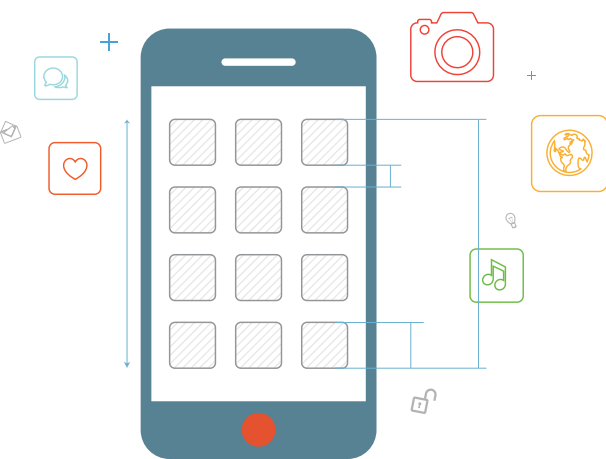


THE BEST PRACTICES FOR MOBILE APP DEVELOPMENT

The popularity of mobile devices calls for stringent practices that will help developers get results and also satisfy customers

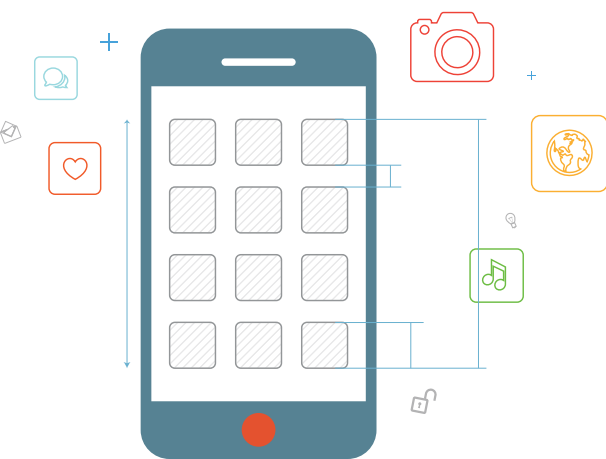


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Introduction

The popularity notwithstanding, mobile app development faces several challenges. Factors such as the never-ending proliferation of new devices, inherent security issues of the mobile space, user acceptability and more, weigh developers down. The architecture and the design of the mobile space are fundamentally different from the conventional desktop space, mandating a radically different approach. Here is a list of best practices that would allow mobile app developers to resolve such challenges and take mobile apps to newer heights.

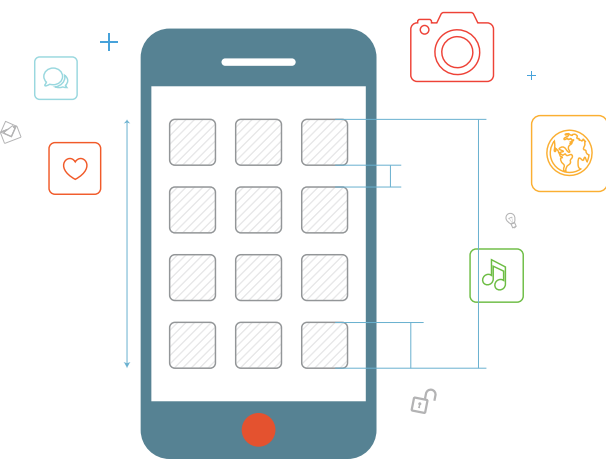


Have clarity on the design upfront

Determine the design methodology upfront, taking into consideration the most appropriate architecture suited for the application. Making changes in design at a later stage of the development process not just causes considerable delays and extra efforts; it also erodes the integrity of the application.

Today, most developments take place in a cross-platform environment to allow users to run the app on Android, iPhone, and Windows devices. Opt for a layered structure—it is the best in such a multi-platform environment, with modular pieces plugged in under the hood, and each modular piece retaining identical business rules and application logic. This ensures consistency across platforms, even while the app conforms to the look and feel of different platforms. However, it is also important to institute a strict policy regarding use of components across platforms, to facilitate maintenance and extensibility across applications on different platforms.

Another vital aspect is to select the right database upfront. Make sure the database supports all the required features in the app, and is also robust enough to withstand the rigors of distributed computing requirements of the business. It is always a good idea to opt for a scalable database and one which requires a very small footprint, considering the limited computing resource available in mobile devices.



