Presentation Layer

The main focus of this layer is how to present the app to the end user. When designing it, app developers must determine the correct client type for the intended infrastructure. Client deployment restrictions should also be kept in mind.

- Another prerequisite for designing this layer is choosing the correct data format and using powerful data validation techniques to protect your apps from invalid data entry.

In addition, our mobile app developers also focus on decoupling business logic from the presentation code.

Business layer

Caching, logging, authentication, exception management and security are all matters of concern. According to our developers, you need to split tasks into different categories to reduce the complexity of this layer.

- For complex rules, app policies, data transformations and validation, you must identify the set of demands separately for each of the categories.

Data Access Layer

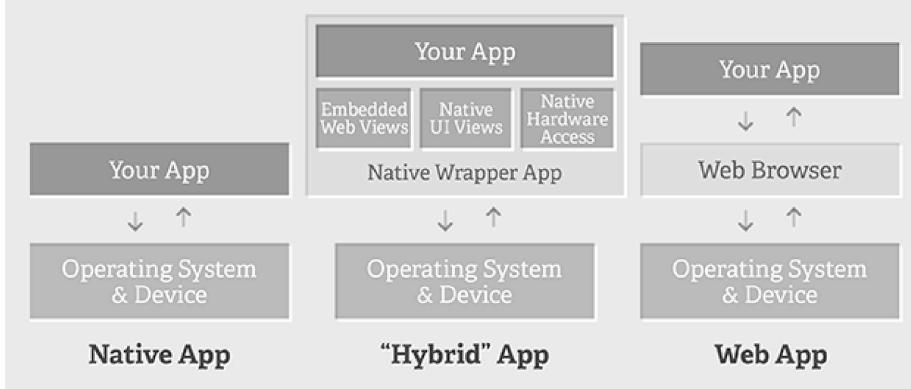
This layer complies with the app requirements to facilitate secure data transactions. You must design this dimension so that it can be rescaled over time as business needs change.

data transmission across all boundary layers. All data access functions are encapsulated in this layer, which manages all the required connections. In addition, it handles all data sources and CRUD (Create, Read, Update, and Delete) operations.

We also apply the least privileged method, thus preventing any attempt to destroy or steal data by protecting data access mechanisms.

Choosing the architecture for your mobile application

Mobile App Technology Stacks



We've been providing our customers with software development services for more than eight years. Here's a suggestion from our team of developers and designers to help you choose the right architecture for your program:

- If you have no budget constraints, it's advisable to develop native programs as they offer intuitive functionality and performance.
- You can also opt for the "develop once, run anywhere" concept, but take a different approach. You can either create a modest development effort for a mobile web app or a hybrid application, or else use a multi-platform framework for cross-platform solutions and provide a richer experience while gaining access to a wide range of mobile devices.
- If your audience includes iOS and Android users and your goal is to provide the best user experience, Magora recommends the development of native applications. However, if you need to involve all other operating systems, including Windows, multi-platform development may be an economical option - though availability may be compromised.
- We can also combine native and web development to complement each other, the better to help you engage with customers and employees. While native applications offer the best user experience, web applications ensure the visibility of your business by offering customers the choice of a variety of devices.



By now, you may have come to understand the importance of mobile app architecture for successful and cost-effective development that not only guarantees perfect mobile presence but also extends your business reach.

- To set the appropriate mobile software architecture, we first need an overall picture of your business - this way we can set future goals for process multiplication and daily routine automation.

So, to provide the flexible software solution your company needs, we must begin with market research and competitor analysis.

Want to know what else should be kept in mind when designing a mobile app architecture? We are always ready to answer all your questions.



Max Summers

September 24, 2018

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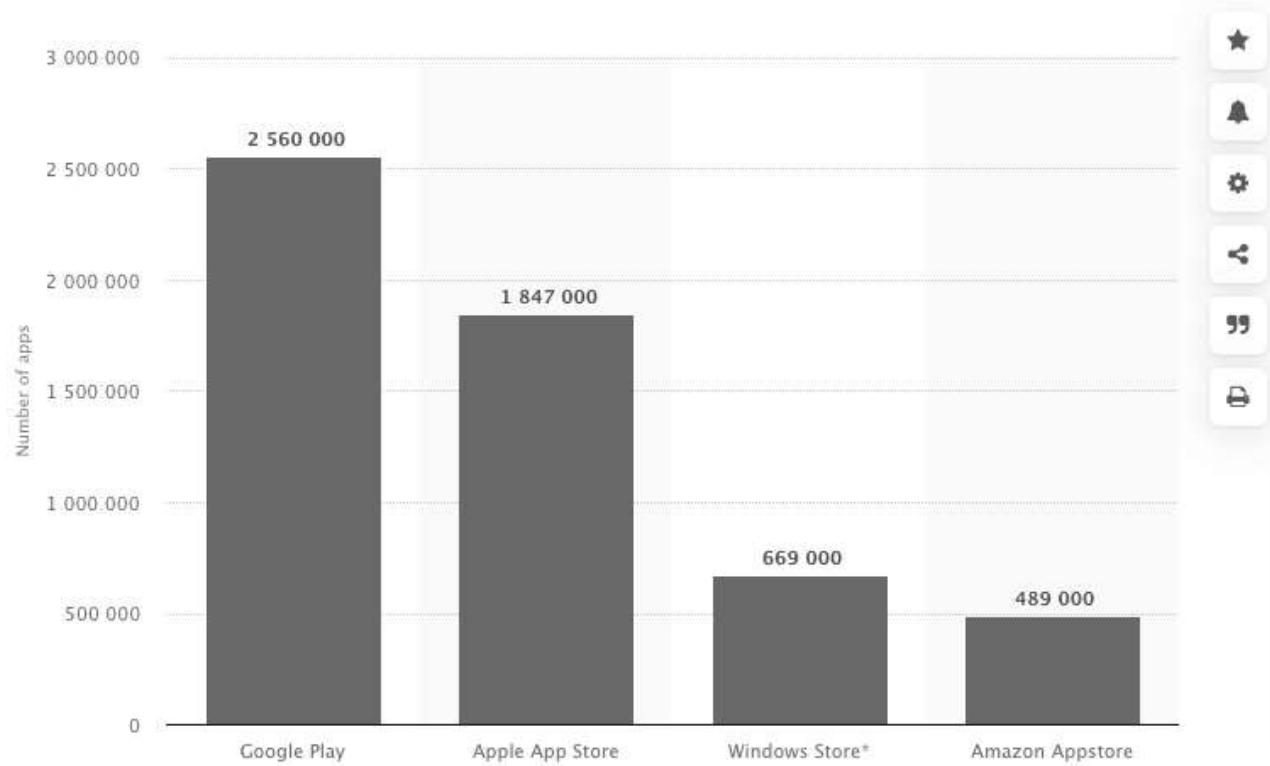
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Business enterprises from all over the world are focusing on [building the apps](#) to reach their target audiences more simply and proactively, solving their

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Although the competition is fierce nowadays. According to Statista, as of the first quarter of 2021, Android users were able to choose between 2.56 million apps, making Google Play the app store with the biggest number of available apps. Apple's App Store is the second-largest app store with almost 1.85 million available apps for iOS.

Applications generate revenue in several different ways, such as charging users a small amount of money for the use of an app (an average of 1.02 U.S. dollars per app in the Apple Store), charging for access to premium features of an otherwise free app or simply selling ad space.



