MCA 305C: Mobile Application Development

UNIT I

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II

Basic Design : Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III

Advanced Design: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing.

UNIT IV

Technology I - Android : Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V

Technology II – IOS: Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application

Text Books

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
2. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012

Reference Books

1. http://developer.android.com/develop/index.html
2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS
3. Development: Exploring the iOS SDK”, Apress, 2013.

Lecture Notes

UNIT-1

INTRODUCTION TO MOBILE APPLICATIONS

Talking about the mobile applications, the first thing that comes to mind are the apps like Whatsapp, Instagram, swiggy, etc that we use in our everyday life. Ever thought about how these apps are made? Which technology is used? Let's discuss what technologies or frameworks can be used to develop a mobile application. Mobile apps are majorly developed for 3 Operating System. :

1. Android
2. IOS
3. Windows

There are 3 different ways to develop Mobile apps: –

1. 1st Party Native App development
2. Progressive web Application
3. Cross-Platform Application

- **1. 1st Party Native App development: –**

These types of apps normally run in the native devices, that is, it runs only in the OS that it is specifically designed for it. These apps cannot be used on different devices using a different OS. The apps that are developed for android are normally coded using Java or Kotlin languages. The IDE normally used for android app development is Android Studio which provides all features and the apps that are developed for IOS are generally coded in Swift language or Objective-C. The IDE suggested for IOS App Development is XCode.

Example,

Here's an example of a 1st party native app:

A retail company wants to improve the in-store shopping experience for its customers. They develop a 1st party native app that allows customers to:

- Browse the store's inventory and product information
- Create a shopping list
- Scan barcodes to view product information and reviews
- Locate items in the store using an interactive map
- Pay for items directly through the app, without having to wait in line at the register
- The app is only available to the company's customers and can only be used in their physical stores. The app is designed to integrate with the company's existing systems, such as inventory management and point-of-sale systems.

This app is developed by the retail company for their own use, to improve the in-store customer experience, increase sales and gain insights from the customer's behavior.

In this example, the retail company is the 1st party, and the app is a native app, because it is developed for the specific platform (iOS or Android) and can take full advantage of the device's capabilities and features.

Advantages of Progressive web Application:

1. The main advantage of this process is that its development speed is fast the same code base is used for IOS, Android, web applications.
2. The web development team can be repurposed to develop the mobile application.
3. No installation required.

Disadvantages of Progressive web Application:

1. The major disadvantage is that PWA don't have access to all the feature and so the user experience is not that good IOS does not support all the features of PWA
2. The UI for development is bespoke i.e. the buttons, edit texts need to be programmed which was not necessary for the 1st party native Apps.
3. The community is not that wide spread.
4. No extra room for business model i.e. it is still a challenge to develop a revenue model or advertising opportunities for PWAs. At the moment, there are fewer options than among native apps to subscribe to.

3. Cross-Platform Application: –

These are frameworks that allow developing total native applications which have access to all the native features of IOS and Android but with the same code base. These apps run on both Android and IOS. So normally the development speeds of these apps are very fast and the maintenance cost is low. The performance speed is comparatively low to 1st party native apps but faster than PWA.

Xamarin is Microsoft cross-platform solution that uses the programming languages like .NET, C#, F#. The IDE preferred is Visual Studio. The UI/UX is totally native giving access to all features. This technology is having a wide community. And whenever an update is released by Android and IOS the same updates are released by Microsoft through Visual Studio.

React Native is Facebook's cross-platform solution which uses the language JavaScript And the preferred IDE is WebStrome & Visual Studio Code. Same like Xamarin React Native has totally native UI/UX and gives access to all features. And the updates are released the same day by Facebook as Android and IOS.

Flutter is Google's cross-platform solution which uses the language, Dart. The IDE preferred is Android Studio, IntelliJ IDE, and Visual Studio Code. The UI/UX is bespoke and Flutters has to come up with their new libraries whenever Android and IOS comes up with an update to mimic those update. The community is fast growing.

Example,

Here's an example of a cross-platform application:

A project management company wants to create a project management tool that can be used by teams on different platforms. They develop a cross-platform application that:

- Can be used on Windows, Mac, iOS, and Android devices
- Allows users to create and assign tasks, set deadlines, and track progress
- Integrates with popular tools such as Google Calendar and Trello
- Has a user-friendly interface that works seamlessly across all platforms
- The application can be downloaded from the company's website or from different app stores such as App Store, Google Play Store, Microsoft Store, and Mac App Store, depending on the platform.

EMBEDDED SYSTEMS

Embedded systems are growing smarter and intelligent across embedded domains. Thanks to the remarkable advancements in the field of electronics, especially wireless communication technologies, SoCs, Microcontrollers, FPGAs, networking techniques, and cognitive computing among others that support ultra-fast communication and data exchange. The trend is spanning across the embedded landscape including automotive, industrial automation, semiconductor, consumer electronics, avionics, energy, and healthcare domains.

While we talk about the explosive growth of embedded systems, we cannot ignore one significant factor that is fostering these advancements — Embedded Apps. Needless to say, embedded apps, with their advanced features as well as intuitive and user-friendly nature, are becoming key to any technological innovation in the modern era.

We live in an era of no 'NO' to Apps. Apps impact our day-to-day lives in one form or the other, more often through the smart gadgets we use. From the days when Apps displayed a myriad of data in a single window, Apps have evolved to presenting only the specific content or data the user needs. For instance, if we consider the data generated by an embedded system as a thousand-page book, modern-day apps help users by extracting that one paragraph that is relevant to the user, rather than showing the whole book.

This blog aims at providing an insight into various types of embedded Apps and tools essential to developing an intuitive and user-friendly application.

Apps in Embedded Systems

1. IoT and Cloud Application

IoT is disrupting several market segments, be it Industrial, logistics and supply chain, automotive, medical, smart cities, and security among others. Connected fitness trackers, smart speakers, and IoT-enabled building automation are already a common talk in the market. Four key factors call for a developer's attention when we talk about IoT App — The IoT device by itself, the data ingestion layer, analytics, and finally the end-user. The data generated by the IoT devices are transmitted over a wireless or wired interface, processed, and analysed before being displayed at the user end. The data is presented in an easy-to-understand format, enabling the user to monitor, control and analyse the data and generate reports using an intuitively designed interface, which we call an IOT App or Cloud App based on the use case.

An IoT app developer has to pay in-depth attention to various critical factors such as cross-device compatibility, interoperability, cloud integration, connectivity, scalability, data security, privacy, and various standards and regulations. The developer should have expertise in a range of tools and techniques to develop reliable and robust IoT/Cloud Applications. Some of the tools are:

- IoT Analytics, cloud storage, web services using AWS/Google or other similar platforms.
- Communication technologies such as Cloud Connectivity, WiFi, WiMax, LTE, 6LowPAN, WirelessHART, ANT, ZigBee, BLE, NFC, and RFID.
- Knowledge of communication protocols such as MQTT, CoAP, XMPP, DDS, STOMP, AMQP, REST, LWM2M, Websocket.
- Microservices and containerization.

2. Web/PC Application

Web/PC applications offer an intuitive interface for users to communicate with embedded systems. Web/PC applications are advantageous in managing devices deployed in remote locations. These applications communicate with the embedded device hardware over a low-level software code written typically in C. An HTTP request over the webserver carried out through the high-level program and the low-level coding communicates with the Hardware to trigger the command.

As a developer one should have expertise in the following tools and techniques to develop a robust Web/PC Application:

- C, C++, BOOST, RabitMQ, ZMQ, Flat/Protocol Buffer for creating High performance, multi-threaded, Distributed Applications.
- HTML/CSS/CGI/Python, PHP, GOLANG for optimizing Web pages/services for embedded low latency/footprint.
- HTML5, CSS 3, Sass, Bootstrap, Foundation, AngularJS, ReactJS, VueJS, NodeJS, Django, Flask, Laravel, Java for developing Enterprise Web applications.
- IoT Analytics, cloud storage, microservices using AWS/Google.
- Selenium, RTRT, gtest/cpptest for developing test automation software.
- Time-series Database, NoSQL database.

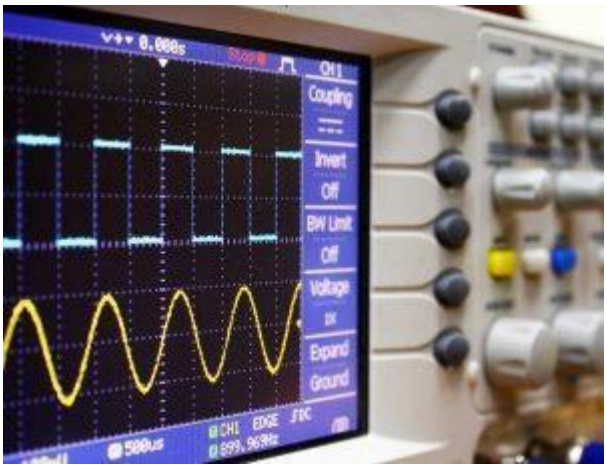
Web/PC Applications are used in real-time distributed systems of Scientific, Engineering, Medical, Industrial, and Defense domains due to their evolving functionalities and remote management capabilities. Complex systems deployed in a demanding environment of extreme vibration, high temperatures, dust, etc. can be monitored and controlled with precision and accuracy using Web/PC applications.

3. Industrial Applications

Industrial Apps are widely used in a range of applications such as Factory Automation, Oil and Gas, Mining, and Industrial safety among others, to monitor and control complex systems and processes. Industrial Apps are integral to Industrial control systems, providing real-time analytics and intelligence to users, optimise production operation and thereby enhance productivity. These Apps can be implemented on various platforms including Industrial PCs, Tabs, and Smartphones. The spurt in robotics and automated machinery in an industrial environment coupled with the emergence of sophisticated Apps have redefined factory operations enabling remote monitoring, control, automated diagnostics, preventive maintenance while ensuring the least downtime. Industrial Apps are widely used in Wearables, Manufacturing Control Systems, Warehouse and Inventory Management, Equipment Maintenance, Production and Workflow Management, Industrial Safety and security, etc. Tool and Techniques expertise for creating Industrial Apps include:

- Java and .NET for implementation of Industrial Apps.
- Microsoft's SQL Server, PostgreSQL, MySQL, DB/2, etc. for Database management.
- Analytics and Cloud Storage.

4. Scientific and Medical Application



As said at the beginning of the blog, even if an embedded device has all the required functionalities and features, it's the UI that defines the user experience. Any medical/scientific product, be it a large system or a handheld device, demand an intuitive user interface, seamless user experience, feature-rich UI/UX controls, and ergonomic design.

Medical/Scientific Apps present complex data in a simplified and user-friendly format and help the users solve complex analytical challenges quickly and easily. Some of the popular tools used for the implementation of scientific apps are:

- QT, UWP, Xamarin, C#, .Net, Electron for developing PC Apps.
- Report generation — Charts and Plots.

5. HMI Application

Human Machine Interface or HMI is increasingly becoming a significant part of embedded systems. From data acquisition, communication, presentation to monitoring, control, and diagnostics, HMI offers a safe and reliable interface for various complex industrial applications. Today, HMI is imperative to Automation applications as it forms the data foundation of the system.

An HMI development activity calls attention towards three key things — a robust Graphical User Interface, memory optimisation, and power efficiency. Factors such as shrinking device size and increasing functional complexity are posing many challenges in creating intuitive, user-friendly designs. In addition, the spurt of graphics technologies across embedded applications is making a huge difference in our outlook towards HMI — as a user and a designer alike.

HMI functions as a gateway between a multitude of hardware and software components in an Embedded System, which includes Hardware modules, I/O devices, controllers, servers, etc. For instance, in an industrial scenario, robotics controls in complex machines are enabled and managed through HMIs.

Some of the popular tools used are Microsoft's Visual Studio .Net, Qt/QML, Android, ReactNative, etc.

6. Mobile Application

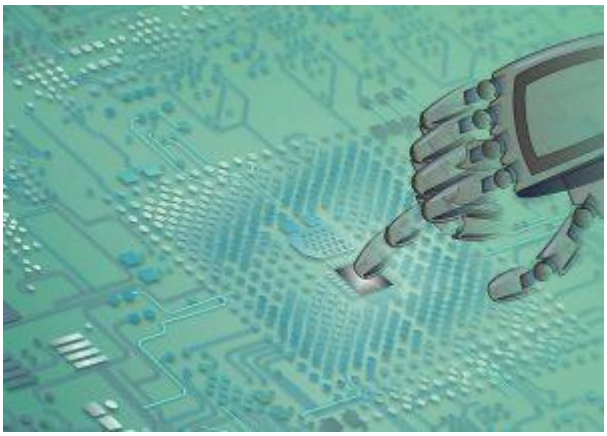
Embedded mobile applications are often designed for industry-specific use. In most cases, it complements a PC or Web Application, by enabling remote access to the embedded system. Embedded mobile apps are widely used in the Industrial, Healthcare, and Automotive industries. One of the primary concerns of Embedded Mobile Applications is security since these applications handle critical and confidential data over the internet. Implementation of a foolproof, secured App platform is critical to avoid any kind of data breach.

Mobile devices are available on a wide range of processors and operating systems. Thus, the Application created should work seamlessly irrespective of the platform it runs.

Some of the popular tools to develop Native Android, iOS apps, and Hybrid mobile Apps include:

- Xamarin, QT for developing Hybrid Mobile Apps.
- Java, Kotlin, NDK, JNI (Android), ReactNative, Flutter for Android Apps.
- ObjectiveC, Swift, ReactNative, Flutter for iOS Application.
- JustinMind, Adobe Photoshop/XD, Pencil, etc. for wireframes and prototyping.

7. Bare-metal and Headless Applications



A bare-metal application is a firmware application, or a set of sequential instructions executed directly on the system hardware — commonly on microprocessors or microcontrollers — and runs without an OS. Bare-metal applications are faster, are power-efficient, and use less memory. Due to these characteristics, bare-metal apps are widely used in time-critical, low latency applications that have stringent boot time but minimal CPU bandwidth, connectivity, and memory; for example, DO-178 compliant applications for mission-critical and safety-critical systems.

Headless Apps find their applications in wearable, medical, home automation, industrial, health, and wellness devices, wherein a user interface is not required for executing the functionalities.

Some of the popular tools used for building Bare-metal and Headless Apps include:

- C/C++/Assembly apps on various IDEs for the bare-metal environment.
- FPGA, DSP Algorithms.

Explain market and business drivers for mobile application

The rapid adoption of mobile services and solutions has been driven by the "perfect storm" of hardware, software, connectivity, business challenges and consumer demand. Here are five compelling trends that have combined to accelerate the adoption of mobility.

1. CONSUMERISATION OF IT

Technology has become an integral part of everyday life. Business users are also consumers and they are using mobile devices in all aspects of their day-to-day activity; from social media to online shopping, email, video capture and gaming.

Mobile devices are more user-friendly; interfaces are intuitive, customisable and consistent. As a result, the consumer experience is having a significant impact on what users expect from their business applications.

2. UBIQIUTOUS CONNECTIVITY

As technology has come to dominate business processes, workers need constant access to data and applications if they are to work effectively. Users have come to demand access to information anywhere, any time and on any device.

Business users also depend on real-time communication to facilitate collaboration, speed up decision making and deliver an excellent customer experience. Mobile devices, flexible working and cloud-enabled computing allow users to operate as a part of a team, wherever they are.

3. USER-CENTRICITY

Convenience, flexibility and performance are key features of mobile computing. Instant-on devices and cloud-based services put the user at the heart of the process. Desktop virtualisation and bespoke business apps are replacing traditional, feature-heavy business applications.

As users become more mobile, they become increasingly frustrated with traditional IT. Mobility provides the flexibility, efficiency and convenience that modern users demand from their technology.

4. CLOUD COMPUTING

As businesses continue on their journey to the Cloud, processes become more data-driven and device-independent. Public, private or hybrid Cloud infrastructures are being used to deliver business essentials such as email.

Collaboration, Office 365, CRM and file synch and share applications are not device-driven. Users are able to exploit the inherent benefits of Cloud services on their device of choice; making mobile not only a viable option, but the most effective.

5. COST OF OWNERSHIP

Competition amongst mobile device and platform providers continues to drive quality up and prices down. Screen resolution, processing power, battery life and security continue to improve and with most devices in the workplace becoming user-owned, the fixed costs of provisioning and replacing devices is being eliminated from the business, allowing IT to spend Op Ex on device and application management.

Explain delivery of mobile applications

Importance of Mobile Applications in Retail

Mobile commerce has seen a paradigm shift in recent times. Businesses have started including mobile browsers and applications in their eCommerce strategies along with regular websites to enhance the customer experience.
This means that mobile shopping is common among users and also has a significant impact on purchase decisions. This implies that mobile commerce is important and retailers as well as users are constantly using it to enhance their business.

Also, mobile applications make other aspects of retail extremely accessible. Therefore, it's time that your business also adopts mobile applications for easier fulfillment.
Read more about mobile applications and their relevance in eCommerce.

The Relevance of Mobile Applications in On-Demand Delivery

On-demand delivery means quick results. This means that buyers who resort to on-demand delivery are looking for deliveries in a few hours or maximum, the next day.

Since on-demand deliveries are the quick fix of retail and eCommerce, they should be easy to process for retailers as well. This is where mobile applications come in for scheduling pickups and deliveries.
Mobile applications make it extremely convenient for retailers to schedule deliveries for their hyperlocal orders. Since everyone has a mobile phone in hand at all times, the process of assigning a delivery partner becomes much easier.

