**App development frame works and their features**

App development frameworks have been revolutionized continuously in the way of creating mobile applications. These tools and libraries are widely used in the development process. Below are the app development frameworks that have been used widely in the industry. Let's check into detail how each of app development frameworks are being used and their features.

**1.React Native.**

React native was found by Facebook in 2015. This framework can be used to build both Apps and websites. It also Facilitates to develop Android and IOS apps. Here react native helps to develop specific versions of multiple features by using a single codebase across all platforms. It is used widely because it helps to enable quicker development and implementations. Interactions with third party extensions, reusable elements and graphical user interface for front end apps are important characteristics of Reactive native. JavaScript, Java, Python, C++, Objective-C is mainly used in react native to build apps.

**Features of React Native.**

* Third party extensions.
* Reusable components
* Cross platform accessibility
* Exceptional performance
* Cost efficiency
* Simple User interface makes more responsive and faster reload.
* Debugging's tools are being added to ensure quality of the app
* Live reload helps to check both codes and designs at same time.

**2.Flutter**

Flutter was introduced by Google. It is an open and free framework which is used to build native android and IOS applications with simple codes. It is considered as one of the best frameworks to use Software development kit for cross platform. Flutter is a précised framework which contains widgets, debugging's, APIs, rendering engines and other resources to assist developers in creating apps and deploying them. Using flutter advanced user interface, animations and high performance will be developed in the app.

**Features of flutter**

* Cross platform
* Easy debugging
* Open source
* Scrolling feature will be used for automatic adjustment of scroll behavior
* Skia graphic library is used to render layouts

**3.Xamarin**

It is also an alternative app development framework that is been used to develop android and IOS apps. It uses C# language to build apps. Xamarin makes coding even faster by using short code lines. it also transfers scripts quickly into multiple systems including IOS, Android MacOs and Windows.

**Features of Xamarin**

* Codes are reusable once it has been written it can be used everywhere
* Highly secured and safe because it provide**s** end-to-end encryption and authentication
* Maintenace for developers is easy when using Xamarin.
* Provides choices to develop apps for native apps and forms.
* Compatibility with various devices

**4.Android (Kotlin)**

Kotlin is a statically objected oriented programming language that is compatible with JAVA virtual machine. Kotlin was originally designed to improve java programming language and is often used in conjunction with Java.

**Features**

* Kotlin is open source.
* Kotlin supports java.
* Safe and reliable. This feature of Kotlin uses the strongest language which is relatively safe.
* Kotlin provide developers a way to program both synchronously and asynchronously.
* Standard library functions benefits using Kotlin offers these libraries.

**UI components.**

Building components and widgets which accelerate development and user interfaces.

Frame works like Flutter and react Native offer libraries of UI elements.

**Optimizing performance.**

Native frame works generally offer good performance for UI/UX components. However cross platforms like flutter have made significantly performance in UI components.

**Complexity**

If the app involves animations, interactions and custom UI components native frame works provide flexibility. In cross platform frameworks can handle complex scenarios.

**Maintainability**

Choosing a framework with a large community group ensures support, updates and resources.

**Budget**

Potential costs with each framework can include licensing fee, developers' salary and maintenances services.

Understanding the relationship between App development frameworks and programming languages.

In mobile app development frameworks and programing languages play a crucial role but they play distinct roles. To understand the effective building applications for different platforms such as Android and IOS. Programming languages are fundamental tools used to write software. Each of the mobile platforms has its own framework and programing languages. Programming languages depend on syntax while frameworks deal with architecture. Software developers use different kinds of programming languages to develop applications. This instructs the computer how to execute code into the machine language which is understood by the computer. This output later turns into human readable language and then displayed on screen.

Types of programming language

There are different types of programming languages which include-

* Objected oriented
* Procedural
* Functional

What is object-oriented programming?

OOP is a programming paradigm that uses objects and their associated procedures, or methods to design and build applications.

Languages used in OOP

* Java
* Python
* C++
* JavaScript
* PHP
* Ruby on Rails
* Objective-C
* Swift

Procedural programming

Procedural programming focuses on creating a list of instructions for the computer to execute. The instructions are called procedures which are typically organized into subroutines or functions.