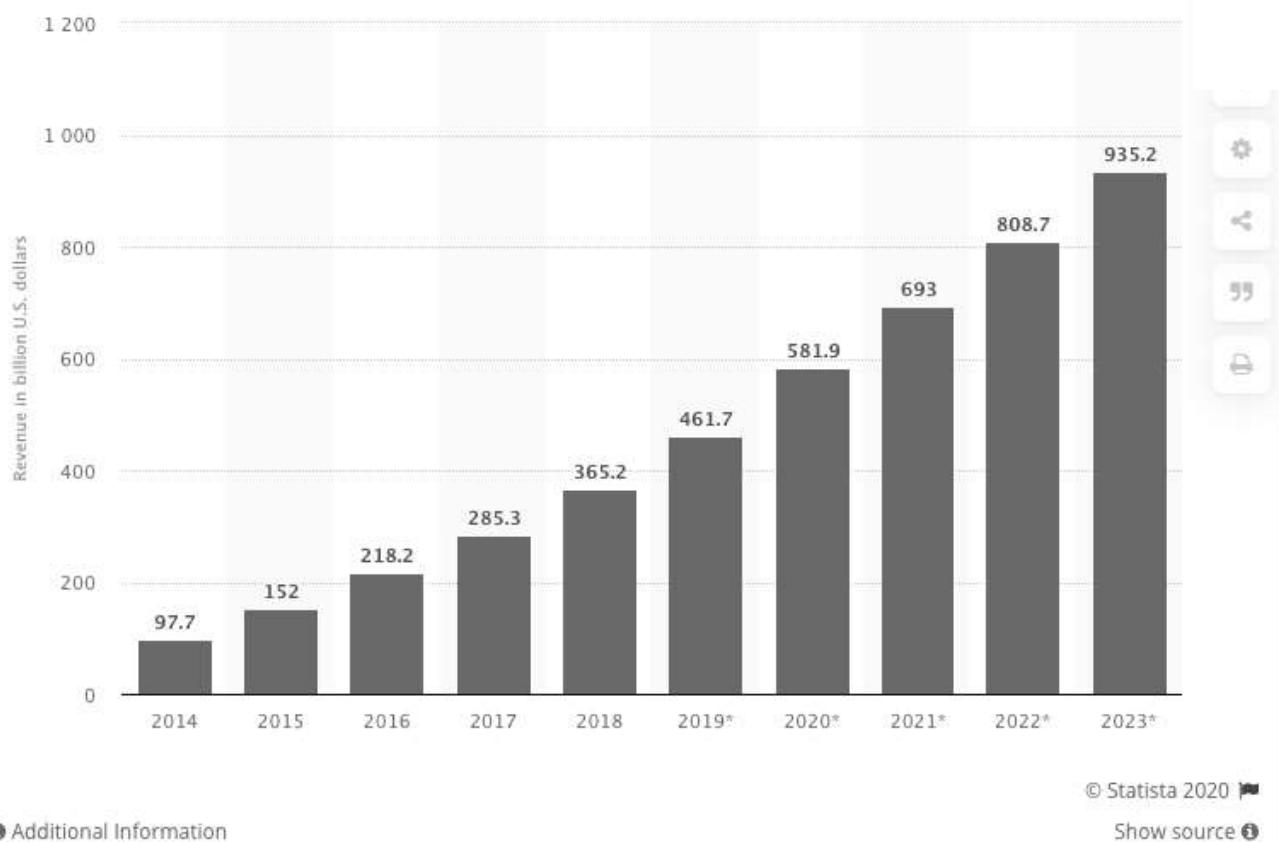
Details: Worldwide; Appfigures; VentureBeat; Q1 2020; last reported figures

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Talking about revenue, mobile apps are projected to generate more than 935 billion U.S. dollars via paid downloads and in-app advertising in 2023.



Source: [Statista](#)

To succeed in this battleground, it is essential to choose a suitable mobile app architecture. Most of the apps fail due to poor architecture. Here's our expert overview of mobile app architecture and mobile app development process basics.

What Is Mobile App Architecture?

In the process of creating any mobile or web application, you should make sure every component is well-built. Even the smallest problems that may arise in the process of creating a mobile app architecture can undermine the quality of the final result. As the saying goes, if you want to do something, do it well. This is why every popular Android and iOS application has a highly reliable mobile app architecture and successfully wins over its users.

What is mobile app architecture? It is a set of structural elements and their interfaces from which the system is composed, as well as their behavior in the

program, and the whole work of the mobile application is determined by its quality. By missing an important element in creating a mobile app architecture you endanger the success of your project. The complexity of building high-quality architecture depends on the size of the application. The proper architecture will allow for saving a lot of time, energy, and costs in the future.

What Is Mobile App Architecture Diagram?

First of all, having the right architecture means that your mobile application is independent of external resources. All successful projects that are now running on iOS and Android were created by the manual labor of developers and were not subjected to the use of frameworks or similar means. Architecture should not rely on the existence of any library. So you can use frameworks as tools, and not try to drive your system into their limitations. Your mobile application architecture diagram should not be exposed to other operating systems and databases so that it can function regardless of the status of other programs.

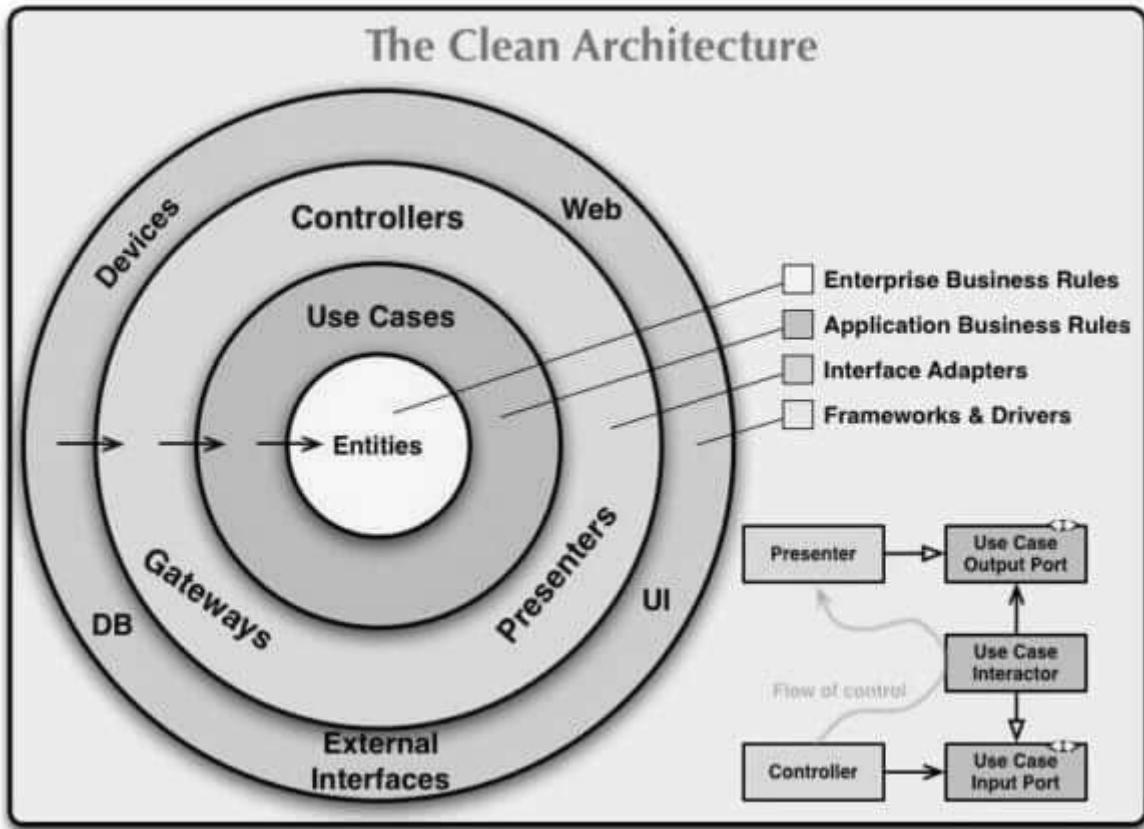
Mobile App Architecture Example

Good architecture is, first and foremost, a profitable architecture that makes the process of developing and maintaining a program simpler and more efficient. A program with a good architecture is easier to expand and change, and also to test, debug, and understand.

For example, the Clean Architecture is a good fit for large scale projects with big budgets.

This type of architecture is universal, allowing for the installation of various plugins and quick troubleshooting, but it should not be created using frameworks. The program code must be written from scratch.

Let's look at an example of successfully implemented mobile application architecture:

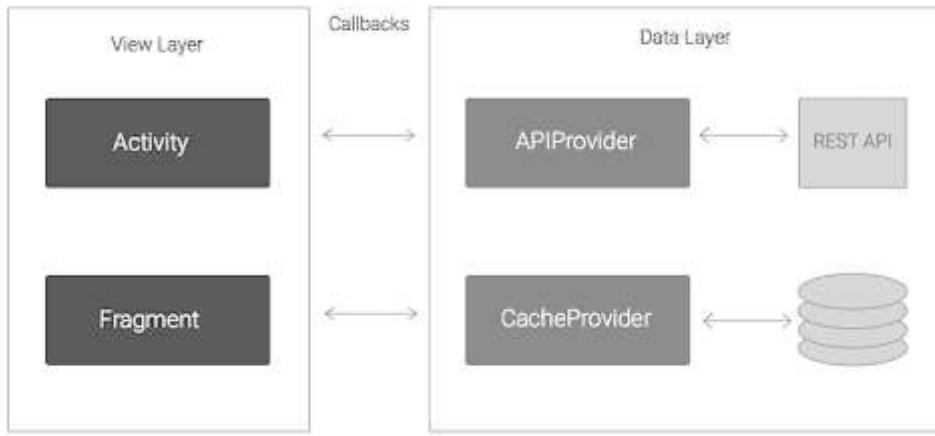


Each layer of such a mobile application is independent of other programs and components and entitles a key fragment containing the logic of your application and important objects. All layers are connected by the Dependency Rule, which states that in the source code, all dependencies can only be specified internally. For example, nothing from the outer circle can be mentioned by a code from the inner circle. This applies to functions, classes, variables, or any other entity.