Here are a few reasons why mobile apps for hyperlocal on-demand delivery can help you manage your order fulfillment much better –

Accessibility

Having an app dedicated to hyperlocal deliveries can make it extremely convenient to receive, process, and deliver orders from one place itself.

It eliminates the need for manual work and record keeping. The hyperlocal delivery apps can help you schedule pickups, assign delivery partners, and stay in contact with them for improved communication.

Since apps are always present on your phones, they make it extremely accessible to work on orders even outside of the business and you can delegate work easily in the shop or warehouse. Your business never shuts if you have an app for the most crucial aspects like shipping & delivery.

Faster Deliveries

When you have a mobile app dedicated to deliveries, you can assign a resource to work on it and not skip a single order.

You can also process more incoming orders quickly as it is through a mobile app that does not require much technical know-how.

If you schedule quicker for pickups, A delivery partner will be assigned faster, and you can deliver in record time. Thus, making deliveries faster is yet simplified.

Simplified Order Management

A mobile app helps you manage all orders from one place. This means you can avoid confusion about incoming and outgoing orders and keep sync with the inventory about how many orders are being processed.

You can link the app with your online store to keep track of incoming orders so that you don't miss out on any opportunity.
On-demand delivery requires quick action and you can only achieve that if you have the means to access orders quickly. With a mobile app, you can do so within a few clicks.

Uncomplicated Record Keeping

It can get tedious to keep a record of the transactions that take place for shipping. Since the list is long and you need to strictly keep a record, having a shipping passbook can be extremely beneficial.

The mobile app gives you a chance to track all the transactions in one place and see how many times you have loaded money and spent on different shipments. Along with that, you can also practice better funds allocation with a record of your transactions.

Order Tracking

Lastly, order tracking can be done quite easily through a mobile app as the interface is much more user-friendly.
Once you schedule a pickup, you can track the whereabouts of the delivery executive and after the order is picked up you can track it until it reaches the destination.

With live updates and tracking information, you can easily manage your work anywhere on the go.

Types of On-Demand Delivery Mobile Applications

B2B – Business to Business

B2B on-demand mobile apps are made to focus on connecting a business with another business. In this case, both the service provider and service taker are not the end-users of the end products, they are just facilitators. The service taker uses the service to produce the end products, which eventually reach the consumers.

B2C – Business to Consumer

In this type of mobile application, the businesses offer products/services to the end consumers. This model is very famous and is usually used by most of the businesses that deliver products directly to end-consumers, like Myntra, Dominos, and Amazon.

C2C – Consumer to Consumer

C2C is an on-demand delivery mobile application that connects end-users to the end-users. In this application, the users themselves create products and services to sell to other end users.

What a Hyperlocal On-Demand Delivery Application Must Contain?

'Add Order' Facility

The hyperlocal on-demand delivery application must have an option to add new orders. Without adding new orders, sellers will not be able to schedule pickups and deliver their products. In the add order facility, the seller must be able to add the order details like price, quantity, type of product, etc.

Scheduling Orders

Along with adding orders, sellers should also be able to schedule orders for the further date. This helps in better organization of incoming orders and no order is skipped.

By scheduling orders for later, sellers can free bandwidth and entertain more orders.

Order Tracking

Without appropriate order tracking, you will not be able to track the whereabouts of your shipment. Therefore, your mobile application must contain granular tracking details or live tracking of the order.

Payment Selection

Next, the seller must be able to select the payment mode chosen for the shipment. For example, if the seller wants to create a COD order, they must be able to select so while creating the order.

If they want to create a prepaid shipment they must also be able to mention the payment mode such as net banking, credit card, debit card, UPI, wallets, etc.

Geo-Location Tagging

Hyperlocal deliveries need to have a precise address as they cater to a short geographical area. Thus, it is extremely important to have a geolocation tagging option so that the seller can directly select the delivery location on the map. This will help in faster deliveries and increase the days as the address mentioned would be correct.

Explain requirements gathering of mobile application

Requirements for mobile apps and their development process considerably differs from software developed for desktop computer or web applications. Beside many other reasons, lack of efforts for requirement gathering and inappropriate app development processes creates significant challenges for app developers and sometimes results in app failure. Extracting user requirement for an educational app was the main objective of this research. In the research we understand requirement of users and the environment in which they will use this app in the future. We collected data from teachers in three different languages using an online questionnaire and printed questionnaire. Analysis of the results reveals that most of the teachers have the same preferences for app functional features, user interface and usability requirements. From analyses and literature review, we identified challenges that an app developer can face, studied the implications of requirement gathering on software development and users' expectation of app quality.

3. Explain validation for mobile applications?

In today's time, mobile phones are expanding from simple communication to gadgets that can do everything. Mobiles phones are uses to order the food, to avail the cab so that we can know the direction. All these facilities are possible only by using mobile applications.

Introduction

Every developed mobile application has to go through the mobile testing process. This process assures us to maintain the level of the quality of the application before it is

released into the market (app store/ play store). The development life cycle of the mobile application is shorter than the other, so the mobile application's success depends only on the testing of the mobile application. Applications are tested based on usability, security, functionality. This increases the general efficiency of the application and increases the reliability factor among the users as well.

The need for a Mobile App

The need for a mobile application is arising to do our daily work. In today's busy and hectic lifestyle, we want to do meaningful work in daily routine.

Here are few examples of the daily routine work:

Like:

1. We want to pay an electricity bill.
2. There is a need to communicate with the manager and submit the report.
3. Want to look for the nearby store
4. Want to know the cab status

There is one solution for all these works: we need the below things to do our daily work in a second.

- Need for Smartphone
- Internet Connectivity
- A mobile application to do the work

We can smartly do our daily work by using our smartphones.

To use the mobile phones, we need the properly tested mobile apps so that the more and more users like the application. It is the user experience that makes the mobile application successful.

VALIDATION FOR MOBILE APPLICATIONS

Validation of the Mobile App

Validation of the mobile app indicates the possibility of success for the idea. It indicates whether your idea can provide profit for the business. This plays an important phase in ***mobile app development****.*

The idea of the development of a mobile app is truly unique. But one is oblivious of the market condition or the demands of the audience. Therefore various steps need to be followed to get your mobile application validated.

Identifying and Analyzing Existing Apps in a software development company

In the process of developing apps, there are a certain number of applications in the play store/ app stores that have the same utility. So one needs to identify existing applications similar to the app idea and then study the creation of a unique position in the market. So competitive analysis helps in evaluating the mobile app idea which helps in getting an estimate of the features to be included or excluded.

Studying the market among **Android App Developers** and **iOS App Developers**

One needs to identify the specific group for which the application is being developed. Only the specific market needs to be analyzed. As only some people might be in need of a solution, one needs to analyze the requirement of the audience including the difficult points in order to avoid failure.

Pay heed to your Audience

Studying your audience's requirements helps in creating an application that is suitable for them. Through email correspondence or phone call interviews, one can get complete knowledge about the real difficulties involved. User reviews can be analyzed to verify mobile app ideas. Also, take advantage of email validation software to understand if users' email is valid and reachable

Creation of a Minimum Viable Product (MVP)

Being aware of the competition, gaining the requirements of the target audience one is better equipped and informed about the features of the application being developed. Now there is the requirement of coming up with an MVP that can be sent for testing and evaluating its functions.

Prototype

Prototypes help in defining the design flow much before the development. After getting ready with a prototype one can evaluate the effectiveness of carrying out various iterations.

Creation of final design

After completing the various phases, the final draft of the application design needs to be created. Customer validation is then required. Testing by some of the users and receiving feedback may be required. Beta version can be launched with only a few users signing up in order to get insights to create and launch the final product.

The ideal app can be created only after passing through various steps such as

- Study app store/play store to study the uniqueness of the idea
- Organize meetings with people who can throw better light on the ideas
- Study customer reviews and app listings
- Calculate development cost and funding to add or remove certain features

After finalizing the application idea, a detailed study regarding the idea is carried out with a focus on

- Identifying issues of the users
- Go through competitors' app and their focus
- Find out whether the application is compatible with the market
- Study user-usage in order to identify salient features

Keyword Research

One needs to be cautious in selecting the keywords for mobile app development. Numerous tools such as SEMrush, KWFinder, Google Keyword Planner are available to help in keyword research and selection.

Landing page

This forms the most important part of app development as it can greatly impact the marketing of the application. This helps in

providing the complete information on a single page. Landing page comprises of

- Visitor's email addresses
- A complete description
- Details regarding the launch date and feature description
- Screenshots of your application.

SHORT ANSWER QUESTIONS

1.Define MAD?

2.Define Embedded Systems?

3.What are the market and business drivers for mobile applications?

4.What do you understand by MAD?

5.Explain types of Embedded Systems?

LONG ANSWER QUESTIONS

1.write a brief notes on Embedded Systems?

2.Explain about Market and Bussiness Drivers in detail?

3.Define MAD? Explain in detail about MAD?

4.Explain about the publishing and delivery of mobile applications?

5.What is requirement gathering? Explain about the validation for mobile applications?

UNIT-2

Basics Of Embedded System Design

An Embedded system is a controller, which controls many other electronic devices. It is a combination of embedded hardware and software. There are two types of embedded systems microprocessors and micro-controller. Micro-processor is based on von Neumann model/architecture (where program + data resides in the same memory location), it is an important part of the computer system, where external processors and peripherals are interfaced to it. It occupies more area and has more power consumption. The application of the microprocessor is personal computers. This article discusses steps involving in embedded system design.

What is an Embedded System Design?

Definition: A system designed with the embedding of hardware and software together for a specific function with a larger area is embedded system design. In embedded system design, a microcontroller plays a vital role. Micro-controller is based on Harvard architecture, it is an important component of an embedded system. External processor, internal memory and i/o components are interfaced with the microcontroller. It occupies less area, less power consumption. The application of microcontrollers is MP3, washing machines.

Micro-Controller	**Read-Only Memory**	**Read Write Memory**
Timer	**I/O Ports**	**Serial Interface**

Embedded Design

Types of Embedded Systems

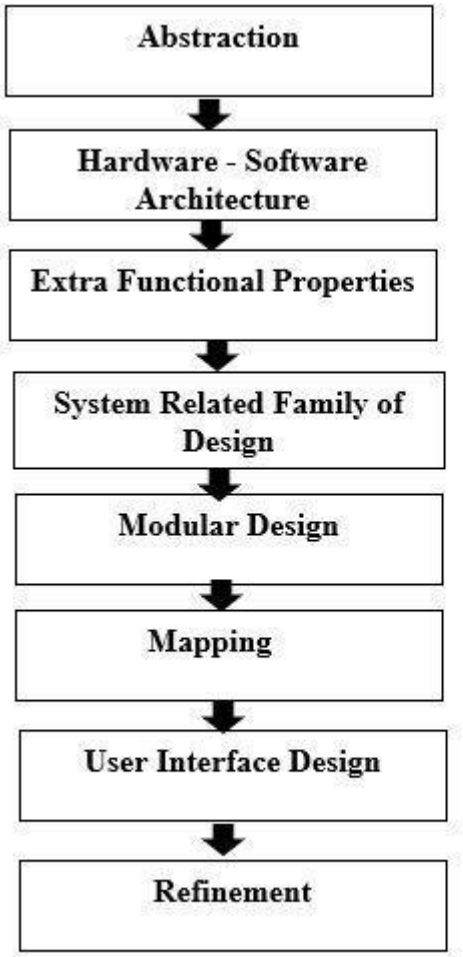
- Stand-Alone Embedded System
- Real-Time Embedded System
- Networked Appliances
- Mobile devices

Elements of Embedded Systems

- Processor
- Microprocessor
- Microcontroller
- Digital signal processor.

Steps in the Embedded System Design Process

The different steps in the embedded system design flow/flow diagram include the following.



 Embedded design – process – steps

Abstraction

In this stage the problem related to the system is abstracted.

Hardware – Software Architecture

Proper knowledge of hardware and software to be known before starting any design process.

Extra Functional Properties

Extra functions to be implemented are to be understood completely from the main design.

System Related Family of Design

When designing a system, one should refer to a previous system-related family of design.

Modular Design

Separate module designs must be made so that they can be used later on when required.

Mapping

Based on software mapping is done. For example, data flow and program flow are mapped into one.

User Interface Design

In user interface design it depends on user requirements, environment analysis and function of the system. For example, on a mobile phone if we want to reduce the power consumption of mobile phones we take care of other parameters, so that power consumption can be reduced.

Refinement

Every component and module must be refined appropriately so that the software team can understand.

Architectural description language is used to describe the software design.

- Control Hierarchy
- Partition of structure
- Data structure and hierarchy
- Software Procedure.

Embedded System Design Software Development Process Activities

There are various design metric required to design any system to function properly, they are

Design Metrics / Design Parameters of an Embedded System	Function
Power Dissipation	Always maintained low
Performance	Should be high
Process Deadlines	The process/task should be comple specified time.
Manufacturing Cost	Should be maintained.
Engineering Cost	It is the cost for the edit-test-debug software.
Size	Size is defined in terms of memory Memory/Physical Memory.
Prototype	It is the total time taken for develop testing it.
Safety	System safety should be taken like safety like engine break down safet taken
Maintenance	Proper maintenance of the system order to avoid system failure.
Time to market	It is the time taken for the product/ to be launched into the market.

Embedded Software Development Process Activities

Embedded software development process activities mainly include the following.

Specifications

Proper specifications are to be made so that the customer who uses the product can go through the specification of the product and use it without any confusion. Designers mainly focus on specifications like hardware, design constraints, life cycle period, resultant system behavior.

Architecture

Hardware and Software architecture layers are specified.

Components

In this layer, components design is done. Components like single process processor, memories- RAM/ROM, peripheral devices, buses..etc.

System Integration

In this layer, all the components are integrated into the system and tested whether its meeting designers, expectations.

Challenges in Embedded System Design

While designing any embedded system, designers face lots of challenges like as follows,

- Environment adaptability
- Power consumption
- Area occupied
- Packaging and integration
- Updating in hardware and software
- Security
- There are various challenges the designers face while testing the design like Embedded hardware testing, Verification stage, Validation Maintainability.

Embedded System Design Examples

- Automatic chocolate vending machine (ACVM)
- Digital camera
- Smart card
- Mobile phone
- Mobile computer..etc.

Automatic Chocolate Vending Machine (ACVM)

The design function of ACVM is to provide chocolate to the child whenever the child inserts a coin into ACVM.

Design Steps

The design steps mainly include the following.

1. Requirements
2. Specifications
3. Hardware and software functioning.

Requirements

When a child inserts a coin into the machine and selects the particular chocolate that he wants to purchase.

Inputs

- Coins, user selection.
- An interrupt is generated at each port whenever a coin is inserted.
- A separate notification is sent to each port.

Outputs

- Chocolate
- Refund
- A message is displayed on LCD like date, time, welcome message.

System Function

- Using a graphical user interface, the child commands to the system which chocolate the child wants to purchase.
- Where the graphical user interface has an LCD, keypad, touch screen.
- The machine delivers the chocolate when the child inserts the coin if the coins inserted are excess than the actual cost of selected chocolate. The ACVM machine refunds the money back.
- Using a Universal synchronous bus, the owner of the ACVM can keep track of client location.

Design Metrics

Power Dissipation

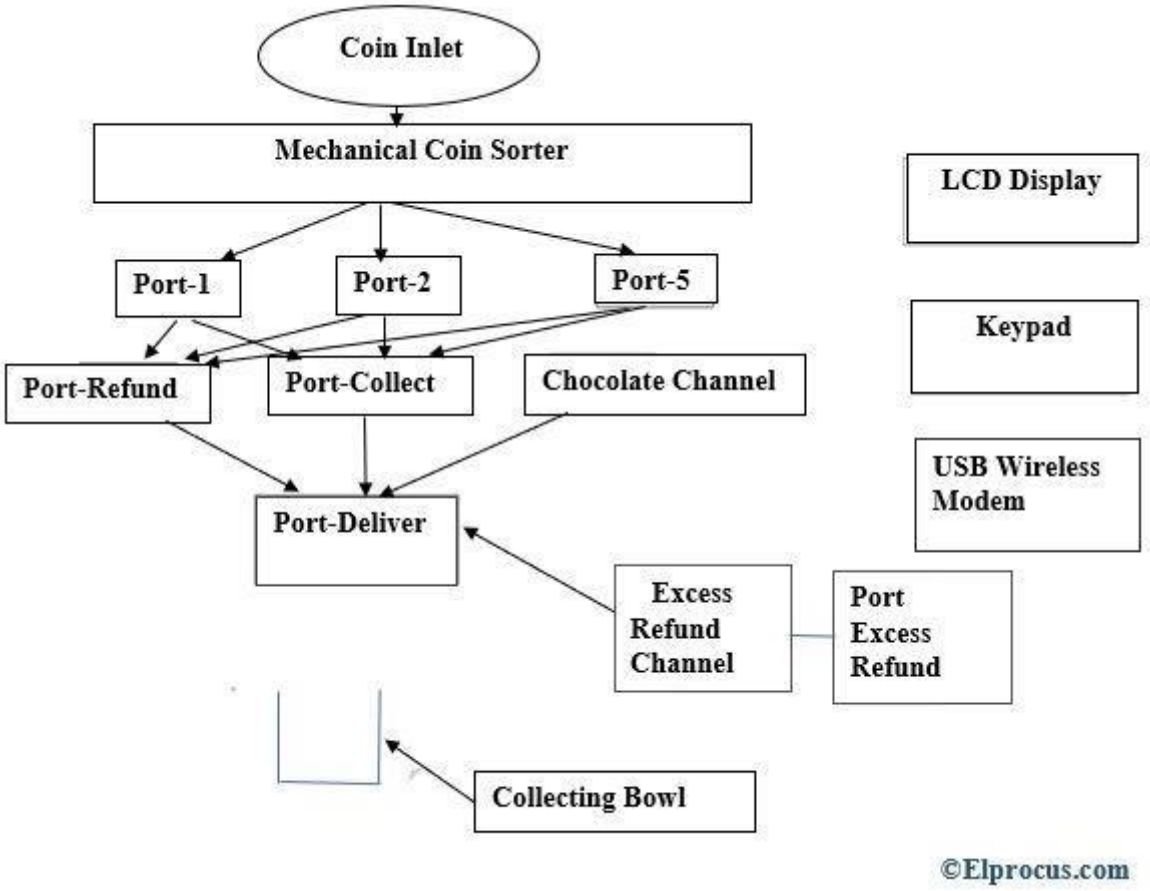
The design should be made as per display size and mechanical components.