Do not ignore performance considerations

In spite of all the popularity and convenience of mobile devices, they still lag behind conventional desktop PCs and server based appliances in computing power. The smaller device footprints and resource constraints mean that this will remain so in the near future. Even the most recent devices still boast only about one third to one half of the CPU and RAM of a low end desktop computer. Further, the quality of data connection varies considerably on a mobile device, depending on signal strength, and type of connection such as Packet data, Broadband, or Wi-Fi.

Developers make a big mistake by ignoring such performance considerations until the end of the project. Decisions such as design of web service APIs and data formats can leave a big impact, and limit or degrade performance. These can be difficult to change at a later stage. The best practice is to look into performance optimization upfront.

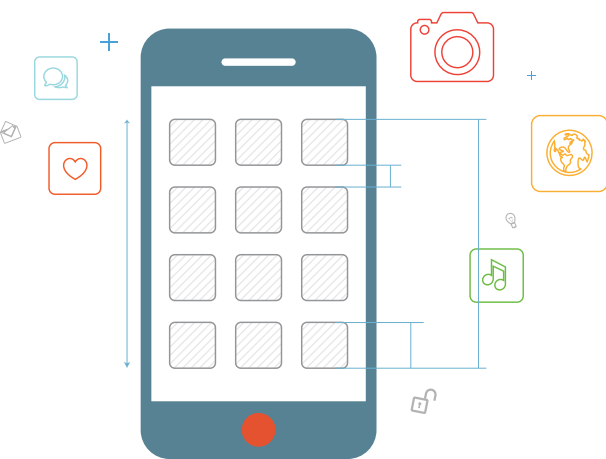
Some specific pointers to conserve computing power and optimize the varying connection strength include:

- ▶ Limiting the number of objects created to make judicious use of memory.
- ▶ Limiting data retrieval to the minimum required and using a lightweight data format such as JSON instead of more verbose format such as XML to make the best use of limited bandwidth.
- ▶ Using push notifications rather than periodic polling for data updates wherever possible, to conserve battery power. Battery drains quickly when an application constantly polls a web service for updates or continues to process data in the background.
- ▶ Making provisions to upload data to a server-side platform to perform CPU-intensive processing and return the result to the device, to deliver a more - responsive user experience and also to conserve battery power.

Ensure top notch user experience

The success of any app ultimately depends on its usability. All the major mobile platform software vendors – Apple, Google, and Microsoft – have laid down user - experience specifications and guidelines. Following such guidelines ensures a seamless experience and delivers consistent look and feel across all applications on the platform. However, over and above these platform guidelines, app developers should consider the following best practices:

- ▶ Avoid cluttering the screen. Display only the most relevant options in the screen, considering the limited screen space. Refrain from using small font to cram in more options; and rather use drill down menus or sub menus to include rarely used options. Another option is to use separate “Summary”, “Detail” and “Edit” user interfaces to display relevant information for the respective functions.
- ▶ Limit having users scroll down. Scrolling down is extremely inconvenient on a mobile screen.
- ▶ Use high or low contrast, and bright or light colors on the screen, depending on the anticipated use of the app. For instance, if the app would be used primarily in low light or sunlight conditions, it is a good practice to use high contrast and sufficiently bright colors. Make sure to test the app in the target location to deliver superior user experience.



Do not take security **lightly**

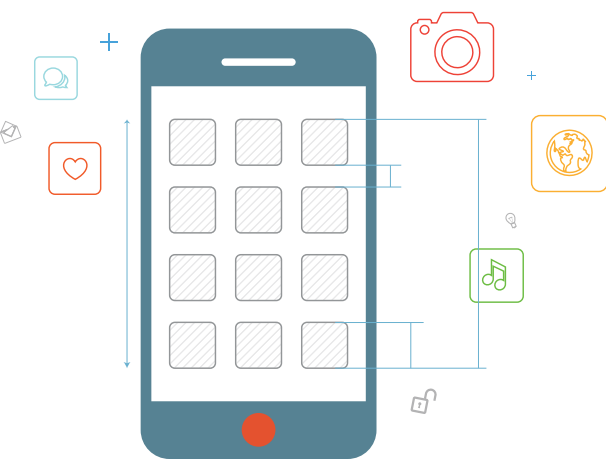
In today's age of heightened security concerns, mobile app developers need to look beyond the inherent security capabilities offered by the platform.