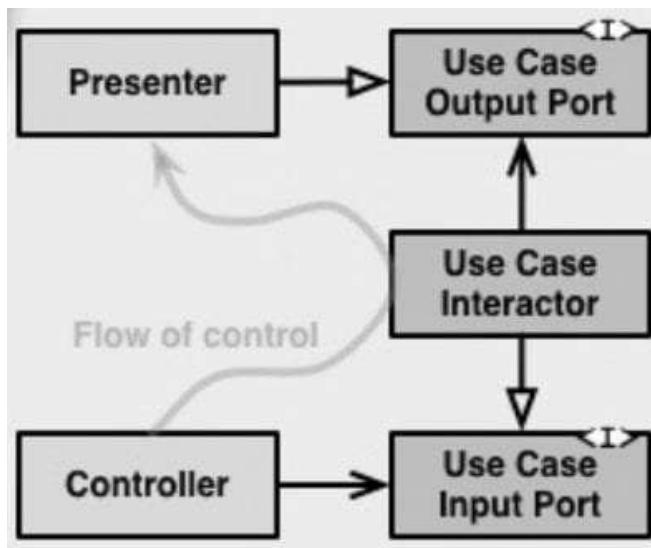
What Is Android Mobile App Architecture?

Back in the past, developers did not have any libraries to work with the network, and `AsyncTask` was still an important component in the creation of Android mobile app architecture.

Let's look at the classic system of creating architecture for Android applications:



In today's reality, the implementation of Clean Architecture is the best solution for reliable operation. This architecture will allow your application to be independent of frameworks, databases, and more. Transitions between layers in such Android mobile app architecture are carried out through Boundaries, that is, through two interfaces: one for the request and one for the answer. They are needed so that the inner layer does not depend on the outer layer (following the Dependency Rule), but at the same time, it can transmit data to it:



In order for a dependency in such an Android mobile application architecture to be directed towards the reverse flow of data, the principle of dependency inversion is applied (the letter D from the abbreviation SOLID). That is, instead of Use Cases being directly dependent on the Presenter (which would violate the Dependency Rule), they depend on the interface in its layer, and the Presenter must implement this interface.

iOS Mobile App Architecture

The standard iOS mobile app architecture can be divided into four blocks:

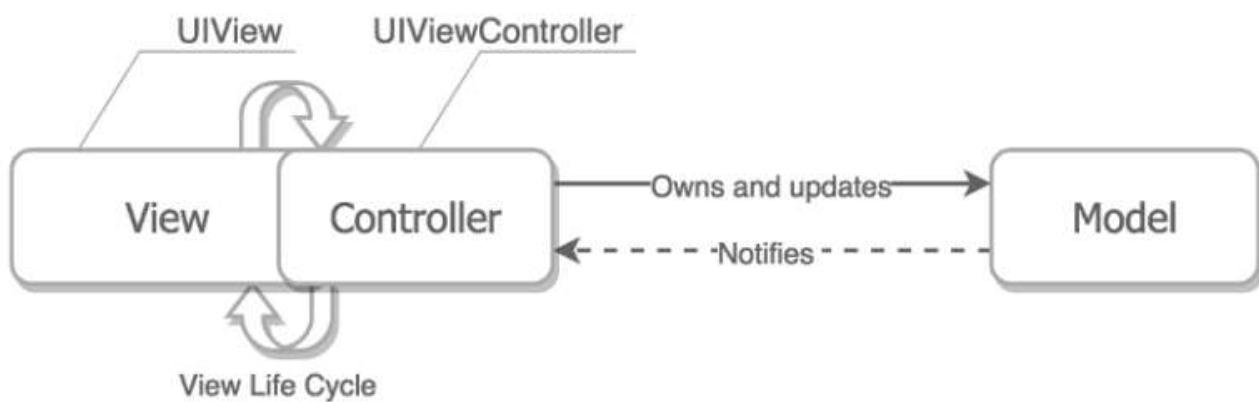
Kernel level (Core OS) — works with the file system, controls the validity of various certificates belonging to the applications. Also responsible for the security of the entire system. Contains low-level access to the elements of the device.

Core Services (Core Service) — provides access to databases and file controls.

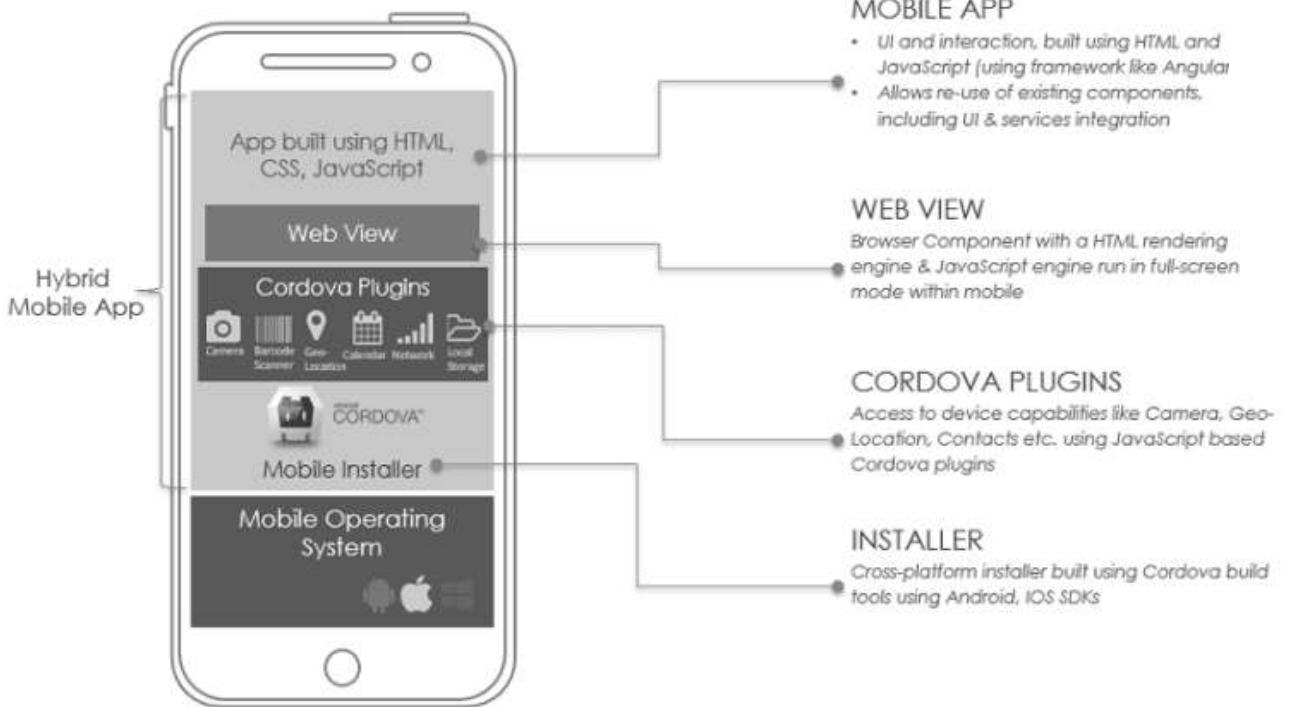
Media level (Media) — contains tools that allow for processing most media data formats.

Interface level (Cocoa Touch) — has many elements for creating mobile interfaces, and also provides the remaining layers with information coming from the user.

An MVC (Massive View Controller) and its prototypes are used to create a high-quality iOS mobile application architecture. Cocoa MVC encourages you to write Massive View Controller because the controller is so involved in the View life cycle that it is difficult to say that it is a separate entity. Although you still have the opportunity to ship some of the business logic and data conversion in the Model, when it comes to shipping work in View, you have few options:



In most cases, the entire responsibility of the View is to send actions to the controller. In the end, it all ends with the View Controller becoming a delegating `part` and a `data source`, as well as a place to start and cancel server requests.



Enterprise Mobile App Architecture

For the successful functioning of their businesses, many companies use corporate applications that make it easy for the client and employees to communicate with the company. Inside the application, functions of monitoring, purchases, communication, and filtering services and products from the company are used. For a modern business, one of the priorities is the strategic use of IT technologies and the implementation of business objectives in such a way as to gain a competitive advantage in the market.