Process Deadline

Timmer must be set, so that whenever the child inserts the coin the ACVM must respond within few seconds in delivering the chocolates and refunding if excess.
For example, if the response time is 10seconds, the ACVM should deliver the chocolate and refund the money if excess within 10 seconds as soon as the child inserts the coin and place a request for chocolate.

Specifications

From the below ACVM system, when the child inserts the coin. The coins get segregated according to the ports presented, Port1, Port2, Port5. On receiving coin an interrupt is generated by the port, this interrupt is sent to reading the amount value and increasing.



automatic – chocolate – vending – machine

An LCD present here displays the messages like cost, time, welcome..etc. A port delivery exists where the chocolates are collected.

Hardware

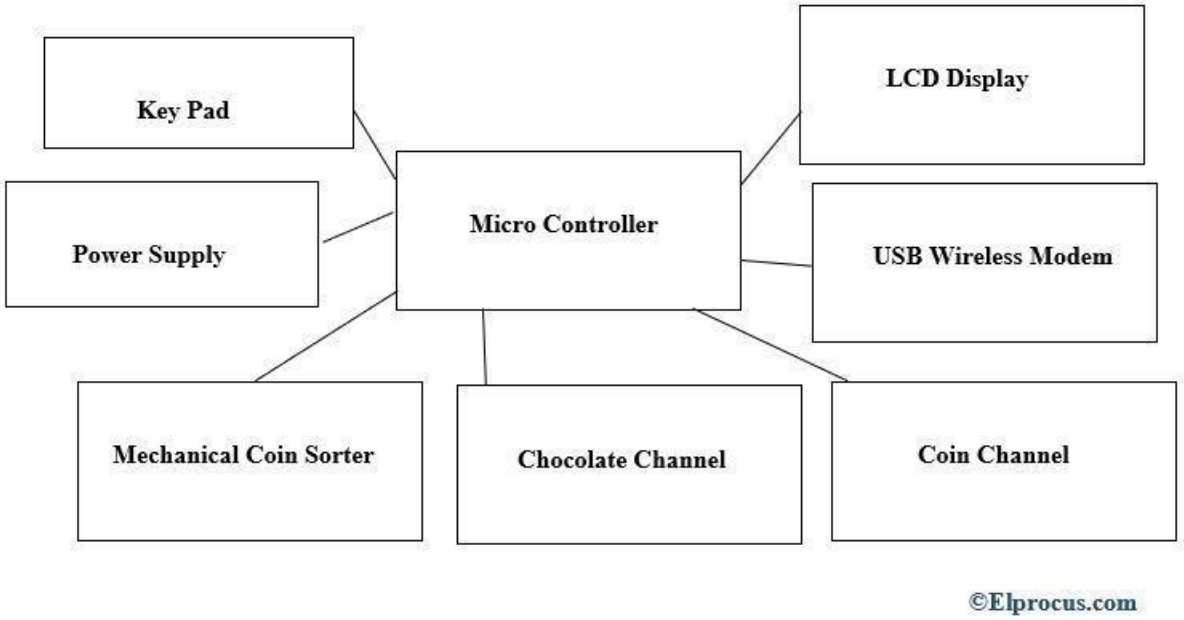
ACVM hardware architecture has the following hardware specifications

- Microcontroller 8051
- 64 KB RAM and 8MB ROM
- 64 KB Flash memory
- Keypad
- Mechanical coin sorter
- Chocolate channel

- Coin channel
- USB wireless modem
- Power supply

Software of ACVM

Many programs have to be written so that they can be reprogrammed when required in RAM /ROM like,



hardware-architecture-block-diagram-of-active

- Increase in chocolate price
- Updating messages to be displayed in LCD
- Change in features of the machine.

Explain constraints for mobile applications

1. Screen size, sensors and interactions

Screen sizes are much smaller when designing mobile software. You have a limited canvas, and your design should be simple with enough space for users to touch and interact with different elements.

Users may use your software with one hand or two hands, or use any of the supported gestures to interact with your software.

Depending on your content, you could choose a spatial format (map view), a list format, a block design or other ways to display your content.

If you are building for iOS or Windows Phone, there are fixed screen sizes and resolutions to plan for. If you're building for Android, you have more variations to keep in mind.

You also have a variety of sensors and enablers that can help you design interactions. While many of them are great enablers for design, they also come with their constraints (eg: GPS when used indoors with a spotty data connection may not return a location. How will your software handle this?)

2. Storage and cache sizes

Depending on what you're building, you might have options to download and store/cache content for offline usage. This could help reduce the data transfer for online transactions, making the product feel more responsive.

Think aboutwhether the storage is available on a memory card (removable storage) or internal memory.

With a memory card, you have to tackle states where the user might delete/modify content on the memory card, pull out the memory card while interacting with the software or for memory card corruption.

With internal software, you may have limited allotment for storage, and the possibility of cached data getting overwritten.

3. Latencies

It's a good idea to time operations and load times. Users on a mobile expect an instant response for something they do.

A lot of this depends on your product architecture. You may be able to do some architectural jugglery to deliver a phased experience. Think of how images load in your browser on a slow connection – a lighter pixelated version loads first, and then the sharper image loads. The intermediate stage keeps the user occupied till the final image loads.

Even if you can't eliminate all latencies, you could plan to tackle the intermediate wait stages with engaging messages or cached content.

First time use is a special case. When the app is used for the very first time, there are usually a lot of background setup activities that need to be done.

One way of mitigating the wait during this time is to have a front-end tutorial for users to engage with, while your app performs setup or

bookkeeping in the background. On subsequent usage, you could use data/states cached to deliver a faster experience.

4. Network issues

Any mobile product has to contend with network latencies and failure points. Plan for these earlier on, or you may find you're losing users because they keep staring at a 'Try again later' or 'Connecting…' message.

Try to avoid blocking spinners – one that does not let the user do anything while he waits. See if your platform and design permit loading partial elements and cached data to keep him occupied when he waits.

Depending on the platform you develop for, you may also have cases where the user can pull out the SIM card during an operation and put it back in, or walk in and out of Wi-Fi zones. This affects not just the software on the phone, but also the backend that supports it.

Finally: try identifying failure points and use that as avenues to show your product's personality. Twitter's fail-whale is a great example of how a failure point can become an icon.

5. Data use requirements

In addition to just data connection, the SIM card also provides information like MCC (Mobile Country Code) and MNC (Mobile Network Code) that you may have used to identify which country the user is and what network he is connected to. You can get info on whether he is on a roaming network and home network, and adjust the amount of data required accordingly.

For example, you may choose to download and cache a lot more data when the user is connected to Wi-Fi or a home network, but take a download-as-required approach when he is on roaming.

6. Fonts, language and tone of voice

The fonts and language you use in the product makes a big difference to the user experience.

Language and tone of voice reflect your product's personality.

The tone can be informal (Howdy!), formal (Welcome), friendly (let's get started), impersonal (press this button to continue) or any other variation

that suits your product. It's important to realize what tone your customers are comfortable with, and stick to one tone through the product.

Point to note: if you're building a global product, be careful about the tone of voice you choose. What comes across as informal in one culture may seem blasé in another.

Languages may bring their own issues – getting translations, checking that terms do not get curtailed, etc. You may also have to plan for right-to-left languages like Arabic.

7. Corner cases for product usage

There are many use cases that you may not be able to test during development.

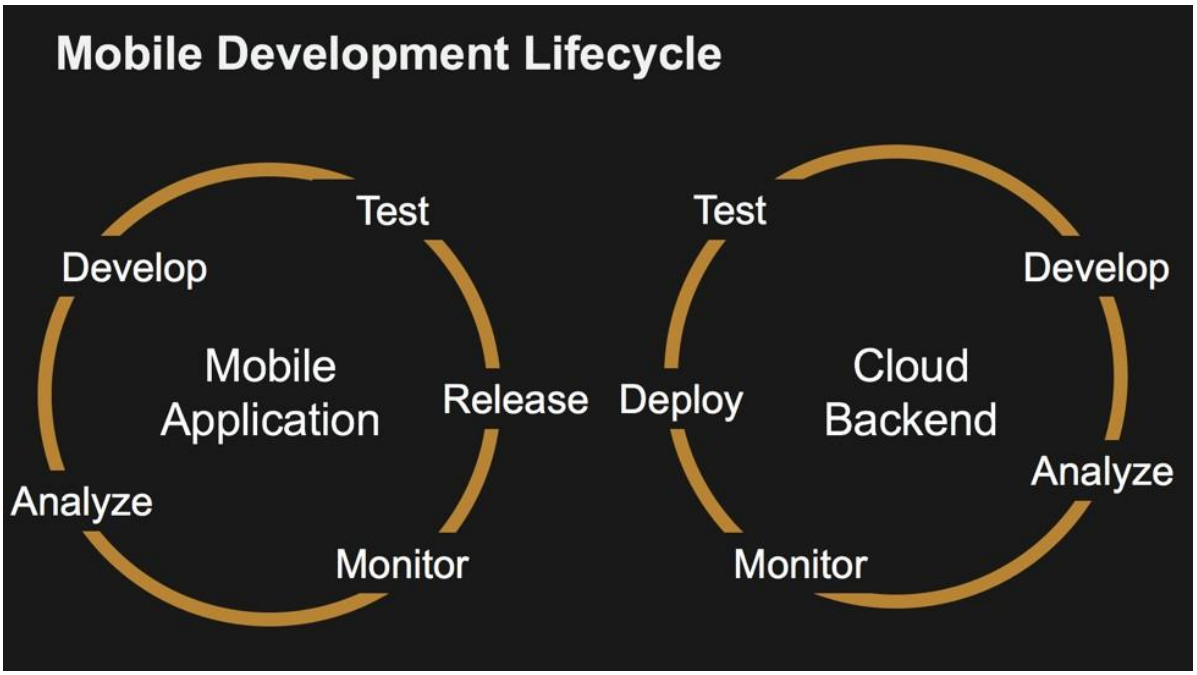
For example, it might be difficult for you to test 'international roaming' use cases unless you procure an international SIM, or send an Indian SIM to a tester/friend sitting abroad.

For many of these, it is usually possible to visualize multiple user journeys and scenarios when you're designing the product, and think of which cases you want to implement.

You may decide that there are cases that are too extreme to develop for, which is fine. If you have identified many use cases like this, you could at least plan for these with engaging error/fail messages, or take them as opportunities to get feedback (eg: this product was not designed to work in international roaming scenarios. Send us a quick email if you think we should be focusing on this – with an option for the user to mail quick feedback from the mobile client.

Explain architecture of mobile application

Mobile app architecture is a set of structural elements along with their interfaces that compose the system. It includes some techniques which help one in developing a mobile application. The app architecture gets formulated by taking all procedure that works on mobiles. This set of system helps to avoid customer problems.



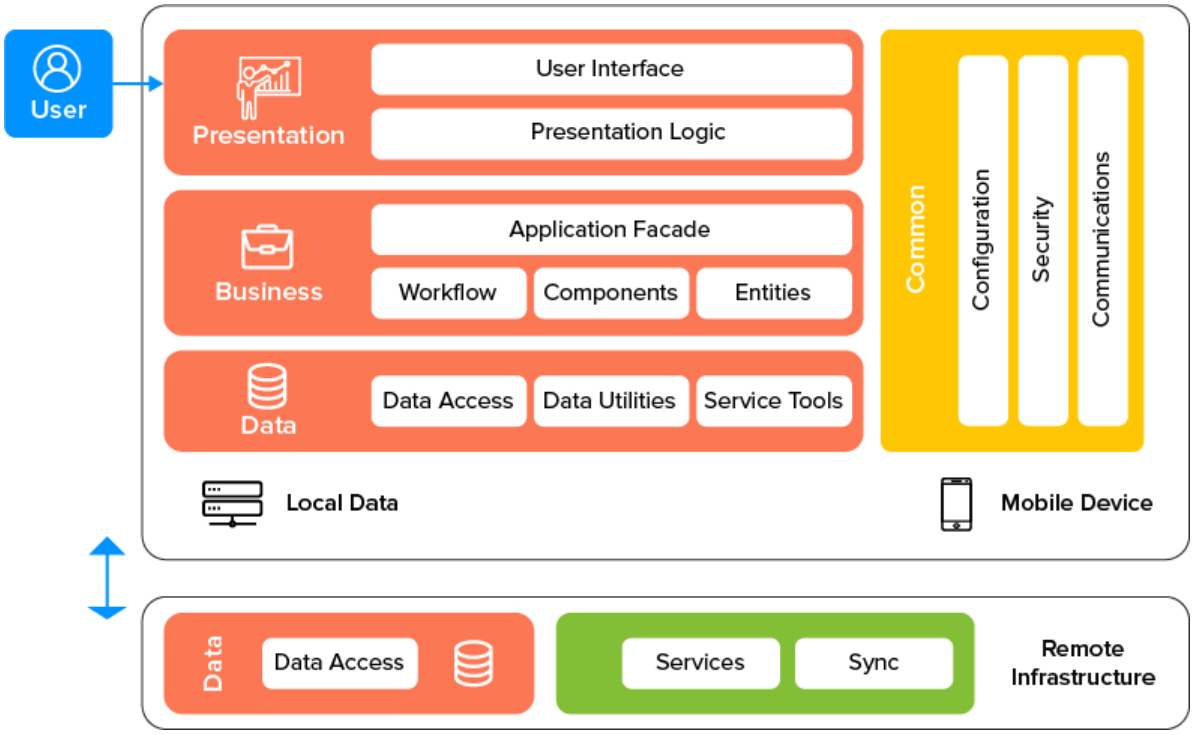
Application Architecture

The building or developing application architecture acts as a road map. You can follow this road map for best practices. You can make a well-structured app. All you need is the help of app architecture and software design patterns.

You need to prepare a mobile app by keeping a company's standards or industry in mind. This practice can avoid future problems. The problems may lead to recreating many features of the app again. Keeping care of every problem while creating application architecture, gives high-quality results.

The quality determines the whole work of the mobile application. Missing an important element during app architecture development can endanger your project's success. The size of the application decides the complexity of the process. The process is building high-quality architecture.

Mobile App Architecture Design



The most popular multilayer architecture is the three-layer architecture. This three-layer architecture is important for designing or creating mobile app architecture. It refers to your component's internal architecture. The given are the main three important layers of mobile architecture design:

Presentation Layer

The presentation layer consists of two components. These two components include the User Interface and UI process. While discussing this layer, the primary focus is the end user's mobile application's presentation. The mobile application developers should look for a client type. So, it would be compliant with the infrastructure.

During the presentation layer stage, you need to decide on many important things. These include themes, fonts, colours and shadings. The developer should keep in mind the client's deployment restriction while mobile app architecture designs. Another important necessity of this layer is to select the correct data format. Then use robust data validation mechanisms.

Business Layer

The business layer is for the elements on the business front. This layer looks at how the app will present the business to the end-users. This layer includes business components, workflow, and entities. These layers' complexity is more complex than others. It concerns too many problems such as caching and logging. The exception management and security challenges also add to its complexity.

There are two parts of this layer to reduce the complexity. These include the service layer and domain model. The service layers are for common application function sets. While the domain model is for knowledge and expertise linked to specific problems.

Data Access Layer

The data access layers are to meet the application needs. They offer efficient and secure data transactions. For this purpose, a developer needs to design this layer. It combines different parts including data utilities, data access components, and service agents.

The selection of the correct data format is important. Also, having a strong validation technique is another factor that makes it important to design this layer. Mobile app developers should consider the maintenance of the data. This practice helps in keeping this layer changeable with the business requirements.

Factors to Consider During Mobile App Development Architecture

It is important to build a better application architecture as it can get you success. You need to keep the details of mistakes during mobile app development architecture. This practice can lead you to success. If you avoid the problems and don't consider the factors, your app can be a failure. The following includes the things you need to consider while developing the architecture:

Determining the Device Type

Determining the device type is another important factor. There are different categories of smartphones that you need to determine and consider. The operating system decides the type of smartphones. There are various android phones, iPhones and many others.

They are based on the operating system they use. Besides the category or type of device, you should consider many other things. Other things include screen size, resolution, and CPU characteristics. Furthermore, you should also consider storage capacity and availability of development tool framework.

Bandwidth Scenarios

Your target audience's bandwidth scenarios are important to consider. There can be times when there will be zero connectivity. While creating a mobile app the targets audience internet network is an important factor. If your app is slow on the users' internet, they would abandon the app. This state would not be good for your business.