Apps require the capability to connect directly to its database to function optimally. However, with most apps communicating over the public Internet, this exposes the database to grave security risks. Using a Virtual Private Network (VPN) is an option to connect securely, but the complexities centered on cost bandwidth, and end-user configuration makes VPN unviable. It makes better sense to offer a more secure web service front-end.

One best practice is to store all data in secure web-servers and route all communication between the mobile client and the web server over an SSL-secured connection. This prevents the capture of encryption token through packet sniffing or through any other “man-in-the-middle” attack.

Apart from encryption, consider providing the app with options such as:

- ▶ Backup capabilities to archive data on a periodic basis
- ▶ Remote “kill” or “wipe” capabilities to erase data in the event of the user losing the device. An important point to consider is that not every mobile application requires the same level or type of security. It is not a good idea to include security deployment just because it is effective. All it may do is slow down the app. Rather, consider the nature and criticality of the data and deploy appropriate security measures.



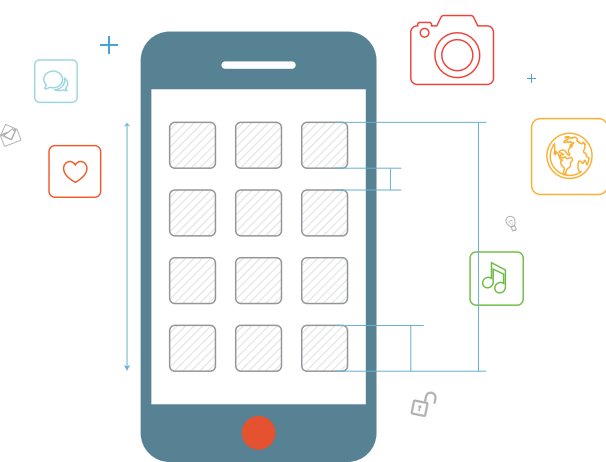
Pay importance to data access considerations

Data access is a critical factor that can make or break an app. Here again, the best practice depends on the nature of the app, the purpose for which it would be used, and how and where the app would be accessed.

The paradox for developers is that mobile app users generally require information on a real-time basis; but catering to that alone may not actually be a good idea. Just about all mobile devices frequently switch between different types of connections with varying speeds, and there would also be many times when the device has no data connection. The workaround is to create a caching mechanism that keeps copies of data previously retrieved from server. This allows users to accept some data even when they are offline and also speed up things for the user when connected over a slow connection.

The most secure option is to store data in a back-end database server. However, this too would require round the clock connectivity to function, which is practically a non-starter. As such, the best practice is to provision for storing some data in the device's native file system, which would allow the user to upload the required data before moving away from the corporate network. For instance, a sales rep could download the updated inventory data at the start of the day before he begins to make his calls, and ensure that even in an area with low signal his work is not stalled.

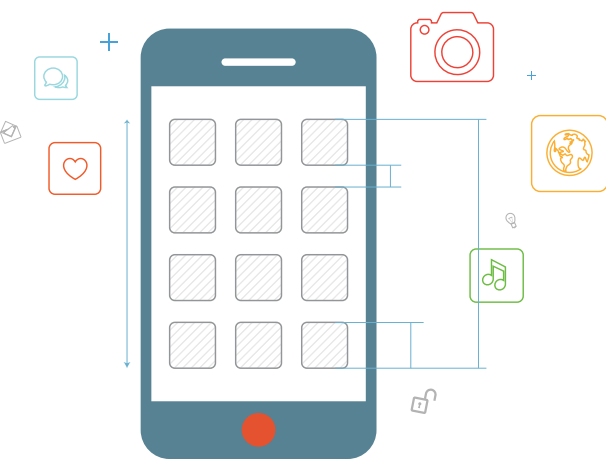
The above set-up would also require a synchronization capability to update data in the server at the end of the day. Make sure to synchronize only what is required, and that the synchronization technology in use is capable of handling common issues such as upload conflicts, which may occur when multiple users try to upload the same data.



Testing

Testing is a standard phase of the development process. When it comes to mobile apps, it is a good practice to test the app not just for usability and consistency over multiple browsers, but also for power consumption to confirm that it does not drain away the battery. Also, many mobile app developers neglect testing their apps on the actual user environment. The best practice is to test the app on multiple connections, and check for data access across all such connections, and even offline.

With mobile technology advancing day by day, the challenge is to co-opt the latest breakthroughs to make their apps perform even more efficiently, in terms of speed and features.



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