At the same time, in the enterprise mobile app architecture, there is often a discrepancy between the IT infrastructure and business requirements, which is caused by rapid market changes. The problems of the information architecture of business solutions are most often associated with insufficient speed and low scalability, unreliability, as well as the complexity of updating and maintaining software.

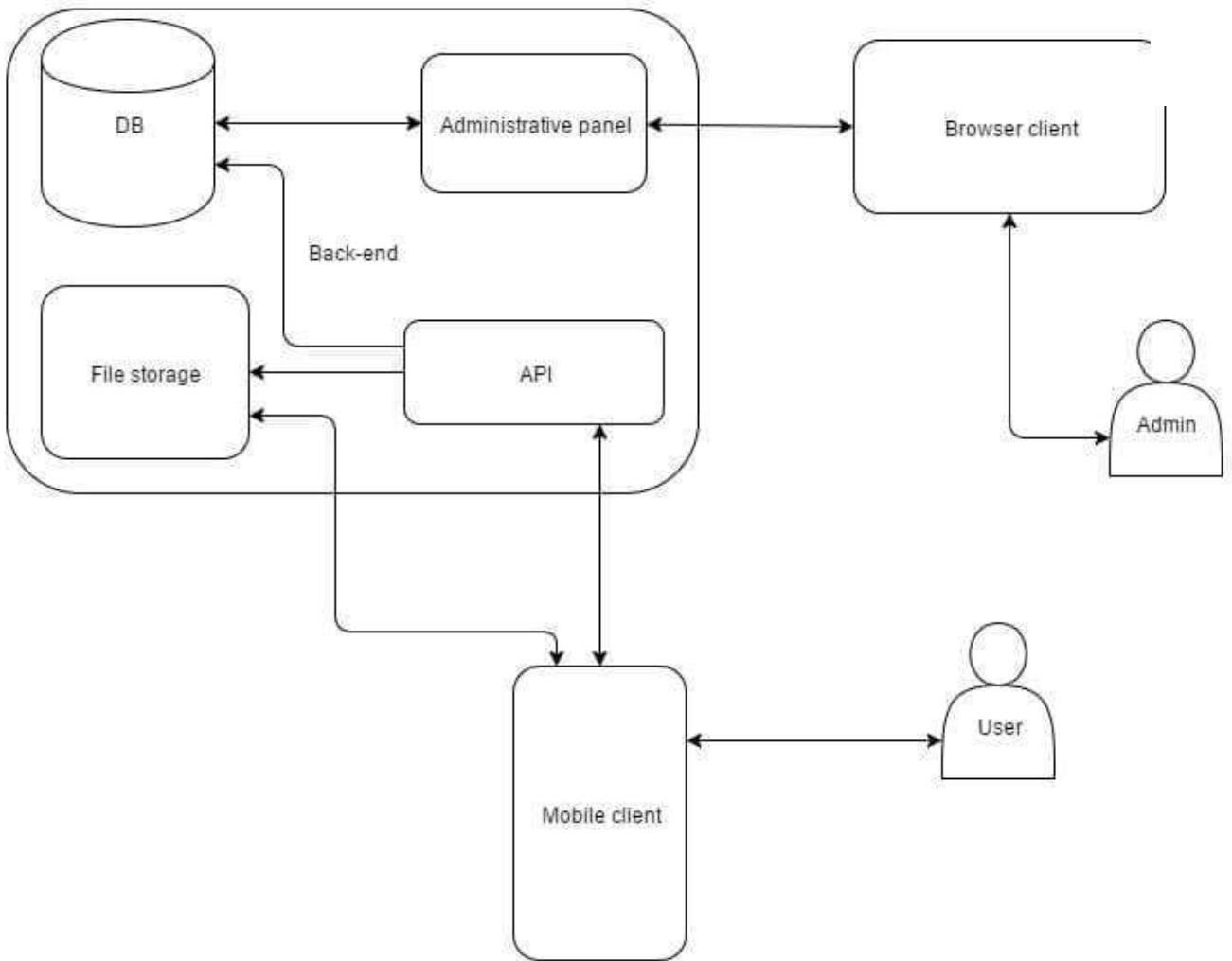
Mobile Application Architecture Properties

Now we know that for high-quality, uninterrupted operation of your mobile application, it is recommended to use the Clean mobile application architecture. When creating a suitable platform for the convenience of your client and employees, you need to follow a few tips that will help ensure your mobile application architecture is of the highest quality. It is important to put together the right technical requirements for the development team so that the experts have a joint goal and working methods.

Mobile Application Architecture Best Practices

In the process of creating a high-quality mobile application architecture, it is necessary to keep the synchronization of all the processes and capabilities of the application. What features really will be in demand in the future application is still a big question. Therefore, to include all ideas in the first version is not the best solution. This will increase the development time, overload the interface, and postpone the “combat” product launch.

Here we can see the standard model of the data system in the classical mobile enterprise application architecture:



Architecture for Mobile Application & Tips for Making It

A well-designed architecture is needed for all applications, both complex and simple. Using architecture for mobile application saves time, effort, and costs. A program with a reliable architecture is easier to tweak, test, and debug.

How to understand if your application has a good architecture? Here is the checklist:

Efficiency: the application performs the tasks and performs the functions in any condition. The system is effective, reliable, and copes with all the loads.

Flexibility: the chosen solution is easy to change, and errors are few. You can change one element, and it will not be fatal, influence the other one in a

Extensibility: you can add as many functions as you like to the application

Scalability: time for development and updates decreases. The solid architecture allows you to direct development in several parallel threads.

Testability: The architecture for mobile application is easily tested, which means that the number of errors decreases and its reliability increases.

Understandability: the code should be understandable to as many developers as possible. A lot of people are working on the application. A good architecture allows beginners to understand the project quickly.

Elements to Consider Before Developing Your Mobile App Architecture

For a solid background for a mobile app, some things should be considered first and foremost. Precisely, building a mobile app requires your foresightedness in four key dimensions:

1. Choosing the mobile app dimensions that fit your preferred devices
2. Prescribing scenarios for a different quality of Internet connection
3. Polishing UI details for your target audience
4. Picking the proper navigation between the elements on a screen

Here are the specifics for each of these elements.

Determining the Device Types

The parameters of smartphones determine the specifics of your mobile app. Think in advance of how it will run on each screen (meaning its size and DPI), how the app will be compatible with the processor (CPU), and how much

RAM it will need. Pay proper attention to these hardware and software details

Also, make sure your app will work great not only on a smartphone and tablet but also on different smartphone models.

Considering Bandwidth Scenarios

Another thing to consider is the compatibility of your mobile app with different types of Internet connection. Many developers don't acknowledge this nuance while working on mobile app architecture. Be more prepared and get ready for the worst scenario.

This problem is worth your attention while meeting your remote target audience. All over the world, the availability of the Internet network will differ. Some countries already have 5G, while others still survive on 3G. Moreover, the speed and battery usage characteristics matter here. Thus, ensure your mobile solution has everything needed to guarantee a comfortable experience for your users anywhere.

Defining User Interface

An awesome UI is always a must for a mobile app. Built on the basic presentation layer, it becomes the point of interaction with users. The key to success is to give them a solution that is both simple and creative. Besides, your design choice should always meet the demands of your target audience.

Picking the Right Navigation Method

Finally, proper navigation is about finding a fair compromise between user expectations and app restrictions. It's the result of exquisite artistry in linking the frontend and backend in one solution.

Among the possible options, pay your attention to these top 5 methods that users like:

Stacked navigation bar — you design a fixed bar and put there links to all other elements within your mobile app

Tab controller — a container that allows switching between the groups of tabs with links

Modal controller — the screen menu that allows switching between tabs and links

Single view — a screen with one element and an option to go back

Gesture-based navigation — the intuitive tool that encourages to use finger combinations or efficiently interact with the Home button to cause an action on the screen

To pick the best navigation method, learn your customers! Some styles are intuitive for them, while others make them confused or bored.

How to Choose the Right Architecture for Your Mobile App?

When it comes to the specifics of building an app, everything starts from these fundamental layers:

1. Data layer — the data-related platform within a mobile app
2. Business logic layer — the place for all the domain processes and operations
3. Presentation layer — all the technical details connected with the user interface

This multitier architecture dictates the rule for software development: your team should build each dimension separately and make them work together smoothly. At the same time, this initial complication ensures addressing complex issues fast and without changing the entire app.

Data Layer

This layer is all about the safety of data maintenance — including access, utilities, and service tools. It's the background from which you can further develop business logic and presentation peculiarities. The patterns you choose for the core operations determine the way your app will work.