You need to consider the account power consumption, design access mechanism, and speed. Furthermore, choose the best software protocols and hardware for your mobile app. There are many things you need to consider. You need to adjust all these things for a slow and intermittent internet connection.

User Interface

For a mobile application, a great user interface plays an important part. A great user interface makes it easy and comfortable for users to interact with the app. The application interface should be simple and creative. It should not confuse or mislead users. The more, the simpler and creative it would be, the evolving the connection between your app and users. You should use a creative interface according to the demand of your target audience.

The Right Navigation Method

Choosing the right navigation method is important and crucial. It is an important aspect of mobile app development. The navigation method should be according to the app requirements and customers' preferences. Choosing the best fit after analyzing different navigations methods can lead to success. Some of the popular navigation methods include:

Stacked Navigation Bar

In this navigation bar, there's the design of a fixed bar. You put their links to all other elements within your mobile app.

Tab Controller

With the tab controller, one can switch between the groups of tabs with links

Modal Controller

There's a screen menu in the modal controller. It allows switching between tabs and links.

Single view

In this method, there's a screen with one element and an option to go back.

Gesture-Based Navigation

It encourages us to use finger combinations. With this method, the user can interact with the Home button to cause an action on the screen.

You should also decide whether you want to create a real-time update or push button. You can decide this factor by keeping your audience in mind. The real-time update can

3. Explain user interfaces for mobile applications.?

Design is not just what it looks like and feels like. Design is how it works." –Steve Jobs

If you are a startup then you must know **the importance of user interface design** in your mobile or web application. Building websites and mobile applications, nowadays, are essential for businesses because people only tend to trust companies with a reasonable online presence.

Besides, if customers can't reach you, they can't rely on you and in this digital age, customers want immediate connection. So even if you have a website, **understanding the user is crucial and important in interactive designing**. Your website should entice customers to engage.

Keep in mind that UX – user experience for mobile applications is as important as it is for a website. You should have a mobile application that can convert visitors into full-time customers, increasing your revenue in the process. Therefore, you need to focus on the importance of app design and take into account the important features of user interface design.

No doubt we can find many **pre-made mobile app UI design templates** but how do you mold those ready-made designs to better communicate with your customers is the real deal. A word of advice? Nothing can beat a design developed from the ground up.

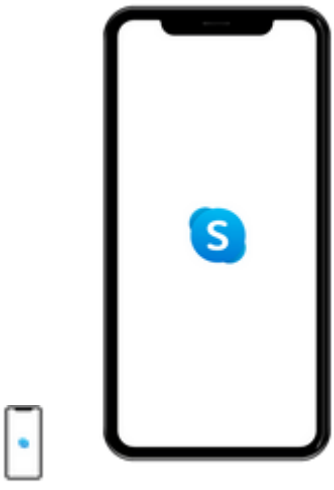
The importance of user interface design and user experience (UX) go hand in hand, meaning, they are not exclusive of one another. Even though both UI/UX are not exclusive, doesn't mean they are the same thing. They do have their differences. **But what is the purpose of the mobile user experience?** UX is more focused on how things work whereas the purpose of user interface design is to make the entire design look simpler, intuitive, and engaging through visual elements.

So whether it is a website or a mobile application, the interface should have a user-centric design.

According to studies, **people form 75% of their judgment on a website's credibility purely on its aesthetics**. But also know that a good UI with poor UX will not give you what you desire. Similarly, a good user experience with a bad interface can not result in an optimal application. Get both on-point and you will have exactly what you want since both UI/UX branding plays an important role.

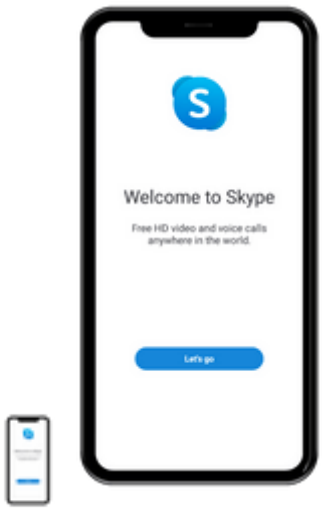
List of Various Types of User Interfaces for Mobile Apps

Splash Screen



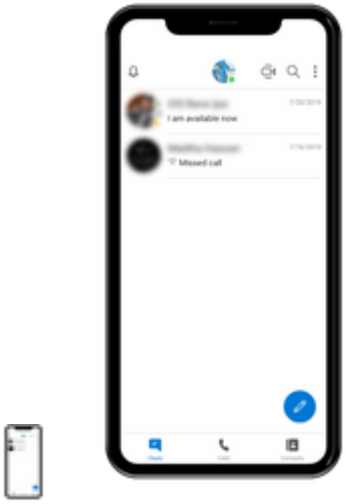
Very first screen appears when you launch an application for not more than 3 seconds. Splash screens form the very first impression and attract the user's interest. Try using exciting illustrations, punchlines, and visual elements to achieve optimal user experience.

Onboarding Screen



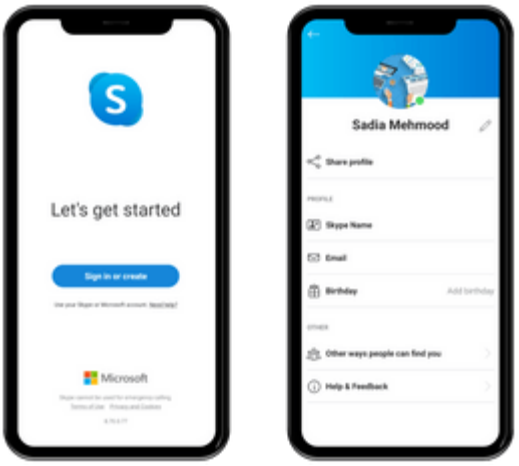
They are minimal tutorial screens that are only shown to the first-time users which tell them about their next steps, and about the basic features and functionality of the entire application to make the journey less complicated.

Home Screen



It's the main screen of the entire mobile application. All the other screens are linked to the home page as it highlights the functional menu and the features. UI designers must understand the importance of designing the user interface of the home screen to make it more understandable and user-friendly.

Login and Profile Screens



There are lesser mobile applications that don't need a login page, but many do. Therefore, make sure to steer clear of all the unnecessary distractions on the log-in screen. Consider UX and limit the information fields for customer convenience and be sure to integrate error messages in case of right/wrong information input.

There are different types of UI screens used in different mobile applications, according to requirements such as eCommerce has its UI screens: checkout and product catalog similarly social platforms have varying screens but the basics (see above) stay the same.

What is Meant by Usability and Why is it Important for User Interface Design Foundation:

- It should be easy for the user to become familiar with and competent in using the user interface on the first contact with the website. If we take a travel agent's website that a designer has made well, the user should be able to move through thesequence of actions to book a ticket quickly.
  - It should be easy for users to achieve their objectives through using the website. If a user has the goal of booking a flight, a good design will guide him/her through the easiest process to purchase that ticket.
  - It should be easy to recall the user interface and how to use it on subsequent visits. So, a good design on the travel agent's site means the user should learn from the first time and book a second ticket just as easily.

Usability in user interface design is important because it allows the user to complete tasks easily and efficiently on the website without ambiguities and frustration. It is measurable since it lets you determine the success rate of the application such as if people are downloading and using your application, meaning the usability is good.

Below you will find some pointers on the importance of user interface design, so let's jump in.

The Importance of User Interface Design

A Good UI Saves Time and Cost.

If you understand and regard the best UI/UX practices from the very start of your project, you may not need to revamp your application again and again which saves time and costs together. Also if you spend a considerable amount of time on UI design, the challenges during and after the launch will be lesser since customers won't have any issues with the product.

Because an immaculate product doesn't need constant updates and maintenance.

A Good UI Attract Users.

At the end of the day, that's all we need, 'Customers'. According to Charles Eames, "The role of the designer is that of a good, thoughtful host anticipating the needs of his guests." Good UI grabs the user's attention and makes sure that they stay. But only an intuitive UI will be able to make users stick around. Therefore, when users land on your application, they should be hooked so that they come back as many times as they want.

Explain about achieving quality constraints

Quality of Service (QoS) in networks :
A stream of packets from a source to destination is called a flow. Quality of Service is defined as something a flow seeks to attain. In connection oriented network, all the packets belonging to a flow follow the same order. In a connectionless network, all the packets may follow different routes.
The needs of each flow can be characterized by four primary parameters :

- Reliability, Lack of reliability means losing a packet or acknowledgement which entertains retransmission.
- Delay, Increase in delay means destination will find the packet later than expected, Importance of delay changes according to the various application.

Short answer questions

1.What is embedded system/

2.Explain about embedded os?

3.what do you mean by performance?

4.Define usability?

5.what are the ways to achieve quality constraints

Long answer questions

1.Design constrain for mobile applications

2.explain about architecting mobile applications

3.what are the user interfaces for mobile applications

4.explain brief about availability and modifiability

5.structure of embedded os

UNIT-3

DESIGNING APPLICATIONS WITH MULTIMEDIA

1. Multimedia Principle

The Multimedia Principle argues that the multimedia application must include a combination of words and images, as information is transferred, processed, and maintained better by the trainee when the teaching environment links its presentation with those two elements. Consequently, based on the Cognitive Theory of Multimedia learning model, both channels of sensation are used, creating in the long-term memory a fuller and more structured representation that contributes to the acquisition of knowledge.

2. Contiguity Principle

According to the Contiguity Principle it is preferable that the words be presented simultaneously with the corresponding images, rather than separately in a multimedia application. Clark & Mayer demonstrated that graphics must be present next to the text mentioned, as distance generates increased cognitive load, to the already knowledge-limited capacity of active memory, with the direct consequence of dissuading the learner from active learning.

3. Modality Principle

A principle which is the specialization of the Multimedia principle and advocates the presentation of the words as an acoustic narration rather than as a visual text on the screen. It is possible to create better learning conditions when choosing modalities that do not overload a single channel of recruitment but are complementary, as predicted by the Model of Cognitive Theory for Multimedia Learning.

4. Redundancy Principle

This principle supports the narrative presentation with graphics rather than graphics *and* narration *and* text on the screen. This authority claims that the excess information involved in learning, instead of facilitating, cognitively affects the trainee. The cognitive burden can occur when the information itself is presented in multiple forms (verbal and visual) or when presented without necessity in a complex way since the processing capacity of each channel is limited. However, sometimes this principle is overlooked when the teacher can adapt the application to its rhythm and needs, or it may have difficulty in editing narrative.

The Coherence Principle points to the exemption of multimedia presentation from verbal and visual information. At this point, the need to avoid unnecessary texts, sounds, and images in multimedia teaching is emphasized, focusing only on the presentation of the necessary information. Adding interesting but unnecessary material can hurt the learning process since it risks the cognitive load.

5. Personalization Principle

The Personalization Principle emphasizes the use of a friendly and familiar way of expression (narration on the first and second person), as well as the use of an effective pedagogical agent, helping the learning process. Based on the Cognitive Theory of Multimedia Learning, this approach approaches human discussion, and so learners are actively involved in the learning process, trying to understand what the narrator means and thus become more involved in cognitive processes of choice, organization, and integration.

Social media networking applications

We can't imagine our lives without online communication. Years ago, we would wait for weeks to get a letter in the mailbox. Today, however, we don't even start our mornings until we've checked the news feeds on Facebook and Instagram and read messages on Messenger, WhatsApp, Snapchat, and LinkedIn. Just take a look at the number of active users of the most popular mobile messaging applications across the US

Security

People want to interact in a secure environment and be in control of their privacy. Maintaining users' integrity and security can help you achieve your business goals and increase revenue. You should give users the right to control data they share. Therefore, your app should offer features that help individuals fulfill that right.
User privacy extends to profiles, connections, feeds, and in-app communication. If you want to encourage users to generate content in your social app, you should provide privacy controls. For example, Instagram lets users create private accounts and approve those who can view posts and photos. On Facebook, there are privacy settings to let only friends see friend lists and posts and to control who can send friend requests.

You probably want people to be sure your platform is safe, so you need to keep to mobile application security best practices.

Must-have technologies

Notifications. Users need to be motivated to return to your app. This can be achieved through push notifications, email, or SMS. LinkedIn encourages users to return to the platform by sending emails with CTAs. These emails motivate users to connect to other professionals or view job listings.
Payment systems. If you want your platform to handle payments for products or services, you should integrate your solution with popular payment gateways such as PayPal, Braintree, or Stripe.
Integration with social networks. You can add Facebook, Twitter, and LinkedIn APIs to help people register. This way, users don't have to fill out the same information such as name or email again. Necessary data can be pulled from existing networks. What's more, adding social media sharing buttons will give users an opportunity to share content with others, letting your platform get more exposure.
In-app communication. Provide people with chat options and let them comment on activities. We usually build chat functionality with WebSockets, as they allow us to implement real-time communication. You can also use socket.io technology, which combines WebSockets and long polling (technology that can be used to get real-time events).
Database. Your platform will have to store large amounts of data, so you need to think of how and where it should be stored. There are various kinds of data, including text, audio, video, and photo content. You can choose PostgreSQL, MySQL, Microsoft SQL, or Oracle for your database. At SteelKiwi, we recommend using PostgreSQL because it's a good solution that works perfectly with Django.
Admin panel for user and content management. You can't just leave your platform without an admin panel. To be on top of which interactions happen and who registers, you need an admin panel. With an admin panel, you can manage users and important data.
Integration of data sources. When you want to implement additional data sources, say maps or places, you can integrate your app with the Google Maps or Google Places API. Hungry for more? Let's look at some fresh technology trends that can improve your social networking solution.

Trending technologies for social networks

Location-based services. Social networking applications are even more attractive if you add geolocation features. Users can attach geotags to photos and videos on social networks, which is much faster than writing where they are. Social apps with geolocation features are context-aware. They let users create, exchange, and discuss location-based content as well as connect with others in the same location. Take the WhosHere app as an example. It uses location-based features to help people connect and make new friends with others nearby and around the world.
Voice interfaces. When people are on the go and need to send a message fast, they can use voice interfaces. Voice interfaces allow users to give voice commands to their devices. To create a voice interface, you need to integrate your solution with AI-powered personal assistants such as Siri and Alexa. Voice interfaces can perform two functions: voice typing and voice notifications.

How much does it cost to create a social network iOS app

We've been developing iOS applications and can also provide you a rough estimate for the basic feature set.

- Login: 25–30 hours
- User profiles: 25–35 hours
- Connections: 15–25 hours
- Messaging: 25–30 hours
- Creating posts: 15–25 hours
- Uploading photos and videos: 35–45 hours
- Push notifications: 5–15 hours
- Feed: 35–45 hours

Total: approximately 250 hours

Every solution is unique. Your app will likely have other features that aren't listed here. So the social network development cost may vary

FEATURE	FRONTEND	BACKEND	IOS	ANDROID
Login	Facebook API, Google API, ReactJS	Django-all-auth, Django-rest-auth, Auth0, Django-rest-framework-jwt, PostgreSQL/Redis for sessions	Alamofire, ObjectMapper, Keychain Access, Facebook API, Google Sign-In SDK	Retrofit
User profiles	Locationpicker Cropit, ReactJS	Custom logic on top of Django and/or DRF, PostgreSQL for data storage	Alamofire, ObjectMapper, SDWebImage, AVPlayer	Retrofit, Hawk, Glide

Educational Software: What You Need To Know

Education software is computer software with the primary purpose of teaching or self-learning. Using computer software and hardware in education and training goes back to the early 40s, when American researchers were able to develop flight simulators that used analog computers for generating simulated onboard instrument data.

These days, education software constituents of the identity of a school as they could deliver all the associated tasks. Software at present even provides the facility and access to parents for a bird's view of the progress of their children in the classroom.

The Relevance Of Educational Software

More and more educational software organizations, both online and offline are coming up to help fill a need for more personalized, interactive educational experiences for students and teachers alike. There are numerous benefits to these systems and, most importantly, education software is a cost-efficient solution for educational organizations that want to manage information and data regarding their students in an organized way.

Benefits Of Educational Software

Educational software integrates multimedia content and provides users a high interactivity level. The two features distinguish them from traditional teaching practices. Multimedia content, such as graphics, pictures, and sound help engage students in their lessons. For example, when it comes to learning history, students could go back and see videos or other online-based content related to it. Furthermore, an online education software benefits teachers, allowing them to better connect with the students and help them keep students interested in a lesson. Finally, it also promotes a productive learning environment.

11 Types Of Educational Software

An online education software has been an integral teaching tool for teachers as part of their lessons. The implementation of these systems in classrooms has enhanced performance of students and teachers alike. There are numerous educational software available for various subjects. However, educational software firms have started to create educational apps for students and teachers to utilize as a teaching and learning tool. The following are the kinds of educational software that an educational institution must implement.

1. Authoring System.

This helps teachers in developing their own instructional software. They could build electronic flash cards of index cards for teaching children on specific concepts. Furthermore, they could build multimedia content such as lessons, reviews, and tutorials. One could even consider web alternatives, since web authoring systems help teachers in building multimedia content that could be used on a website.

2. Graphic Software.

Students could use graphic software for capturing, creating, and changing images that are available on the web, on the program itself, or online images available. It is particularly useful for building online presentations.

3. Reference Software.

Teachers could include reference software in research projects. Reference software allows students access thesaurus, encyclopedia, atlases, and dictionaries.