Languages used in procedural programming

* C
* Fortan
* Pascal
* Basic
* Cobol

Functional programming

It is a programming paradigm that is based on the mathematical concept of a function. Here code is written as a series of self-contained functions that take input and produce output. These outputs can be data or other functions.

Languages use din functional programming language

Haskell

OCaml

Lisp

Erlang

Clojure

**Framework to develop mobile applications**

Cross platforms applications are very useful as they are developed once and can be installed on any platform. Mobile frameworks help in the development of mobile applications. These frameworks consist of code related to the common tasks which are mostly used in most of the mobile apps. Frameworks that are used to develop mobile

React native

Ionic

Flutter

Xamarin

Frameworks.

* Frameworks are the architecture that already includes some of the codes that are used in the development of an application.
* Templates are presented to develop applications
* These frame works can be used by beginners or expert programmers to write applications
* Little knowledge of syntax is needed
* These frameworks can be used by beginners or experts to write an applications
* Frameworks depend on the type of applications to are developed like web applications, mobile applications etc.

Programming languages

* Developers must write the code from scratch to develop an application
* No templated are available to develop an application
* Knowledge in syntax is essential
* Programming languages must be used by advanced programmers
* Programming languages depended on procedures, objects and functions

**Difference between Native and hybrid apps.**

Native apps are mobile applications Buit for a specific platform either IOS or Android. These apps are developed using programming languages like Java for android, Swift for IOS and Kotlin. These apps are optimized to integrate and perform smoothly with the devices hardware and features by offering fast, responsive user experience.

Hybrid Apps combine web technologies and native capabilities. These apps can run on multiple platforms with a single codebase. It saves time and development costs in deploying on both IOS and Android.

**Performance**

Native-Built for specific platform programming language which makes to utilize full device hardware and software. Which results in superior performance.

Hybrid-Tt is built with web technologies and wrapped with native container. Therefore, it cannot match the performance of native apps.

**User experience**

Native- Native apps excel in user experience because they adhere to the design guidelines. Which can seamlessly access device features, like GPRS, sensors creating more integrated and responsive experience.

Hybrid-It offers generalized user experience because they use a single base code across various multiple platforms.

**Development time and cost**

Native Apps- Building native platforms requires separate development platforms for each. In which more time and costs incurs.

Hybrid Apps - Once of the biggest advantages in hybrid apps are the ability to write single base code and deploy them multiple platforms. This had significantly reduced time and cost.

**Maintenace and updates**

Native Apps-It requires platform specific updates and maintenance which leads to time consuming, and it allows for better optimization and use it for the latest version.

Hybrid Apps- Here maintenance and updates are done easily because it deploys single base code across platforms which helps to cover both platforms. But there are some negative outcomes like not supporting device features and new operating system models.

**Access to device features.**

Native Apps- It has direct access to all features of the device including advanced functionalities like AR and VR and Bluetooth.

Hybrid Apps- Hybrid apps can access many devices features they do so through third-party plugins or third-party libraries, which may not always provide the same level of integration or performance.

**Security**

Native Apps- Native apps generally offer strong security because they have direct access to platform specific security features and APIS.

Hybrid Apps-Hybrid apps can be more vulnerable to security risks as they rely on web technologies and sometimes may inherit vulnerable associates with them.

**Test practices to identify best practices that could optimize usage**

**Evaluating frameworks**

To identify the best practices of frameworks to be used we need to identify some of the best criteria.

1.Performance testing

Identifying performance and response time with resource usage.

2.Secutrity

Researching on the best platform that gives high security features.

3.Maintenance

Updating and maintain projects that developed in each frame wors

4.Community support

Checking availability of community support that is provide with a community support.

5.Scalability

Identify each framework that provides increased loads or more complex features.

Also analyzing strength and weakness of each framework and identifying them how long implications of using each framework can include community support and future updates.

Identifying frameworks that can be used for evaluations. Whether we are using cross platform or native frameworks. By using react native, flutter, Xamarin or Native frameworks like Kotlin or Swift. Once identifying the required framework, we need to set up testing environments.

Set up development environments for each framework. Developing a project that includes features of UI elements, user authentications and handling data.