Make sure the design you've built here is flexible enough to meet the changes in your business needs or your customers' expectations.

Business Logic Layer

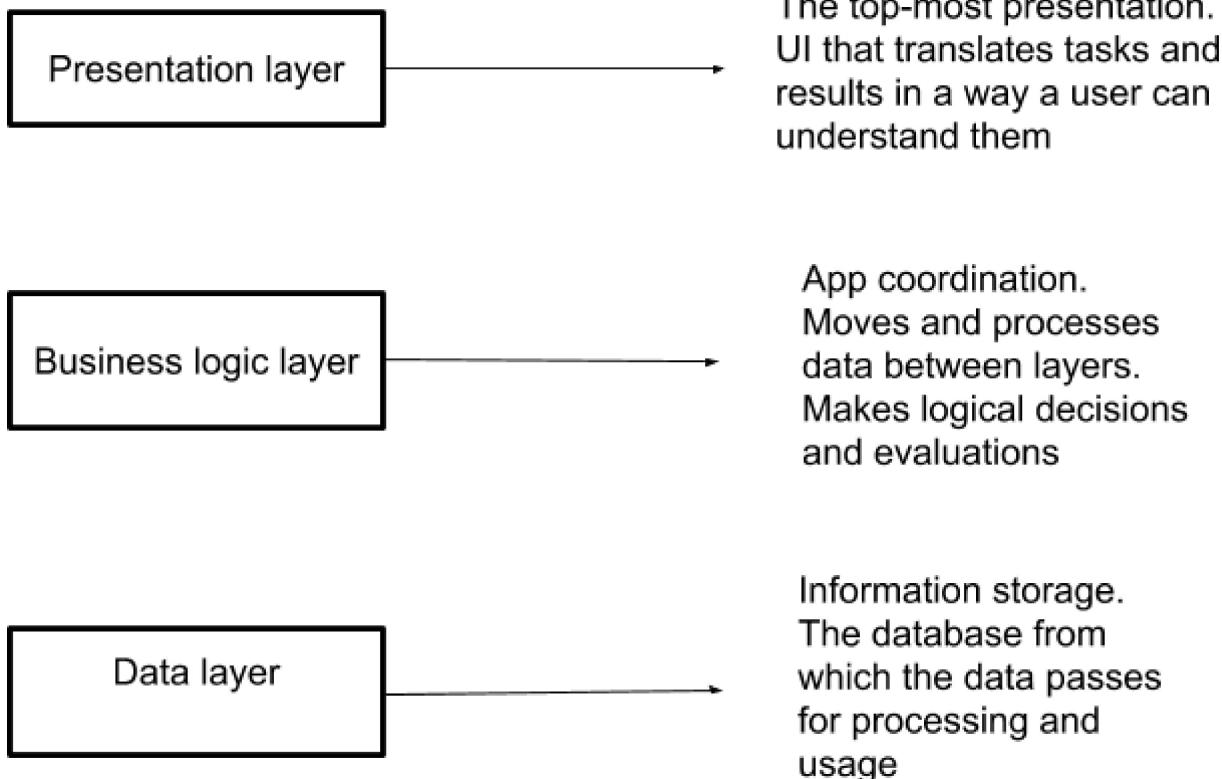
This platform hides all the management work done to create a mobile app: you will have separate tasks for logging, caching, validating, and other technical operations. Also, this is the place for complex business procedures and corporate policies. In other words, here you have an application facade with underlying workflow, components, and entities.

In short, the business logic layer is the place for everything connected with logic and business.

Presentation Layer

The important step here is to define the customer profile so that the images on the screen and the arrangement of elements satisfy your users. Now, your customer is always right — even in the decision on the data format. This layer is not about the exact choice of your data, though — it's about designing the format that prevents invalid data input.

By considering these specifics, how to choose the right architecture? The answer is simple: start with the end. Meet your customers.



5 Steps to Help You Choose the Right Architecture for a Mobile App

Meet Your Customers

To make a successful mobile app, think of your idea as a solution to particular customer pain. Find all the information about your future clients: who they are, what applications they use, what they need. And then, think of how you can make a comfortable mobile app for them. For example, the older your clients are, the more simplistic design they like. Youngsters enjoy motion design while the elderly get confused about it.

To supplement your findings, investigate some industry-specific requirements. Here, your corporate peculiarities can give you some clues about the work of your mobile app. For example, fashion retailers get the most from a web app (where users can see all the product categories and photos in big dimensions). But taxi providers are more convenient for users through a mobile app.

Start Developing a Test App

From the very beginning, don't save on this stage. Start building a native program — this solution is ideal for intuitive functionality and smooth operation. With the information about your users, make everything possible to create a solution that will deeply satisfy their needs and solve their sharp problem.

If your users need various platforms to perform their tasks other than Android and iOS, adopt cross-platform development. If these two most popular platforms are enough, be safe to work with native app development only.

After making this decision, develop the main functionality on its basis. Create the environment your customers dream about: whether they want to work offline, have a specific navigation method, reach interesting content in a feed, etc.

And of course, don't forget to check with users whether they like it! The choice of right architecture is always closely linked with your app's ability to satisfy your target audience. In the end, customers don't mind better convenience, which means the presence of the home menu, notifications, and widgets, along with high speed and stored content. Make sure your app will meet all these requirements — both audience-specific and general preferences.

Polish the Key Functionality

Once you've completed the main preparations and the reality check, you can turn to work closely with specific platforms and offline functions. This step means determining how you will perform the app technically and according to some industry-specific requirements.

First, reconsider all the advantages and disadvantages of different architecture models from the standpoint of technical details. For example, native apps have the best performance and leading user engagement but require installation and are very expensive for users to download. In their turn, web apps are SEO-friendly and don't require installations but need an Internet connection and

(PWAs) — they enhance the experience of web apps with greater reliability, engagement, and speed.

Then, make sure your app includes offline functionality. Users hate depending on their Internet connection while interacting with an app, so you should consider this request. Design the basic functionality you can move offline. Involve the synchronization with the server once the user is connected to the Internet. For offline functionality, you need either native apps or PWAs (note that they depend on a platform still). That's why we recommend relying on these two mobile app architecture options from the very beginning.

Check the Readiness of Your Development Team

Your business can possess some constraints for the project. Thus, identify them by checking your team's capabilities.

Among all, determine the exact development timeframe. Of course, each entrepreneur wants his/her business idea to become real ASAP, but your team needs time to complete it. Thus, discuss with your team whether they possess the resources and knowledge necessary for the development before the project actually starts.

Pay special attention to their skills. If you want a native app, knowing Swift, Objective-C, C, C++, Kotlin, and Java is needed. For web apps, the arsenal of HTML, CSS, and Javascript is enough. Also, ensure your team is acquainted with PWAs, hybrid apps (especially the solutions like Cordova/PhoneGap and Ionic), and Web Native. If you identify some gaps in knowledge, hire new specialists to make the app, or initiate training for in-house team members.

Optimize Your Budget

Once you've collected all the data concerning customer preferences, basic functions, enhanced features, and team constraints, you can calculate the costs. The right architecture of a mobile app is always a balance between the key



Check all the maintenance and support expenses. Revise the decision on native apps or multiple platforms, if needed. And, of course, weigh the benefits in terms of return on investment before making the final decision on the mobile app architecture.

Final Tips for Your Mobile Architecture

The creation of mobile architecture is a sequential plan that must be completed before the development process begins. This plan provides a map of how the various components of the application should be organized and connected to each other. It presents guidelines that should be followed during the development process and some sacrifices (usually associated with a large number of classes and templates) that will ultimately help you create a well-written application that will be easier to test, expand, and maintain.

Read our full review of [iOS 14 supported devices](#), release date, and more.