4. Desktop Publishing.

A desktop publishing software is used for creating and designing newsletters, handouts, and flyers. Teachers could use the software to inform students and parents on activities or events that are taking in place in school. Desktop publishing software use is a must-have skill for new graduates and thus high schools are now teaching students how to use desktop publishing suites like Adobe Create Suite and Microsoft Office.

5. Tutorial Software.

Through tutorial software, teachers could teach students new lessons and give them a platform through which they could learn the lesson at their own pace. Tutorial software consists of giving students new information for learning, giving them time to practice it and evaluate their performance.

6. Educational Games.

There are several educational gaming software available. Education software companies combined gaming and education into one. This kind of software is very effective for younger children since it motivates them to learn.

7. Simulations.

Simulations software lets teachers teach students via virtual experience. For example, students could use this software to acquire experience of flying a plane.

8. Drill And Practice Software.

Teachers could include drill and practice software for strengthening the current skill set of students. This software is beneficial when teachers prepare students for tests and exams.

9. Math Problem Solving Software.

This kind of software makes it possible for math teachers to strengthen the students' problem solving skills. Furthermore, science teachers could use this software for doing science experiments.

10. Utility Software.

A utility software aids teachers in preparing quizzes, tests, and even serves as a grading book. Teachers who are non-tech would find this software easy to learn and use.

11. Special Needs Software.

Online education software also includes special software that is developed for addressing the needs of a student who has special needs. The system is combined with assistive software that provide students with special needs an effective learning platform. Examples include speech synthesizers, computers that read text aloud, and multimedia software that targets certain learning disabilities.

Write about integration with GPS

Mobile applications with geolocation occupy top positions in various app ratings. Why are these applications so popular? This is due to the fact that geolocation allows expanding the capabilities of the app. Moreover, such apps may greatly improve user relationships. Such applications as Airbnb, Uber, and others, confirm the viability of this idea.

What is geolocation? In fact, it is a kind of technology that allows determining the user's current geographical position.

All the mobile positioning services should adhere to the W3C standard. Its main approach to location determination is based on IP addresses. This method has a very low accuracy as the user can work through a proxy, VPN or have a dynamic IP. Nevertheless, the W3C system is the simplest and widely supported, and therefore it must be given priority over other methods of geolocation.

How to Create a Location Based App?

Each geolocation application uses Geolocation APIs for Mobile Apps. What does an API mean? Application Programming Interface is an array of standards, modules, libraries and functions that govern the synergy of apps and operating systems, web services or hardware devices.

There exist two main types of APIs that:

- determine the user's position;
- display objects on the map.

Most of geolocation mobile applications use both types of APIs but implementing both is not necessary. To make your Android application able to determine locations, you have to configure the LocationManager. Using this service you are able to implement:

- selection of methods for determining location;
- turning the methods on and off as needed;
- setting periodicity of the data update;
- navigation to a given waypoint.

Using the built-in Google Maps access, the app can display information provided by Google. An important aspect is that maps are already integrated into the platform and not created specifically for it.

To integrate maps, using the LocationManager tools, you should configure the MapView function, which is required to display maps. The significant fact is that using MapView there is no need to require the configuration of a user interface. The tool is designed in such a way that the program automatically responds to all user's actions.

The Location and Maps services integration to iOS apps does not differ greatly from Android. The MapKit allows integrating maps into your iOS application, while the Location and Maps service allows customizing the presentation of the users' location.

There are several ways of geolocation technology integration in a mobile app and, in this article, we strove to review the most common ones.

GPS

Global Positioning System (GPS) is the oldest and one of the most widely used technologies for location determination that is based on the obtaining and evaluating signals from geostationary satellites. What are the main principles of this method? Everything is quite simple and comprehensible. The easiest way is triangulating signals from the three nearest satellites. The device measures the time it takes for signal from each satellite to reach the receiver and, based on the collected data, determines own position. Among the advantages of using geolocation technology - GPS - notable is the high speed of data acquisition and relatively high accuracy, which can be further increased by orienting to more than basic three satellites. Some GPS chips allow getting and measuring signals from up to 20 satellites simultaneously.

Wi-Fi

This method is based on the analysis of the Wi-Fi access point's location. This technology is actively used by apps that use Android Location service or iOS Location service. Data about each access point is stored in a closed database with the consent of the user. The technology is one of the most convenient to use.

Cell ID

This method is similar to GPS with a difference in reference points used to triangulate the position - cellular towers. The location of each tower is fixed in the database and the geolocation of the device is determined by the location of the towers it can receive a signal from. This method is most appropriate for large cities.

A-GPS

Assisted GPS (A-GPS) is a specific technology that is based on increasing the GPS positioning accuracy with mobile internet/Wi-Fi and/or Cell ID positioning. Not only is it more accurate but also allows upholding the geolocation service operation when one or two of the combined carriers are unreachable.

BLE Beacons

Bluetooth Low Energy is another common way of calculating the user position. This method is based on compact beacons that transmit information via Bluetooth. It is great for closed premises or places where there is no access to the internet. An important advantage of this technology is the extremely low power consumption and high speed of operation.

Top Three Location Based Apps

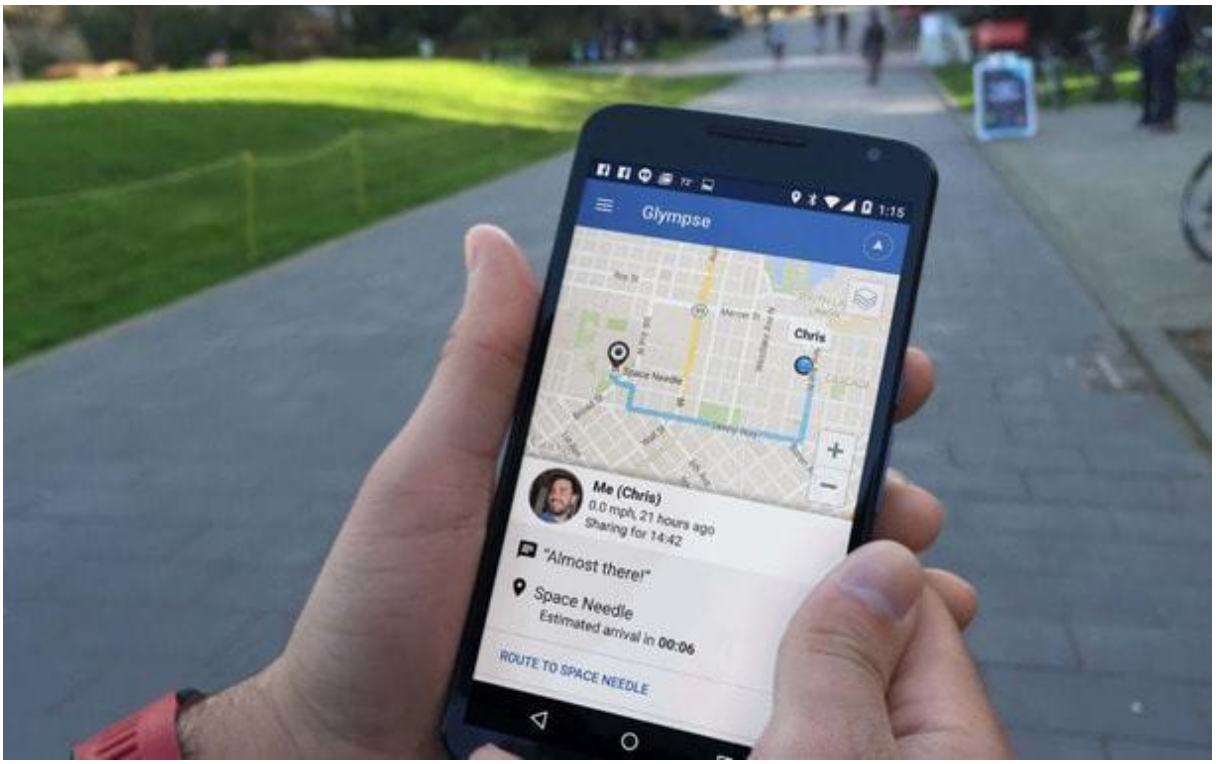
There exists a large variety of apps which use geolocation integration. In fact, it is easy to reveal the most popular and used apps. To determine which apps are the most widely downloaded and used, we analyzed app store statistics and here are the best geolocation apps in our opinion.

1. Google Latitude Based On Google Maps

To use Google Latitude service, you should have Google Accounts profile. The major component of the app interface is the displayed map on which the users may see the current location of their contacts. These positions are determined by Android's in-built positioning service, using GPS and A-GPS. Of course, Google is firmly convinced in upholding the privacy of the users. Any owner of the Android device can turn the location service down or opt against sharing their position with other people. The service has only one limitation - only users with Google Account devices can participate.

2. Glympse

This geolocation app shows not only the current position but also tracks the passed route. You are able to connect a friend by sending them a message in any convenient way. The significant advantage is that the recipient of the message does not need to install the app. In addition to this, Glympse does not require any registration.



3. Family Locator

This program is one of the most commonly downloaded. Installing the Family Locator, the person can receive information about the location of all added family members. In order to use this application, you need to register and invite your relatives or loved ones. Once you and your family members are registered in the application, you can get information about their location and routes, which are displayed on the map.

Write about social media networking applications

Social Media are the biggest platform in today's market. Social media platforms are also marketing platforms. The top social media applications like Instagram, Facebook, Snapchat have gained a lot of popularity among the users since their mobile app development. Because of which the top social media platforms are aggressively in competition with each other to be on top. You can also see a competition between Facebook and Whatsapp

however, both of them are owned by Facebook Inc. And even Instagram which is one of the best social networking apps is also owned by Facebook.

Among this hustle and bustle of social media, brands are too much for people. So, users created accounts on all social media platforms. Even the **top mobile app development companies** look for such amazing developments to gain success.

Top Facts about Social Media Applications

-> There are about 5.5 billion mobile phone users worldwide with an increase of 3% year on year.

-> 4.5 billion internet users worldwide with an increase of 10% year on year.

-> 4.33 billion social media users around the world at the start of 2021, equating to more than 55% of the total global population.

So more than half of the people use any kind of social media platform and that is why it has become the best place to promote and market your application. And that is why many **IT outsourcing companies** are getting a lot of requests for the development of **social media applications**. So, without waiting any further let us have a look at the top 20 best social media apps that will rule the market in 2021 and tell us **what is the future of Social Media?**

Best Social Media Apps in 2021

Let us have a look at these top social media applications, their notable and unique features along with distinct interfaces that helped these applications to top the charts.

Telegram is a freeware, cross-platform, cloud-based instant secure messaging software. It also offers end-to-end encrypted video calling, VoIP, file sharing, and several other unique features which makes it one of the best social media platforms among users. It was launched for Android in October 2013 and for iOS on 14th August 2013. It's Telegram's security that makes this app stand out among the competitors.

As a business, it gives you an opportunity to connect with the users instantly. For example, brands and businesses can create chatbots on the Telegram platform or use Telegram's channel feature to broadcast messages to several subscribers at once.

Top Features of this top Social Media App:

-> Free without any Advertisements

-> Can easily create with around 2 lakh users

-> Most important encrypted and self-destructive messages

-> Turn off notifications, message preview, and lock particular conversations

-> Personal cloud-based storage

Download link: **Android** and **iOS**

1. Reddit

Reddit is another top-class social media platform. Reddit is a social news aggregation, web content rating, and discussion website, and it also claims to be "The front page of the Internet". With its recent update, Reddit added Livestream content through Reddit Public Access Network. It was founded on 23rd June in 2005. There are also dedicated forums for pretty much anything called "Subreddits' '. However, subreddits have different engagement levels which allow the business to find out the relevant and popular subreddits for their brand promotion. Reddit has reached over 430 million monthly active users which raises the question "**Why social media marketing is important for your business's ultimate success?**"

Top Features of Reddit

-> Join the conversation of your choice

-> You are allowed to have a comment, upvote, or downvote every post

-> Gives you a global platform as a discussion forum with thousands of unique topics

-> Create and moderate subreddits to build your community

-> Feature unlock based on your account's karma

Download link: **Android** and **iOS**

2. Instagram

Instagram is an American photo and video sharing social networking service created by Kevin Systrom and Mike Krieger. Facebook acquired Instagram in April 2012 for approximately US $1 billion in cash and stock. Since its launch in October 2010, Instagram has seen a meteoric rise to 1 billion active users which makes it one of the top social media platforms.

The best thing about Instagram is that it works day and night to add features to keep its users engaged. With its recent launch of IGTV in order to support long-form videos, it has emerged as the best platform to target users. It is a great platform for **social media marketing services** if you want to promote your brand or business.

Top features of Instagram

-> Go live to connect with your friends and followers

-> Browse your feed and interact with posts

-> Share pics, videos, stories using creative effects

-> Discover other people's videos, photos, stories, etc

-> Message your friends in private

Download link **Android** and **iOS**

3. Facebook Messenger

Facebook is a social networking site that makes it easy for you to connect and share with family and friends online. It was originally designed for

college students, Facebook was created in 2004 by Mark Zuckerberg while he was enrolled, college students. Facebook has converted messenger into a standalone top social media app and expanded its features.

Businesses can sign up and can advertise, send newsletters, create chatbots, and do many more things on messenger. These top features have given businesses and entrepreneurs a multitude of new ways to connect and engage with their customers. With the increase in the number of Facebook, companies are even getting benefitted through Facebook messenger marketing solutions to boost the business reach and profitability.

Top Features of Facebook Messenger

-> Can send messages to anyone on FB without a contact number

-> Voice call, voice message, and video call

-> Add stickers, GIF, emojis and express yourself better

-> Connect with businesses to get customer support

-> Send money securely and easily in the US, UK, and France only at the moment

Download **Android** and **iOS**

4. Twitter

Twitter is a very popular and known social media application around the world. It is a real-time public microblogging network where users can get

new updates in the blink of an eye. It has been appreciated by most of the mobile social media app designers and users for its short word limit feature. Its emphasis on real-time info and the things that are happening around the world makes this one of the best social networking apps and websites, unique and different from other platforms. As per the advertisers, more than 80% of social customer service requests are served on Twitter.

Top Feature of Twitter which makes it one of the most used social media apps:

-> See viral topics and trending hashtags

-> Chat privately with friends and followers

-> Get suggestions about influential people to follow

-> Discover what your favorite sports, news, entertainment, etc.

-> Go Live with a tap and watch premium and exclusive live streams

Download **Android** and **iOS**

5. Snapchat

Snapchat is another social media application that is loved by millennials. By the end of 2020, Snapchat will have 238 million users worldwide because of its unique features like self-destructive "Snaps' ` and the users can send a picture or a short video as a message which automatically disappears after a few seconds. Snapchat was the first social media platform that made stories popular and later incorporated by other social media apps like

Instagram. The popularity of Instagram has been affected by Snapchat's growth as both are very similar applications as a marketing and advertising platform. Snapchat and Instagram are loved by the fashion industry as they offer **long-lasting benefits of social media marketing for the fashion industry**.

Notable Features of Snapchat

-> Live Messaging and video chat

-> Check your astrological compatibility with friends

-> Check out snaps shared earlier with free cloud storage

-> Create and add filters, lens, 3D Bitmojis to your photos

Download link: **Android** and **iOS**

6. Meet Up

Meetup is going to be the best social app on our list that will make it big in 2021. However, Meetup has a subscription plan which ranges from a month to six months. For one month you need to pay $9.99 and for six months, it's $29.99.

Top Features of Meetup

-> Easy switch between locations

-> Options that help personalize and schedule events

-> Options to explore groups and events by category

-> Save events you're interested in and revisit them later

-> Discussions and messaging within the app

Download link: **Android** and **iOS**

7. LinkedIn

LinkedIn is just like Facebook but for professionals from all around the globe. It allows users to promote themselves and their businesses. Users can increase their business connections while connecting with other professionals from various different factors. LinkedIn is also a great advert tool for businesses, like sending personalized ads, displaying ads on the site, and also boosting your content on the site. That is why many **android app development companies** look to recreate this type of application.

Notable Features of LinkedIn

-> Create a professional profile

-> Make your blogs and articles reach professionals

-> A great marketing opportunity to showcase your company

-> Follow the relevant activities of your connections

Download link: **Android** and **iOS**

8. Tapebook

Tapebook's name is very similar to Facebook, it is a new social network that lets you record short audio or video clips with friends and uploads them to its social feed. The short videos are known as tapes which makes it social podcasting with a video twist. Tapebook's success in the market tells you **Why your Business is strongly needing Social Advocacy?**

-> Allows users to share their talents, travel stories, podcasts, live music, cover songs, and also teaching skills.

-> Real-time recording

-> Record with connections

-> Meet and follow interesting people and discover topics through #hashtags

Download link: **iOS**

9. Pinterest

Pinterest is another major player in the mobile social media application, which has been providing to the entire globe that how significant visual content is or could be. Pinterest inspired the users with new ideas to try new things, which makes Pinterest a **top marketing tool** for businesses as it directly targets the consumers. However, before you start with social media ads you should understand the basics like **What are social media ads? Types & Examples of Social Media advertising**.

Top Features of Pinterest

-> photo sharing and visual bookmarking

-> Invite your friends to collaborate

-> Buy, make, use the ideas you found

-> Discover lifestyle inspirations

Download link: **Android** and **iOS**

10. Tumblr

Tumblr is an American microblogging and social networking website founded by David Karp in 2007 and currently owned by Automattic. The young generation widely uses it for showcasing attractive features like customized blog share platforms and versatile blog content. You can find insightful blogs like **21 Best Marketing blogs you must read** which will keep you ahead in planning the market strategies.