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Successful Mobile Applications: Using UI Design Patterns



By Jerry Cao on 25th July, 2014

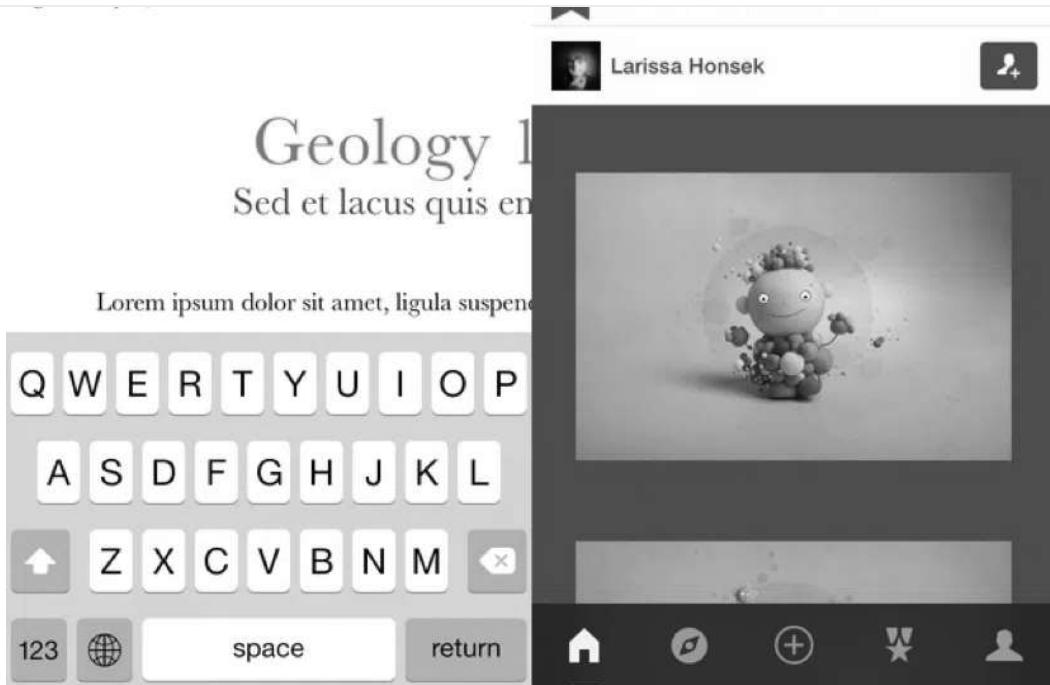
#UX Design

The most successful mobile apps are the easiest to use. They do not require much time to learn functionality, nor do they require much effort to maintain usage. People like simplicity – nobody wants to spend an hour trying to figure out how an app works. Yet at the same time, you also want an app that delivers useful value to some aspect of your life. How can you balance these two qualities in the design of a mobile application?

One way to do this is through the lens of UI design patterns. **Design patterns are formalized best practices that designers, developers, and product managers often use to solve common design problems.** Understanding what the various mobile design patterns are will help you recognize when certain patterns can make your design most useful and intuitive for users.

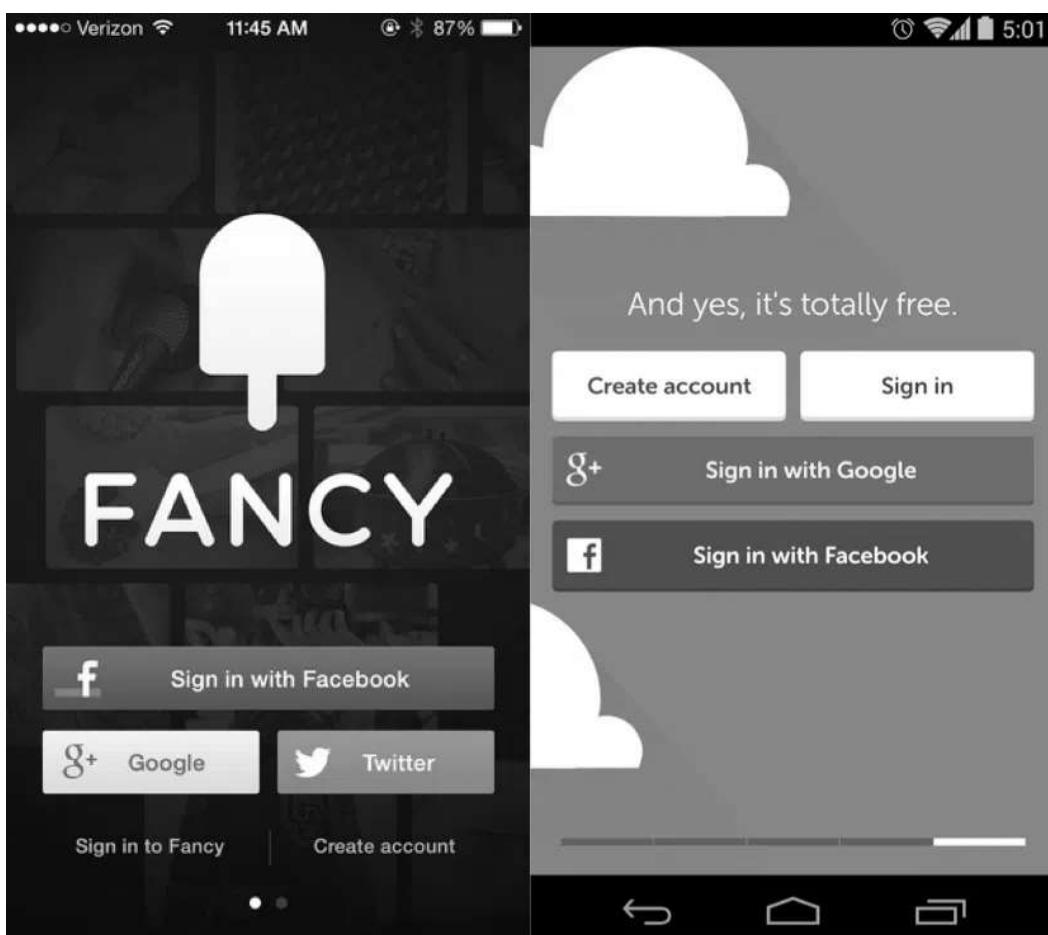
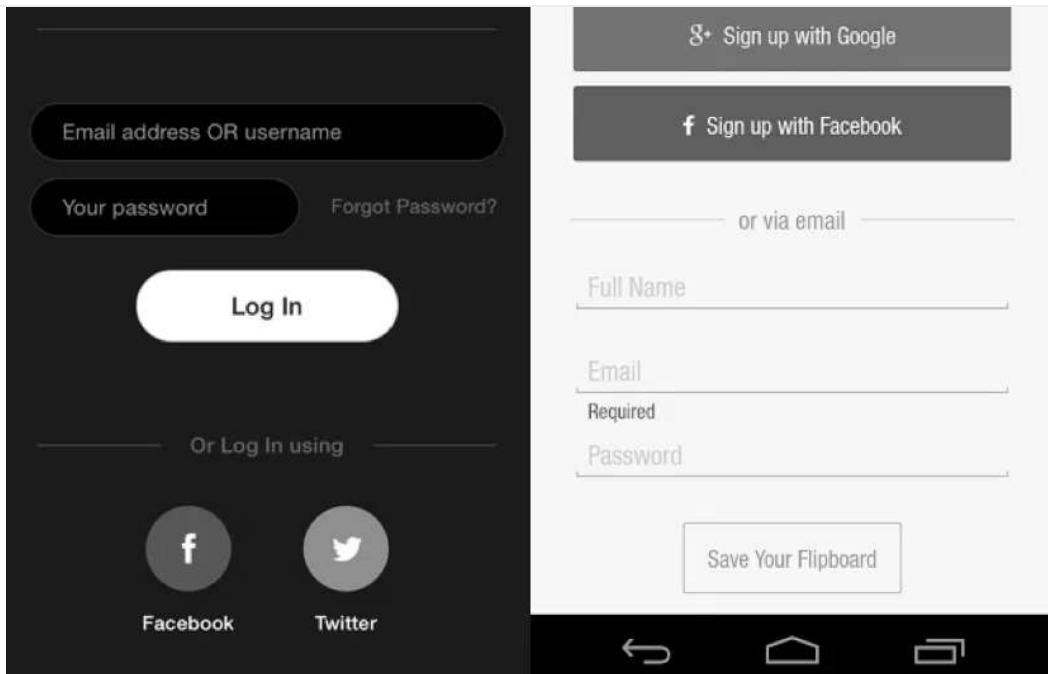
This article shows you several design patterns that are commonly used for the purpose of getting input from the user on a mobile application (photo credits: Flickr.com)

1. Action Bars



Action bars give users quick access to frequently used actions, such as search, share, and creating new content within the app. While navigation bars have been popular on the web and on earlier mobile applications, today's newest design patterns have allowed for greater focus on simple app views and more primary vs. secondary actions, paving the way for use of the action bar pattern. Action bars draw the user's attention to the most important and relevant actions on the app, clearing away clutter and immediately helping users to become more familiar with the mobile UI.