Most Notable Features of Tumblr

-> Viral tags to make your post stand out

-> Other social media integration

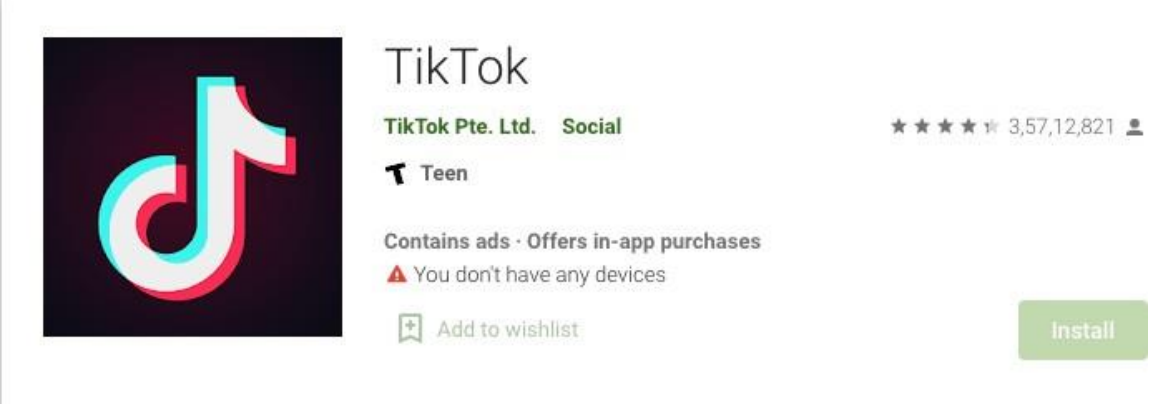
-> create your own GIFs

-> Allows posting text, photos, videos, audio, live, videos, etc.

-> More than 250 beautiful text blocks

Download link: **Android** and **iOS**

11. Tik Tok



TikTok has an amazing growth rate as it is a new social media app for music video sharing. It became a social media sensation as soon as it was released in 2016. On this social media app, users can record videos for up to 60 seconds, edit them, add music and special effects before publishing them to the wall.

Most Likeable Features of TikTok

-> Social Media Integration

-> Integration of music library along with language support

-> Editing tools with AR features

-> Simple yet attractive user interface

-> Make duet videos with anonymous users

Download link: **Android** and **iOS**

12. WhatsApp

Whatsapp has already surpassed a lot of social media and messaging platforms. It has a vast user group that has further shadowed Facebook messenger grades as it is one of the best social media applications. People from more than 180 countries use this free social media app for communicating in business also. It also offers WhatsApp Business for business owners to have a proper professional profile to share updates and provide customer support to the customers. It is easy once you learn **How to Promote your Business – 24 result-driven business promotion strategies**.

Notable Features of WhatsApp

-> Saved offline messages

-> Backup your chat and media

-> Voice call, video call, group video call

-> Share contacts, locations, and every kind of docs

-> Run your account on PC

Download link: **Android** and **iOS**

13. Facebook

As of 2020, Facebook is the largest social media platform globally with 2.6 billion monthly active users worldwide and this number is enough to tell you its craze among the millennials. We all can say that Facebook is ruling the social media market. It is easy to start with the best social media mobile app as you are allowed to post images, text, videos, stories, and live videos. With so many users all around, you might not find the person in the directory but the chances of finding a person are high on Facebook.

Top Features of the most used social media app:

-> Offer free games to play with your friends from your own place

-> Buy and Sell on Facebook marketplace

-> Get every walk of your favorite artist, companies and get their latest news

-> Find local events and make plans with friends

14. Youtube

Along being a social media application, Youtube is also the **best video streaming app** and best video uploading app. You can find every kind of video, you just have to search for it. Youtube is also the second-largest search engine after Google. As of 2020 Youtube has 2.3 billion users worldwide.

Top Features of Youtube which makes it the best video streaming app

-> Youtube live offers 40+ cable channels

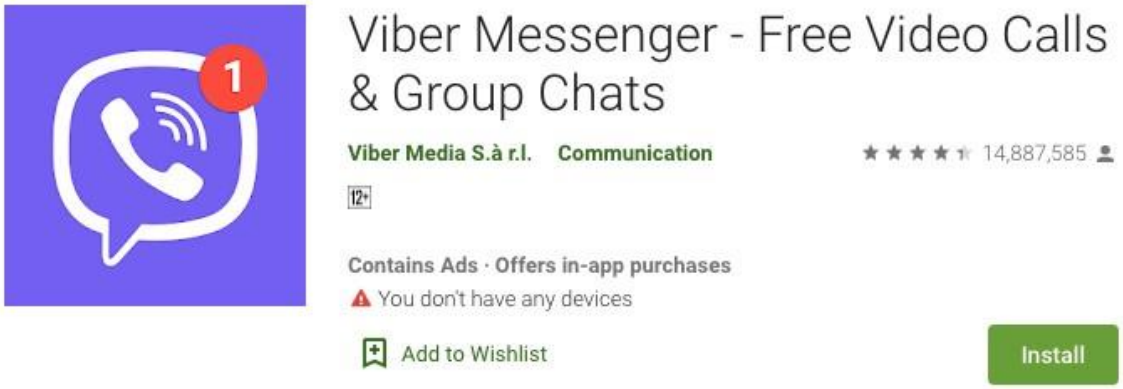
-> Dark Mode along with a big-screen interface

-> Video Management as per your choice

-> Easy access to subscription channels and feeds

-> Bell icon to know about the latest videos

Download link: Android and iOS



15. Viber

Viber is among the fastest and most secure messaging applications. With more than 1 billion users worldwide, Viber is surely giving tough competition to the listed best social media apps. Users can text and make high-quality crystal clear phone calls for free of cost.

Notable Features of Viber

-> Viber Out allows users to make low-cost calls to landlines

-> Make unlimited Audio and video call with mobile data or wifi connection

-> Users can sync their desktop and tablet apps

-> Can start a Viber community with unlimited members

Download link: **Android** and **iOS**

16. Whisper

Whisper is a proprietary Android and iOS mobile app which is available on the respective app store for free. A whisper is a form of anonymous social media that allows users to post and share photo and video messages anonymously. Whisper has a large online community where millions of

people share their thoughts. With a user base of more than 30 million people Whisper is among the top social media applications.

Top Features of this top Social Media App

-> No Followers, friends, or user profile

-> Can maintain their anonymity through the chat or private messaging function

-> Users don’t have an identity when using the service

write about accessing applications hosted in cloud computing

7 Most Popular Applications of Cloud Computing : All You Need to Know

By Simplilearn

Last updated on Sep 28, 202213502

View More

In the digital world, the cloud has nothing to do with the white fluffy things in the sky; it has everything to do with the Internet.

As a tech revolution that has witnessed rapid adoption over the last decade, the cloud fuels some of the world's largest brands, and it's the technology behind some of the most innovative products and tools of recent times.

Businesses worldwide are using cloud resources or cloud computing to access important programs and data on a pay-as-you-go basis. Prized for its convenience and reliability, cloud computing is transforming businesses and their operations across industries.

Here we'll look at some of the reasons why cloud computing is so important, its benefits, the most popular applications of cloud computing, and why cloud computing careers are so high-in-demand.

What is Cloud Computing

Cloud Computing refers to the delivery of on-demand computing services over the Internet on an as-needed basis. It allows businesses to rent access to computing services like servers, storage, databases, analytics, networking, software, and intelligence, typically over the Internet.

By renting IT resources from a cloud service provider, companies can avoid setting up and owning data centers and computing infrastructure. This reduces the cost of developing and installing software to improve business operations. Companies simply pay for services they use when they use. Thus cloud computing enables business owners to lower operational costs, run their infrastructure more efficiently, and scale as business needs change.

What Are the Benefits of Cloud Computing?

Cloud computing offers numerous benefits, which is why businesses of all sizes – from corporate giants to small start-ups - are adopting it with such enthusiasm. The top benefits of cloud computing are:

It is expensive to establish and run in-house computing infrastructure. Purchasing and maintaining equipment and hiring trained IT experts come at a cost. By switching to cloud computing, businesses only need to pay for the services they procure. This results in significant cost savings.

Mobility

Cloud-based technology offers mobility, ensuring workers can access resources in the cloud in real-time from any location or device.

Scalability

Businesses using cloud computing can scale up or down their IT features based on business requirements.

Disaster Recovery

There’s no need for a disaster recovery data backup plan in cloud systems. There’s no permanent data loss in case of a disaster.

Data Security

Cloud computing offers many advanced data security features to guarantee data safety and security.

Wide Range of Options

There are various types, models, and services of cloud platforms available suited to the different needs of enterprises.

Unlimited Storage Capacity

The cloud has unlimited storage capacity for all types of data.

Automatic Software Updates

Software and security are regularly managed by software vendors on behalf of the users.

Better Collaboration

Cloud environments allow easy sharing of real-time data across teams within an organization, which improves collaboration and team performance.

Applications of Cloud Computing

Cloud technology offers several applications in various fields like business, data storage, entertainment, management, social networking, education, art, GPS, to name a few.

The major types of cloud computing service models available are Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and Software as a Service (SaaS). Plus, there are platforms like Public Cloud, Private Cloud, Hybrid Cloud, and Community Cloud.

Let’s start elaborating on the top 7 applications of cloud computing.

1. Online Data Storage

Cloud Computing allows storage and access to data like files, images, audio, and videos on the cloud storage. In this age of big data, storing huge volumes of business data locally requires more and more space and escalating costs. This is

where cloud storage comes into play, where businesses can store and access data using multiple devices.

The interface provided is easy to use, convenient, and has the benefits of high speed, scalability, and integrated security.

2. Backup and Recovery

Cloud service providers offer safe storage and backup facility for data and resources on the cloud. In a traditional computing system, data backup is a complex problem, and often, in case of a disaster, data can be permanently lost. But with cloud computing, data can be easily recovered with minimal damage in case of a disaster.

3. Big Data Analysis

One of the most important applications of cloud computing is its role in extensive data analysis. The extremely large volume of big data makes it impossible to store using traditional data management systems. Due to the unlimited storage capacity of the cloud, businesses can now store and analyze big data to gain valuable business insights.

4. Testing and Development

Cloud computing applications provide the easiest approach for testing and development of products. In traditional methods, such an environment would be time-consuming, expensive due to the setting up of IT resources and infrastructure, and needed manpower. However, with cloud computing, businesses get scalable and flexible cloud services, which they can use for product development, testing, and deployment.

5. Antivirus Applications

With Cloud Computing comes cloud antivirus software which is stored in the cloud from where they monitor viruses and malware in the organization’s system and fixes

them. Earlier, organizations had to install antivirus software within their system and detect security threats.

6. E-commerce Application

Ecommerce applications in the cloud enable users and e-businesses to respond quickly to emerging opportunities. It offers a new approach to business leaders to make things done with minimum amount and minimal time. They use cloud environments to manage customer data, product data, and other operational systems.

7. Cloud Computing in Education

E-learning, online distance learning programs, and student information portals are some of the key changes brought about by applications of cloud computing in the education sector. In this new learning environment, there's an attractive environment for learning, teaching, experimenting provided to students, teachers, and researchers so they can connect to the cloud of their establishment and access data and information.

5. Explain web access applications?

A web-application is an application program that is usually stored on a remote server, and users can access it through the use of **Software** known as **web-browser.**

Another definition

It is a type of computer program that usually runs with the help of a web browser and also uses many web technologies to perform various tasks on the internet.

A web application can be developed for several uses, which can be used by anyone like it can be used as an individual or as a whole organization for several reasons.

In general, a web application can contain online shops (or we can also say them e-commerce shops), webmail's, calculators, social media platforms, etc. There is also some kind of web application that usually requires a special kind of web browser to access them. We cannot access those kinds of web applications by using regular web- browsers. However, most of the web applications available on the internet can be accessed using a **standard web browser**.

If we talk about the web application in general, a web application usually uses a combination of the server-side scripts such as **PHP, ASP,** for handling the information/ data storage and retrieval of the data.

Some of them also use the client-side scripts such as **JavaScript**, **HTML** to represent the data/information in front of the users, and some of the web applications are also using both **server-side** and **client-side** at the same time.

It allows the users to communicate with the organization or companies by using the online form, online forums, shopping carts, content management system, and much more.

Apart from that web applications also allow its users to create documents, share them, or share the data/ information. By using the web application, users can collaborate on same projects by event when they are not available on the same geographical location.

After knowing that what a web application is, there may be a question hitting in mind that how it will work.

Let's understand the working of the web-application.

How does a web- application work?

In general, web-application does not require downloading them because, as we already

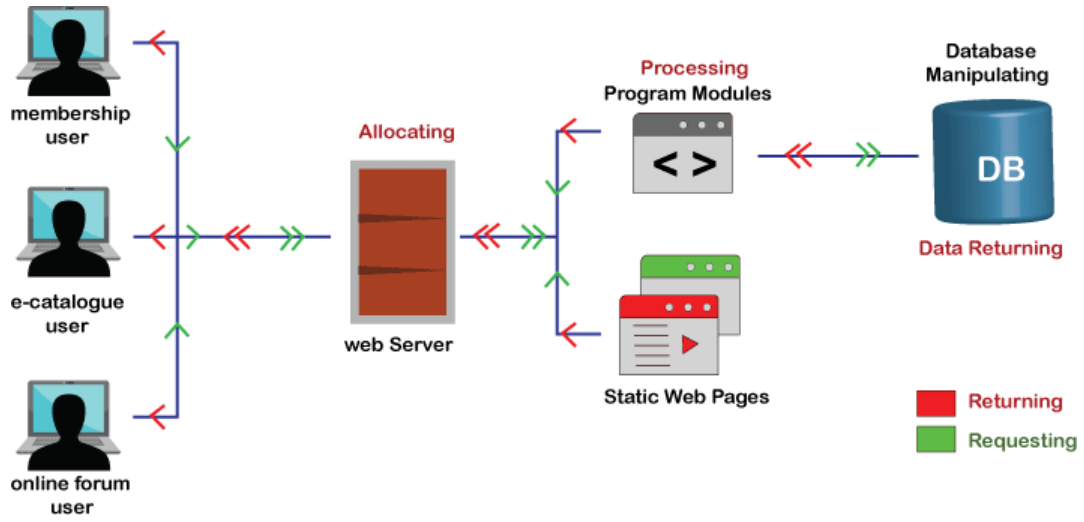
discussed, the web application is a computer program that usually resides on the remote server. Any user can access it by using one of the standard web browsers such as **Google Chrome, Safari, Microsoft Edge, etc.,** and most of them are available free for everyone.

A web application are generally coded using the languages supported by almost every web-browsers such as HTML, JavaScript because these are the languages that rely on the web browsers to render the program executable.

Some of the web applications are entirely static due to which they not required any processing on the server at all while, on the other hand, some web applications are dynamic and require server-side processing.

To operate a web- application, we usually required a web server (or we can say some space on the web-server for our programs/application's code) to manage the clients' upcoming requests and required an application server.

The application server performs the task that requested by the clients, which also may need a database to store the information sometimes. Application server technologies range from **ASP.NET**, **ASP**, and **ColdFusion to PHP and JSP**.



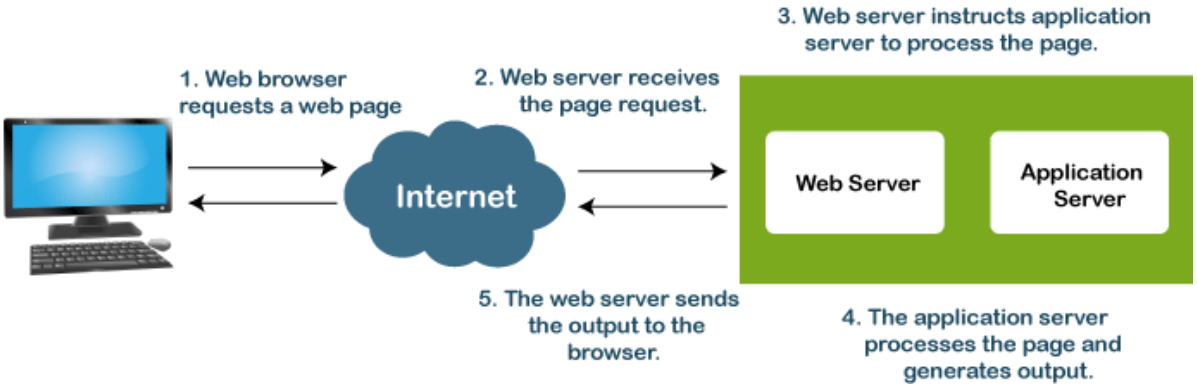
A standard web application usually has short development cycles and can be easily developed with a small team of developers. As we all know, most of the currently available web applications on the internet are written using the programming languages such as the **HTML (or HyperText Markup Language), CSS(or Cascading Style Sheets), and Javascript** that are used in creating **front-end**

interface (Client- side programming).

To create the web applications script, server-side programming is done by using programming languages such as **Java, Python, PHP, and Ruby,** etc. **Python** and **Java** are the languages that are usually used for server-side programming.

The Flow of the Web Application

Let's understand how the flow of the typical web application looks like.