2. Social Login

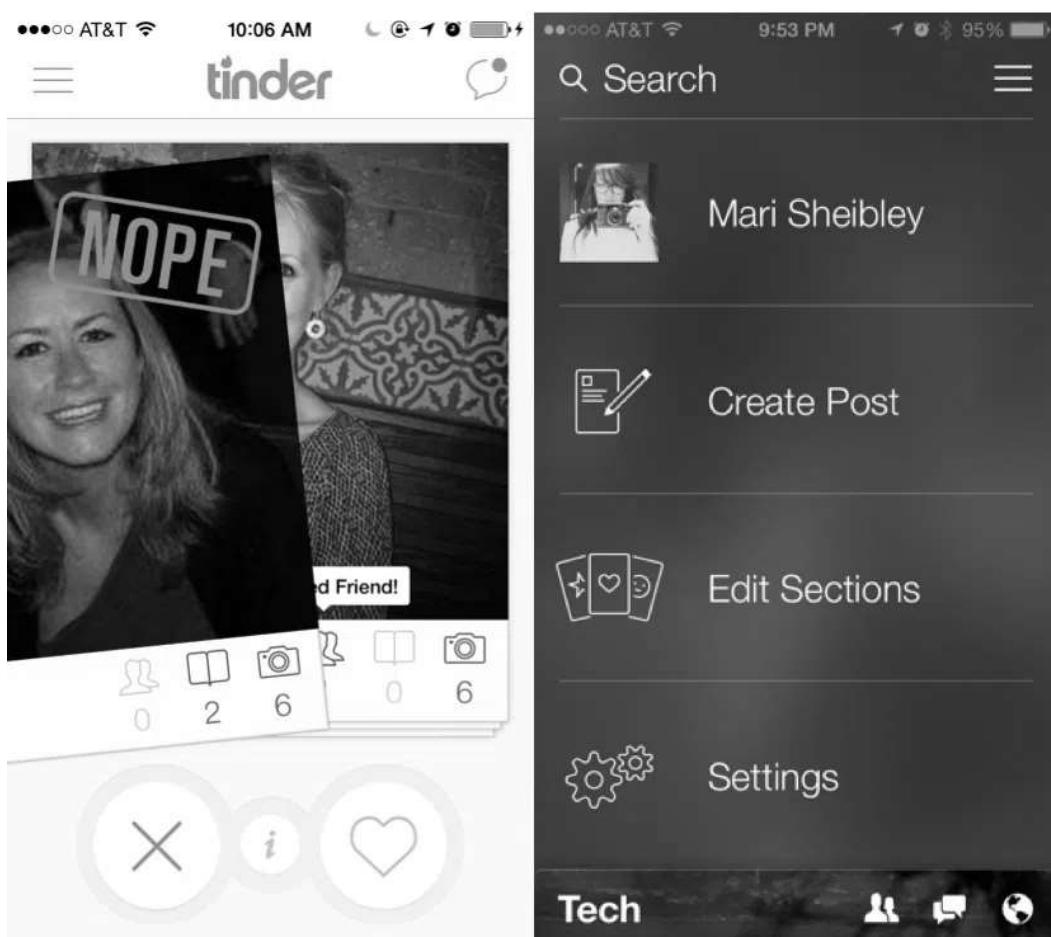


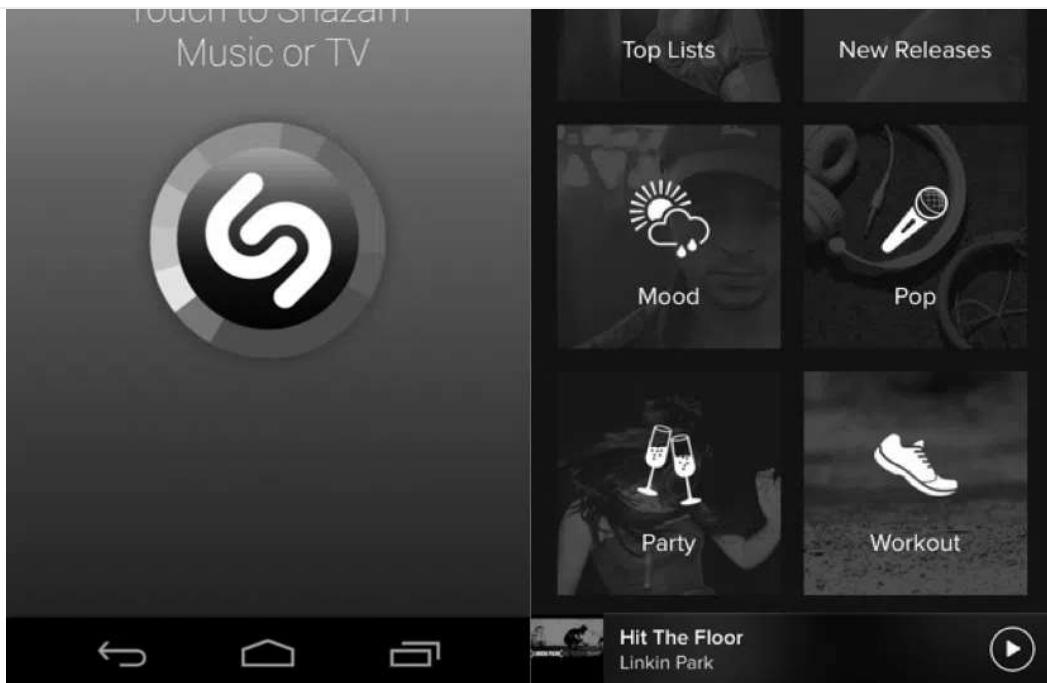
This UI design pattern provides users with a very quick and easy way of logging in. It is now almost an expected design pattern to incorporate into a mobile application – several reasons

accounts.

- Users aren't forced to type their details into an unfamiliar new app they just downloaded, making the signing up process much easier on them.
- By allowing users to sign up through an existing social network account like Facebook Login, you automatically get some basic data about your users, which you can use to more effectively tailor your mobile application to your users' needs.

3. Huge Buttons





Nothing says simplicity as much as a single giant button on the user interface. The ideal touch screen tap target size is 72 pixels, but certain apps like Tinder utilize the huge button pattern to emphasize one specific action. This pattern allows users to know exactly what to do and to be able to do it quickly, no matter where you are or what you are doing. Huge buttons are ideal for applications that serve a limited number of purposes. For example, Shazam really only does one thing: recognize the music and media playing around you at any time. Thus the app consists of a screen with a single gigantic button. Easy, simple, effective.

4. Notifications

Top Screen: Messaging App

- Jimmy Smith:** Founder at Tapview
- Dr. David Comfort, D.Phil:** RE: Investment Opportunity for ReLife...
Dear Robin,
- Michael Johnson:** RE: App Design/Meeting
I'll be in NY April 22-24, would you like to do lunch Wednesday at 12:15? ...
- Michael Johnson:** App Design/Meeting
Hi Robin,

Middle Screen: Real Estate App - Rooms & Beds

Just a **little more** about your apartment...

Bathrooms: 1

Bottom Screen: Twitter-like Feed

- Marcus Nelson @marcusnelson 1500d**
Plz vote both of these up: su.pr/5HKqzi bit.ly/bVqJ5Y
- Guy Kawasaki @GuyKawasaki 1870d**
The pitch is more important than the biz plan. Why then does...
- Ada Kwan @kwantada 1921d**
because i helped u w twitter?
Shouldnt take it THAT seriously :)
- Eric Miltsch @emiltsch 1923d**
christopher.bank@gmail.com.
thanks again for being so helpful...
- Tatyana Kanzaveli @glfCEO 1927d**
Welcome! You can join the discussion by sending 'd glfCEO...
- Patrick Merg @patmrg 1929d**
Thank You for the Follow! Learn more @ patmrg.blogspot.com