1. In general, a user sends a request to the web-server using web browsers such as **Google Chrome, Microsoft Edge, Firefox**, etc over the **internet**.
2. Then, the request is forwarded to the appropriate web **application server** by the **web-server**.
3. Web application server performs the requested operations/ tasks like **processing the database, querying the databases; produces** the result of the requested data.
4. The obtained result is sent to the web-server by the web application server along with the requested data/information or

processed data.

5. The web server responds to the user with the requested or processed data/information and provides the result to the user's screen .

○ .

Short answer questions

1.Define multimedia

2.what is GPS

3.What do you under stand by social media

4.write short note on cloud computing

5.Explain the examples of social media

Long answer questions

1.What are the designing applications with multimedia

2.Explain about integration with GPS

3.Define social media, Explain various social media applications

4.How to design applications using web access capabilities

5.Write a brief notes about cloud computing

UNIT-4

TECHNOLOGY 1

What does TechnologyOne do?
What does Technology One Limited do? Technology One Limited is a locally owned publicly-listed company, involved in the **development, marketing, sales, implementation, and support of enterprise business software solutions**.

Our global SaaS solution provides deep functionality for the markets we serve: **local government, government, education, health and community services, asset intensive industries and financial services**. For these markets we invest significant funds each year in R&D.

What is the future of technology?
By 2024, more than 50 percent of user touches will be augmented by AI-driven speech, written word, or computer-vision algorithms, [5]. “The top trends in tech,” June 15, 2021. while global data creation is projected

to grow to more than 180 zettabytes by 2025, up from 64.2 zettabytes in 2020.

Research and Development[edit]

In 2010, TechnologyOne moved into its new $12 million headquarters in Brisbane, which included what was at the time the largest Australian-owned research and development facility.[36] The company has additional international R&D facilities.[37]

As of June 2019, the company had invested more than $500 million into research and development since its inception.[38] As of 2021, research largely focuses on developing additional functionalities for TechnologyOne's software-as-a-service enterprise resource planning software.[39] It is also creating applications for artificial intelligence and developing a digital experience platform, intended to integrate front and back office applications.[40]

ANDROID INTRODUCTION

1) Linux kernel

It is the heart of android architecture that exists at the root of android architecture. **Linux kernel** is responsible for device drivers, power management, memory management, device management and resource access.

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2) Native Libraries

On the top of linux kernel, their are **Native libraries** such as WebKit, OpenGL, FreeType, SQLite, Media, C runtime library (libc) etc.

The WebKit library is responsible for browser support, SQLite is for database, FreeType for font support, Media for playing and recording audio and video formats.

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3) Android Runtime

In android runtime, there are core libraries and DVM (Dalvik Virtual Machine) which is responsible to run android application. DVM is like JVM but it is optimized for mobile devices. It consumes less memory and provides fast performance.

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4) Android Framework

On the top of Native libraries and android runtime, there is android framework. Android framework includes **Android API's** such as UI (User Interface), telephony, resources, locations, Content Providers (data) and package managers. It provides a lot of classes and interfaces for android application development.

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5) Applications

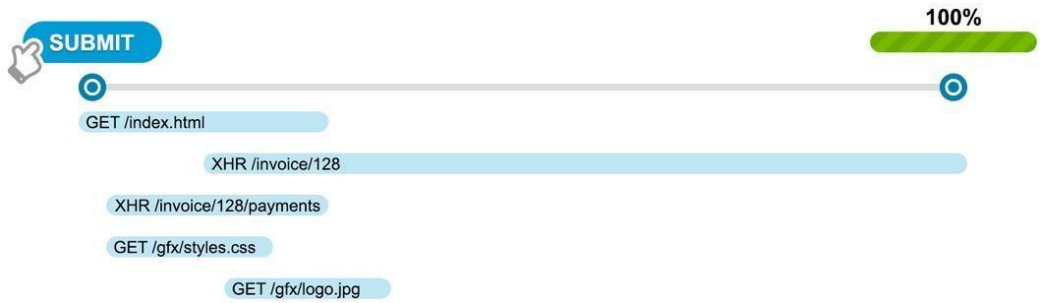
On the top of android framework, there are applications. All applications such as home, contact, settings, games, browsers are using android framework that uses android runtime and libraries. Android runtime and native libraries are using linux kernal.

Expain interaction with user interface

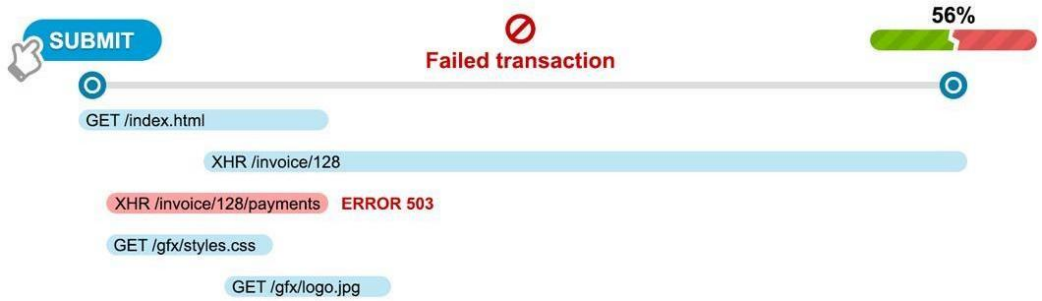
User interaction is reflecting the real user experience after one interaction with the user interface. The interaction starts with an event generated by a real user via the UI in browser. Common types of such events are mouse clicks, touches and keyboard events, but Plumbr supports all other means of interacting with the browser.

Plumbr Browser Agent listens to all such user interactions. Only the interactions resulting in any server-side requests are considered relevant. All other interactions are ignored and never sent to Server to be reported. As a result of this, scrolls in static pages or clicks in empty areas are never registered as user interactions.

Every captured interaction is linked with any HTTP requests occurring because of the interaction.



If any of the requests returns with 40x or 50x series response, the interaction is flagged as failed, indicating that the end user did not accomplish what she intended.



All interactions are monitored for their duration as well. The duration of the interaction is calculated from the interaction in the browser (click/touch/…) until the last fired HTTP request returns its response to the browser.

Plumbr also keeps track of the user performing the interaction, the application in which the interaction was performed, and the functionality that the interaction consumed. This allows you to keep track of what the particular user was actually doing within the application.

Every transaction starting in a browser thus captures and exposes the following information:

- The ID of the transaction
- The ID of the user performing an interaction
- The start and end timestamps of an interaction

- The application to which an interaction belongs
- The functionality of the application used
- Whether the interaction was failed, stuck or successful.

Explain packaging and deployment

Deployment is the process of transferring data to an integration server on a broker so that it can take effect in the broker. Message flows and associated resources are packaged in broker archive (BAR) files for deployment.

When you create application resources such as message flows in the IBM® Integration Toolkit, you must distribute them to the brokers on which you want them to run. Data for message flows and associated resources is packaged in a broker archive (BAR) file before they are sent to the broker.

You can package and deploy message flows and associated resources in one step by using the IBM Integration Toolkit. You can use this approach when you are developing your flows to make changes and quickly see the results. When you want to deploy to a production environment, you can separate the packaging and deployment steps by first packaging your resources into a BAR file and then deploying that file later. You can create BAR files in the following ways:

- By using the IBM Integration Toolkit
- By using the **mqsipackagebar** command
- By using the **mqsicreatebar** command

For more information about packaging resources, see Packaging resources.

After you create a BAR file, you can customize the file for deployment to different brokers; for example, to specify queue names or data source names. For more information about customizing your BAR file, see Configurable properties of a broker archive.

After you create a BAR file and customize it, you can deploy the BAR file in the following ways:

- From the IBM Integration Toolkit
- From the IBM Integration Explorer
- By using the **mqsideploy** command
- By using functions that are defined by the IBM Integration API (also known as the CMP)

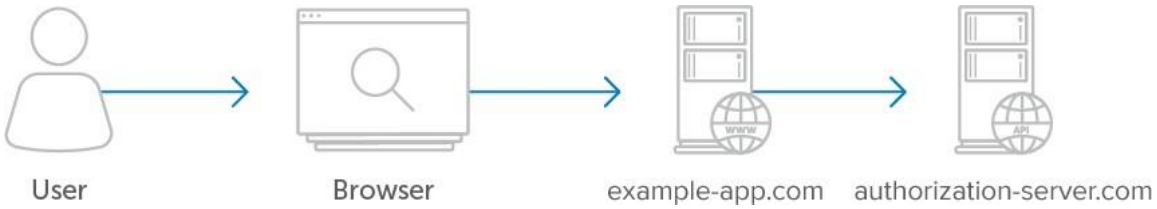
Depending on your work patterns, you might use all these methods at different times. These options are described in Deployment methods.

Try to avoid a mixed deployment case that has message flows deployed as CMF and subflows (.subflow) deployed as source files, along with the ESQL modules that are referenced by these subflows. For more information about this behavior, and examples of the recommended deployment options, see Deploying resources.

Write about interaction with server side applications

Server-side apps are the most common type of application encountered when dealing with OAuth servers. These apps run on a web server where the source code of the application is not available to the public, so they can maintain the confidentiality of their client secret.

The diagram below illustrates a typical example where the user interacts with their browser which is communicating with the client. The client and the API server have a separate secure communications channel between them. The user's browser never makes a request directly to the API server, everything goes through the client first.



The app's server communicates with the API

Server-side apps use the `authorization_code` grant type. In this flow, after the user authorizes the application, the application receives an "authorization code" which it can then exchange for an access token.

Explain GPS and Wifi integration with social media applications

Our physical retail and digital innovation exploration journey so far:

- Part 1 - We explored the humble beginnings of department stores, supermarkets, and the first use of a bar code in a physical store.
- Part 2 - We expanded our innovation journey to ecommerce, smartphones, and robots.
- Part 3 -We shifted to loss prevention technologies: cash registers, CCTV cameras, and Electronic Article Surveillance.
- Part 4 - Fast rising RFID, Self-checkouts, and the Internet of Things (IoT) made an appearance.

In this Part 5, we geo-locate ourselves with GPS, go wireless with Wi-Fi, and become influencers on Social Media.

The First Use of GPS

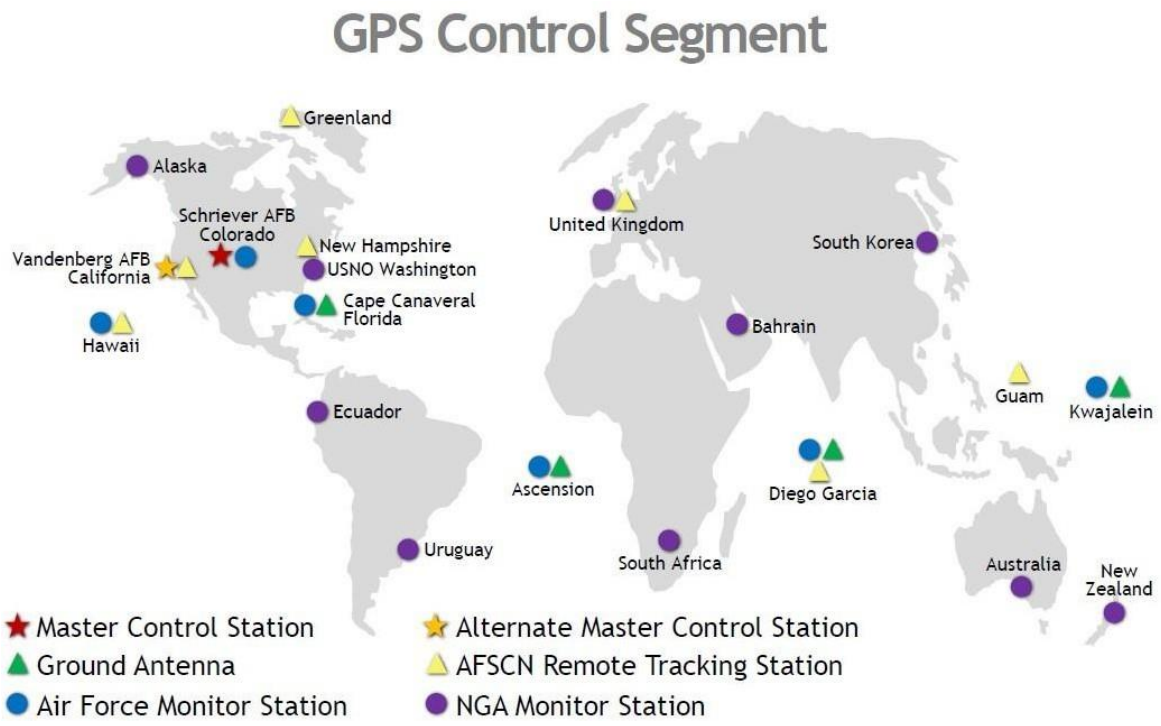
The Global Positioning System (GPS), as you might have guessed, has their origin in space, the final frontier. In 1957, Russia launched Sputnik, the first successful space satellite. Scientists at the Applied Physics Laboratory (APL) at John Hopkins University observing the strange radio signals discovered what became known as the Doppler Effect.

"Utilizing the Sputnik's Doppler Effect allowed the scientists to use radio signals to track the movement of the satellite from the ground. They later expanded the idea: If a satellite location could be determined from the ground via the frequency shift of its radio signal, then the location of a receiver on the ground could be determined by its distance from a satellite."

In 1958, the US Defense Department Advanced Research Projects (ARPA) used the principle of the Doppler Effect to develop Transit, the world's first global satellite navigation system.

By 1968, 36 satellites were operational with Transit technology which dramatically improved location accuracy and were credited with improving the accuracy of the maps of the earth. In 1996, US Defense Department replaced Transit with the current Global Positioning System (GPS).

Fast forward to 2021 when just in USA there are now more than 900 million GPS receivers in use. "You'll find them in cellphones, commercial trucks and buses, and railroads. More than 100 million cars have navigation systems. Ships, planes and drones use GPS for navigation. Trucks use GPS not only for location services but also for electronic logging devices, which show whether drivers have been driving for too long and getting sleepy. Emergency responders use GPS rather than maps to locate accident sites and get people to the hospital. You don't want to be waiting for the firetruck or ambulance when GPS is hacked or disrupted."



Above image points to some of the places that control the 30 operational GPS satellites operations in space as of April 12, 2022. With accuracy now at roughly 2 meters (6.5 feet), we are all hooked on GPS as our find everything technology.

First Use of Wi-Fi

The "Father of Wi-Fi" was Vic Hayes who was the first chair of the IEEE 802.11 group which in 1997 finalized the wireless standard that would operate in the frequency spectrum opened up in 1985 by the USA Federal Communications Commission.

Interesting that I share a history with the employer of Hayes. The 1997 ruling "sparked the interest of his then-employer NCR, which realized that a wireless standard would let the company, and its retailer customers, create a radio link between NCR cash registers and back-end mainframes. The radio link would make connecting the systems physically simpler, and eliminate the need to fiddle with proprietary protocols."

According to the Wireless Broadband Alliance, Wi-Fi today is delivering substantial positive economic, social, and environmental contributions which continue to exceed expectations.

INTEGRATION WTH SOCIALMEDIA APPLICATIONS

Reasons to integrate social media

Social media brings people together and gives them the ability to communicate at any time and from any place. At least, it used to be mainly about this. Now, however, social media is so much more than that. People go shopping on social media, make choices and use different services.

More users and downloads

The importance of social media integration is great for businesses that want to achieve social media presence. Acquiring users is one of the biggest challenges you'll face once you deploy your application. The easier the onboarding is, the more people will finally make it through the onboarding stage and stay with you as your app users.

People generally expect onboarding with social media, as they're used to logging in with a help of their accounts.

Social trust

Social trust is an important thing that drives sales like nothing else. Build trust with the help of in-app sharing features, and it will inevitably lead to a number of users growing. This, consequently, means more revenue from your application.

Maintaining social trust with social media sharing is useful to any app that sells products or services.

Increased usage

Ask yourself, how much time people generally spend on social media. Lots of it! And the younger the audience is, the more time it spends browsing photos on Instagram and making posts on Facebook. Social media integration in Android or iOS can become a game changer in a process of attracting users and retaining them.

Short Answer Questions

1.Introduction to android?
2.write about android developing environment?
3.Explain interacting with UI?
4.What are the server side applications?
5.Define GPS?

Long Answer Questions

1.write a brief notes on android architecture?
2.Explain about persisting data using SQLite?
3.what do you mean by interaction with server side applications?
4.Discuss about integration with social media applications?
5.Explain about the activities and uses of android?

UNIT-5

TECHNOLOGY 2

Intoduction to IOS

In June 2020, Apple introduced the latest version of its mobile operating system, i.e., iOS 14,which was officially released on September 16. Apple has made many updates in iOS 14, which makes it the biggest update to date. Many improvements come with iOS 14, like homescreen design changes, Siri improvements, updates to the existing applications, etc. Also, theusers get multiple tweaks that are used to streamline the iOS interface. However, in this article, we will discuss the features of iOS 14 in detail.

Features

There are the following features included in iOS 14.

Home Screen Resign

Apple has introduced a new design for the home screen, which provides more customization.The users can hide entire pages of applications. Also, it provides a new app library that contains everything that is installed and displays the users at a glance.

Multiple new widgets get placed on a new home screen design, which can be edited to addmore or remove some of them.

Widgets

The widgets have also been redesigned to look more beautiful and contain more data. The iOS 14 has widgets for default apps like Weather, Clock, Calendar, Maps, Fitness, Photos, Reminders, Stocks, Music, TV, Tips, etc. We can place such widgets on the home screen tohave the required information at a glance. We can also alter the size of the widgets to makethem small, medium, or larger.