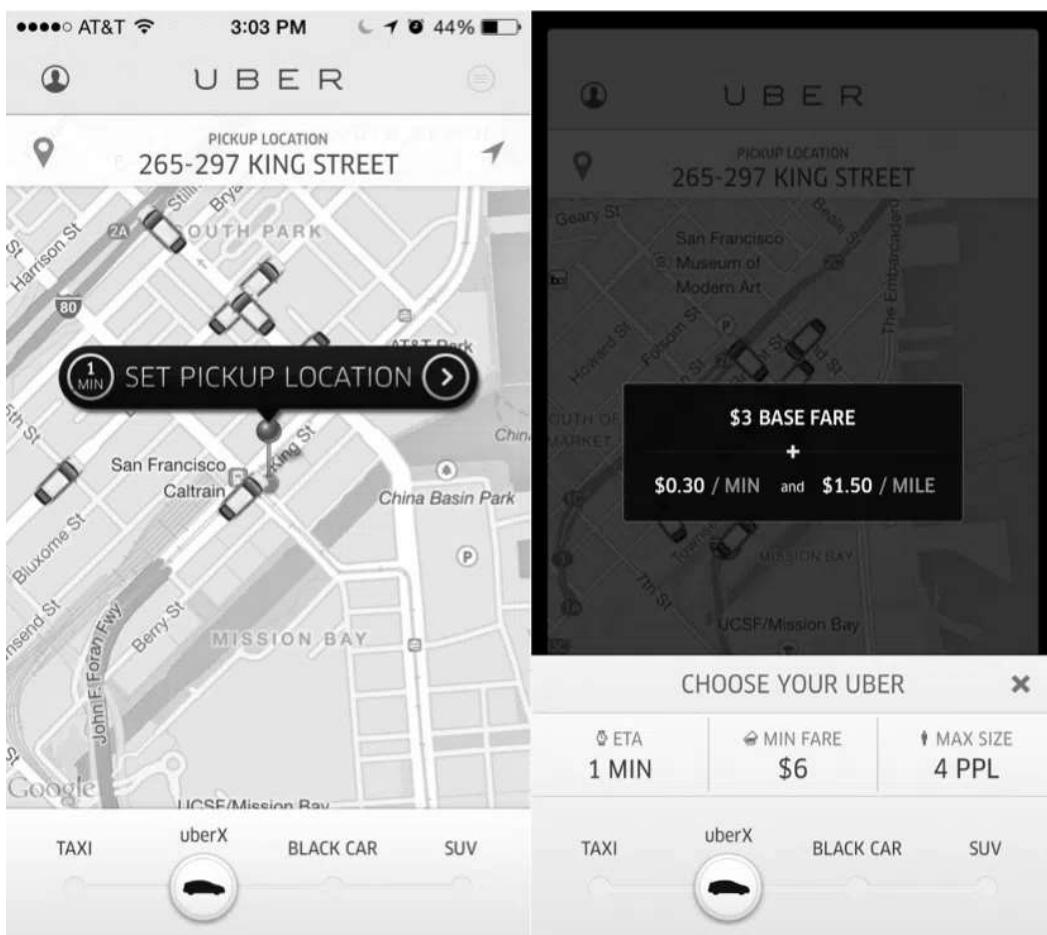
Bottom Navigation: Timelines, Notifications (20+), Messages, Me

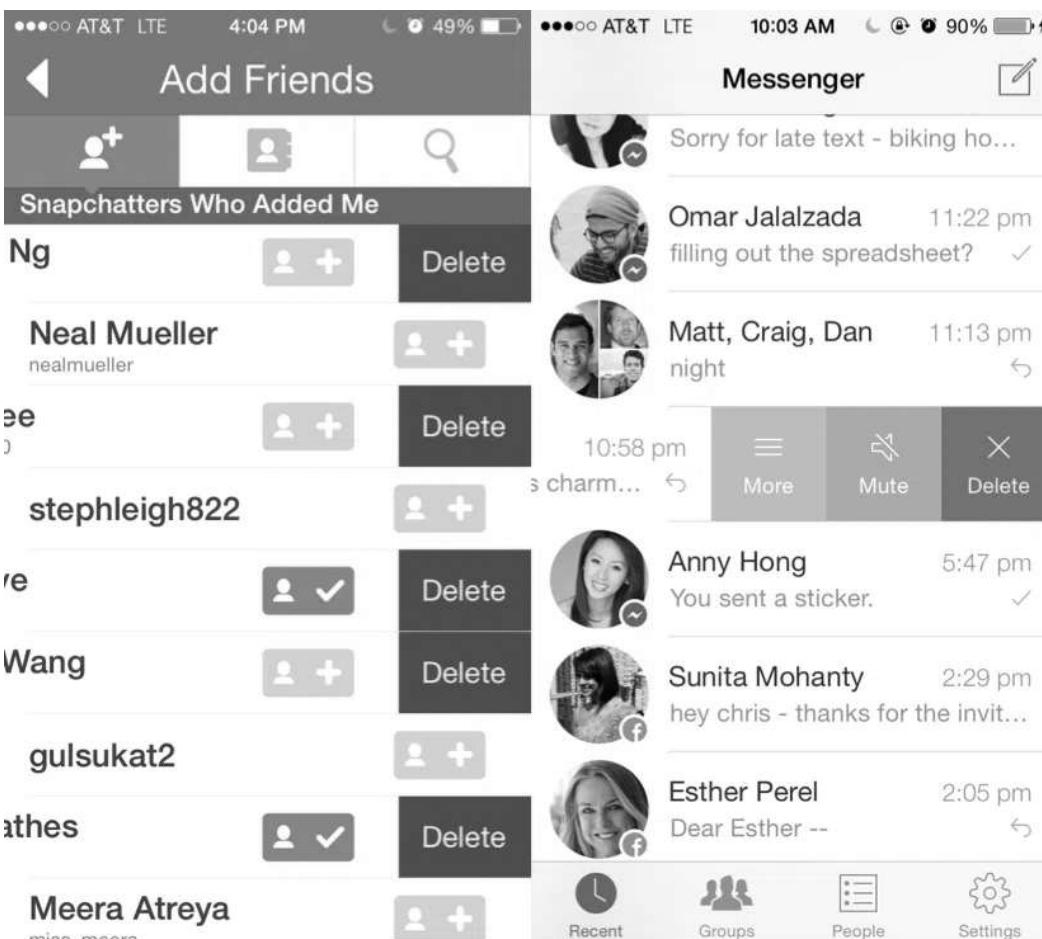
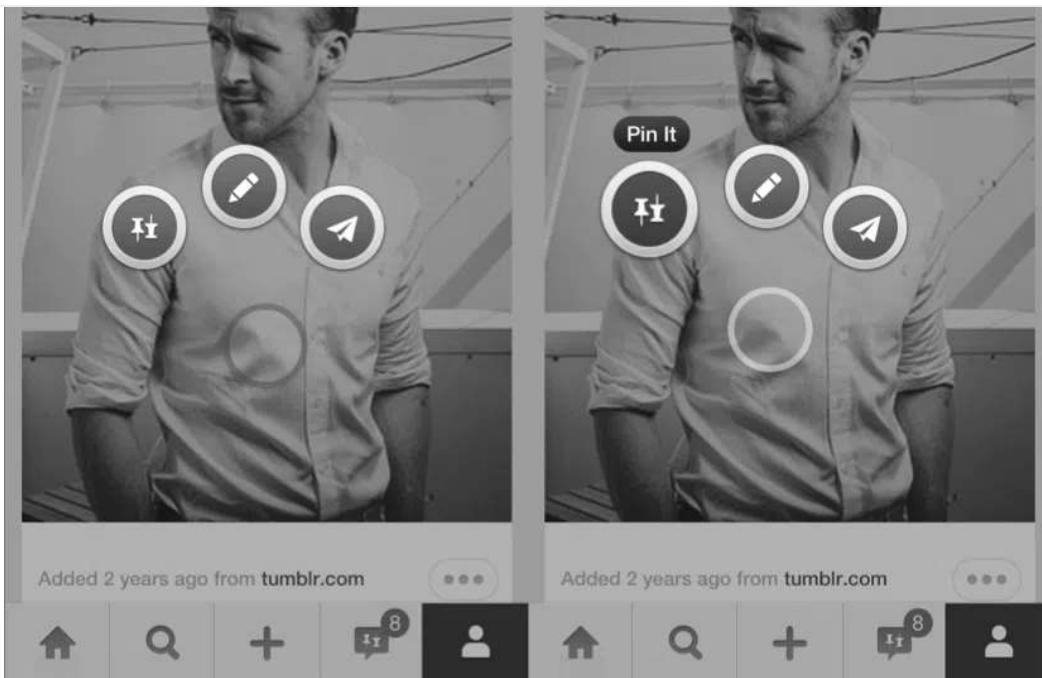
People consume lots of information every day, as evidenced by the use of Facebook, Reddit, Gmail, etc. At the same time however, people are busy – they can't be on their mobile phones

Twitter indicates new activity in a more subtle way by placing a small dot at the top of the timeline icon.

- Facebook displays notifications about new items in the newsfeed with a popup banner that drops down within the app.

5. Discoverable Controls





Sometimes mobile applications have controls that are relevant to only a specific part of the app. In order to minimize clutter yet allow quick access to these secondary controls, these

control to the button. Uber incorporates a slider button so that you can easily toggle between booking a ride and seeing the fare estimation, and Snapchat and Facebook Messenger allow for easy access to additional features by swiping left.

This information is borrowed from one section of a longer, free ebook by UXPin – Mobile UI Design Patterns 2014: A Deeper Look at the Hottest Apps Today. Be sure to grab your own copy to learn about all the other major design patterns permeating the most successful mobile applications of today.



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