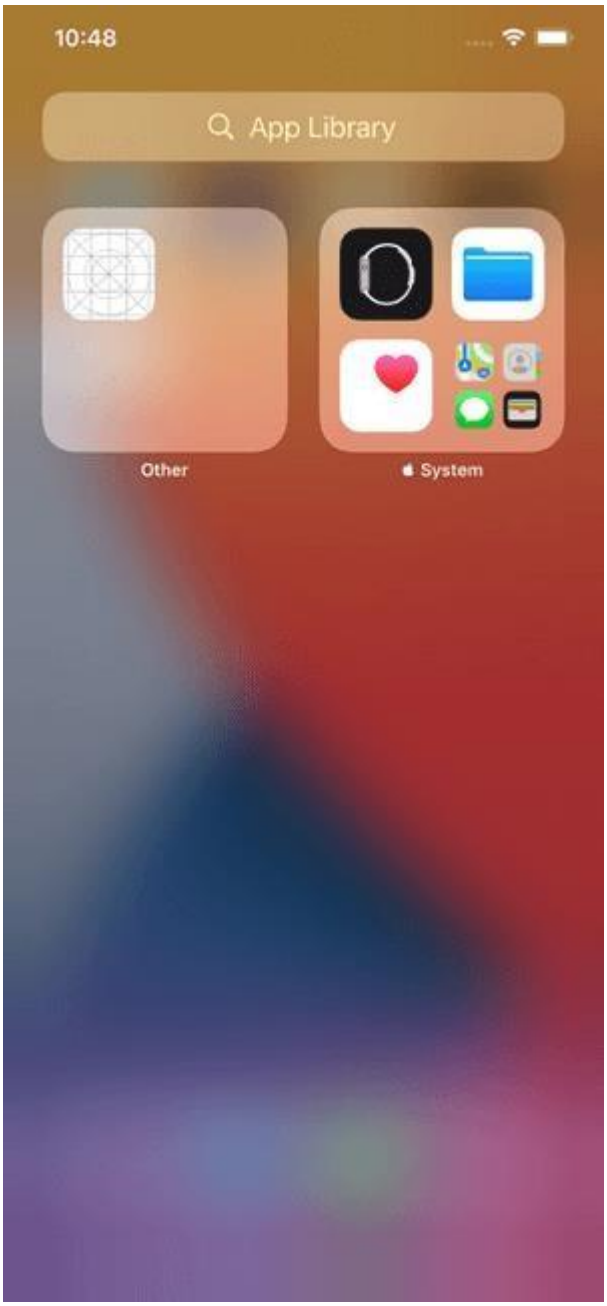
However, we can create a stack of up to 10 widgets to utilize the most space on the home screen. In the widget gallery, we can even select the smart stack of the widgets based on the device intelligence to surface the right widget at the right time. For example, the weather appcan be seen in the morning, calendar

events during the day, Apple maps in the evening, etc. The developer can also create their widgets, which can be placed on the home screen and shown to the user at the right time.

We can edit the home screen and add the widgets from the widget gallery by long-pressingthe home screen. The widget gallery shows the widget suggestions based on the user's activity.

App Library

App Library can be accessed by swiping to the end of the home screen pages. It organized allthe apps into one simple and easy-to-navigate view. It suggests the apps to the user based on the user's activity. It also categorizes all of the apps into a sorted order such as Social, Entertainment, etc. We can also search through the app library using the search bar at the topof the App Library. The apps we download from the app store can be found in the App Library, making it easy to get them.



Compact UI

IOS 14 has given a more compact UI, which allows users to do multi-tasking. When the users receive a phone call, it is shown as a banner instead of the entire screen. It facilitates the user to keep track of what is being done, and cells can't interrupt the user's flow. Users can swipe up the banner to dismiss the call, swipe down it to extend to the phone application to have more options, and tap it to answer the call. Apple has also introduced a developer API so that the apps like skype can support compact incoming calls. It has also improved the face time calls, which are now shown as the banner instead of taking over the entire screen.

Apple has also provided the picture-in-picture feature, I.e., now the users can do video calls along with checking the mail or finding some time for watching a TV show. Also, users can resize the picture-in-picture window for a bigger or smaller screen. Users can also drag the

picture-in-picture window to any corner of the screen. However, the picture-in-picture window can be minimized to have full access to the in-use app.

Search

Apple has also improved the search functionality. Now, the most relevant results are shown right at the top, making it easier to find what the user needs. Search suggestions also appear below the search bar when we start typing into it. iOS 14 also provides a quick launcher, which quickly launches an application by just typing a few characters and tapping go. Searching through the web has also become easier now. The user needs to type something and select the appropriate result from the website and web-search suggestions displayed at the top.

Messages

We can pin our favorite conversations at the top of the conversation list for easier access. If the group conversation is pinned, then we can also see the recent participants around the pin when they send any message to the group. We can have up to nine pinned conversation on an account synced over iOS, iPadOS, and macOS. We can also enable smart notifications in a group chat so that the user is notified only in the case when it is mentioned. We can reply directly to a message in a group conversation. Now, we can set the photo, memoji, or emoji for a group conversation for all the participants.

Memoji

There are 11 hairstyles available for the memoji. We can customize our memoji with the man bun, top knot, and many more. We can also customize our memoji by changing the headwear styles. There are 19 such styles to show off the hobby or profession, including cyclist helmet, nurse cap and many more. Three new memoji stickers can be shared with friends. We can also customize our look with six new-age options to look according to our age.

Maps

Various features are added to maps now, including routes cyclists along cycle lanes, paths, or roads. Apple makes it easy to navigate by offering custom cycling voice assistance. The user can preview the elevation of the ride, also the traffic along the route. Map also provides recommendations for the best places to visit in the city. Guides provide users the suggestions for the best places to eat, shop, or explore in the city. Guides can also be saved, which helps us to get them back later. Maps have also become smarter to support electric vehicles. It shows charging stops along the route. It also calculates the charging time while evaluating ETA. Maps show the congestion zones in the city to help reduce the traffic. Maps also detect the speed cameras and red-light cameras along the route.

Translation

Translation has become smarter in iOS 14. The split-screen is shown in landscape mode, which shows the text from both sides of a conversion. The user can provide the input via the microphone, and the language detection transcribes the original and translated text on both

sides of the screen. Users can also translate their voice from one language to another even without an active internet connection for the downloaded languages. The users don't need to download separate keyboards since all languages have their keyboards included the translated text. Users can also save translations in the favorites tab to access them later. Translate supports the combination of 11 languages, I.e., English (US and UK), Spanish, Chinese, Japanese, Korean, Russian, Gurman, French, Italian, Portuguese, and Arabic.

Siri Improvements

In iOS 14, Siri has also been improved with a new compact design. It allows us to refer to information on the screen and launch further. When we start any request, Siri pops up at the bottom of the screen whereas, the information comes on the top as a notification. There is also a major knowledge upgrade in Siri with 20X more facts now. With Siri, we don't need to browse the web now; it can provide answers to a broader set of questions. Now, we can also send audio messages with iOS and Carplay. We can also ask Siri for cycling directions. While driving, we can ask Siri to share the ETA of the route with a contact. There is also a major update in the set of languages that Siri can translate. Now, Sir can translate over 65 language pairs. Siri's voice is also approved to sound more natural with advanced text-to-speech technology.

Safari

In iOS 14, Safari can translate entire web pages. There is a translate icon displayed in the address field of safari, which can be used to translate a web page into a set of languages that include English, Spanish, Simplified Chinese, French, German, Russian, or Brazilian Portuguese. Safari provides the option to access the privacy report that shows the cross-site trackers blocked in the safari by the intelligent tracking system. Safari also has the edge over android's chrome in terms of performance with a high- speed JavaScript engine. Safari also monitors the saved passwords to keep an eye upon the passwords that can also be involved in the data breach.

Explain data persistence using core data

All the variables and constants that you allocate in Swift are stored in memory, so they get lost when users quit the app.

and retrieved upon restart of the device or app. So, that is longer than a life cycle the running app and keeps it available to the user ***Persistence*** is saving data to a place where it can be re-accessed.

`UserDefaults` is by far the easiest way to persist your data to your device. It's like a dictionary that automatically saves its contents. With all that;

- It saves data into p.list
- We need to keep the size below 1 MB. Because its reads and writes all in one go.

But if the data is getting bigger and complex?

Every app has a data layer. In a cooking app data might include recipes, ingredients. Within this data there are often relationships. For example, a recipe may call for many ingredients. While an ingredient should be free to appear in multiple recipes. The recipe app's data includes **structure** that is clearly defined object types, and **relationships** between instances of the types.

We use **CoreData** to manage data layer.

Persistence *is just one aspect of data layer management.*

CoreData (*data layer management framework*) saves data into something called a persistent store. The store is where the data lives. There are 3 different types of stores CoreData supports on iOS;

- SQLite Store (default)
- Binary Store
- In-memory Store

SQLite is almost always the right choice of your persistent store in a SQL relational database.

Binary store can be appropriate when you always need the database to be read and written in its entirety.

In-memory store can be appropriate when you have a small data model can fit in memory all at once and that does not need to be saved to disk. (like cache)

CoreData abstracts the persistent store's details. That means you won't usually interact with the store directly. That provides a common interface for saving and fetching data no matter what kind of store sits below. Whatever type of store you choose you'll always use the same (CoreData). And, ***you won't need to learn a database-specific language to manage your data.***

Are There Other Ways to Save Data?

Yes. Although Core Data is a great solution for persisting data that has structure and relationships, other solutions are better suited for other types of data. For settings or small pieces of data, `UserDefaults` is most appropriate. If you want to store data directly on the file system, you can use the Foundation framework to serialize and write data to files. If you are familiar with SQLite, then you could use it directly instead of through Core Data. There are also ways of caching transient, downloaded data such as the result of a network request.

Third party databases and persistence frameworks like Realm and Firebase provide useful features like syncing local and remote data, and cross-platform support for iOS and Android.

But, while powerful, these frameworks often lack UIKit integration, and they may not implement the full extent of Core Data features. It's up to you to consider the tradeoffs.

Explain UI implementation

User interface design is a process - a process that tries to determine what a user might want from a system, and then provides the means to make that happen. This process involves three main components:

- **Interaction Design** - the process of determining how the user will use the interface. For example, an instant messaging application might allow the user to communicate with one or more other users by exchanging text-based messages.
- **Visual Design** - the process of determining how the application will display information to the user. For the instant messaging application mentioned above, all text might be displayed in a window, each messaged might be displayed in the order typed or received, and each user's text might have its own color.
- **Information Architecture** - a description of how the information used by the application is represented. For the instant messaging application mentioned above, each message might be considered a unit, and stored in that fashion.

What are the Objects and Actions of a System?

There are a number of objects, and corresponding actions, associated with a system. Since there are too many to discuss here, let's look at some general categories:

- **Input Controls** - screen objects that accept input from a user. For example, buttons, text boxes, and checkboxes fall into this category. The actions initiated by these controls (events) capture user choices and data for the system to interact with at some point in the future.
- **Navigational Controls** - screen objects that allow the user to move around within the interface. For example, tabs, links, and search fields fall into this category. The actions initiated by these controls (events) change the content of the current page, or place the user on a new page, within the system.
- **Informational Controls** - screen objects that display information to the user. For example, message boxes, modal dialogs or windows, and notifications fall into this category. The actions initiated by these controls (events) provide feedback to the user so that they can make informed choices about what is happening or what to do next.
- **Containers** - screen objects that group other controls together for organizational purposes. For example, tabs, bounding boxes, and dialogs fall into this category. There are no actions (events) initiated by these controls. Instead, these controls indicate a relationship between grouped controls so the user knows that they are to be treated as a unit.

Explain location aware,applications using core location

A location-aware application presents online content to users, specifically based on their geographical location.

Different technologies implement cellular phone infrastructure, wireless access points or GPS to determine the physical location of electronic gadgets like cellphones or laptops. The users can then opt to share this information with the location-aware applications. The location-aware applications can then present the users with resources, for instance, an exact location marker on a map, restaurant reviews in that specific area, a snooze alarm set for a particular stop while using a commuter train service, updates or cautions regarding nearby bottlenecks in traffic, etc.

Techopedia Explains Location-Aware Application

Location-aware applications not only build an incredibly focused marketing potential for retailers, but also offer improved social connectivity and superior environmental awareness, providing users with a location-based filter for online data.

Location tools could be browser plug-ins installed in gadgets like smartphones or other Web-enabled devices. Mobile phone towers, wireless access points, GPS satellites or a combination of these can be used to determine the physical location of the user. When it comes to access points and cell towers, physical location is decided according to the connectivity to the independent connection point. This information is then mapped and logged into databases that are constantly updated.

When a user with a compatible mobile device opts for a location-based service, that info is delivered to location-aware applications, which aim to present resources according to the spot where the user presently is. On the other hand, a location-aware application may forward the physical location of a user to other location-aware or social media applications. Users are able to define which application should get the information and how detailed the information should be, or they could bypass all other data simply by manually entering the location coordinates.

A location-aware application offers the following advantages:

- Presents an affordable implementation without resorting to extra hardware like those needed for GPS-centered systems
- Offers location awareness within buildings or areas where GPS cannot be used
- Offers convenience to define user-specific locations, which helps build a fully customized map

Location-aware applications are useful in, but are not limited to, the following cases:

- Fleet management
- Tourism
- Electronic queuing
- Finding the nearest area of interest
- Finding the nearest social media contact

Explain integrating calendar and address book

Calendar integration allows two different applications to sync together and share data from your calendar, avoiding duplicate calendar entries or overlapping appointments. Calendar integration is a two-way process; when you book appointments in either application, that data is automatically synced so that both applications stay current in real time.

Advantages of Calendar Integration

With calendar integration, you can keep your workflow moving smoothly and have confidence that your calendar is up to date. You can also move between different devices – your work computer, home computer, or mobile device – and always have your needed scheduling information at your fingertips.

Calendar integration also saves time and money by minimizing the amount of data you have to enter in your work systems. Scheduling an appointment with multiple coworkers can be done in a few mouse clicks and then seamlessly transmitted to all applicable appointment calendars and integrated applications.

Types of Calendar Integration

Most workforce applications will integrate with the most common calendaring apps, Google Calendar and Microsoft Outlook. More robust integrations will also sync with iCalendar, which allows both PC and Mac users to connect efficiently.

Calendar integration can also work with project management apps or even social media platforms. These types of calendar integration will allow you to organize projects and add milestone deadlines that will sync to your calendar so you'll never miss a beat.

Advanced Calendar Integration Features

Some applications offer more advanced features that can improve your efficiency and lighten your workday. Event tags can help you categorize specific event types and execute rules, such as color coding or sharing functions, based on those tags.

Some applications also provide scheduling features so that clients and customers can book time with you automatically based on your designated office hours and existing calendar appointments. These additional features combine with the default calendar integration to minimize your time spent managing your daily schedule.

Mitel Products With Calendar Integration

MICOLLAB

With MiCollab, your business has everything it needs to connect, communicate and collaborate across blended environments—driving the exchange of thoughts and improving the speed and quality of decision-making.

MICOLLAB AUDIO, WEB & VIDEO CONFERENCING

Get audio conferencing, video conferencing and collaboration all in one application with MiCollab.

MITEAM MEETINGS

Meetings are more productive when employees can transition between chat, voice and video seamlessly on a single cloud application. For your workers to be successful, they need to communicate and collaborate effortlessly as if they are in the same room—especially if they can't be.

MITEL WORKFORCE OPTIMIZATION

Boost your team's performance with workforce optimization applications and tools

Address Book

There are many types of people in our world, including those who like to keep everything organized to that extent that they got a separate address book and make notes there. At least they won't get lost without the Internet and will know all the addresses of their friends and family. So if there is a demand – there is a supply, as a consequence.

This app is a digital version of an address book, where you can keep the name, phone number, and address of a person. There are no limitations considering how many of those you can actually write down, could be millions. All the information is automatically copied into the Cloud Storage.

The app synchronizes addresses among Android devices and allows them to share them. To make everything clearer, you can organize contacts into groups and highlight them in different colors. This way you will always find the address you're looking for in seconds.

You can also export all the addresses to an excel file, which can be used to recover your addresses when you change or reset your phone. In general, this is a classic address app-only addresses and nothing extra, so it is really easy to use.

TOUCH FRAME WORKS

What are Frameworks?

A *framework* is a hierarchical directory that encapsulates shared resources, such as a dynamic shared library, nib files, image files, localized strings, header files, and reference documentation in a single package. Multiple applications can use all of these resources

simultaneously. The system loads them into memory as needed and shares the one copy of the resource among all applications whenever possible.

A framework is also a bundle and its contents can be accessed using Core Foundation Bundle Services or the Cocoa NSBundle class. However, unlike most bundles, a framework bundle does not appear in the Finder as an opaque file. A framework bundle is a standard directory that the user can navigate. This makes it easier for developers to browse the framework contents and view any included documentation and header files.

Frameworks serve the same purpose as static and dynamic shared libraries, that is, they provide a library of routines that can be called by an application to perform a specific task. For example, the Application Kit and Foundation frameworks provide the programmatic interfaces for the Cocoa classes and methods. Frameworks offer the following advantages over static-linked libraries and other types of dynamic shared libraries:

- Frameworks group related, but separate, resources together. This grouping makes it easier to install, uninstall, and locate those resources.
- Frameworks can include a wider variety of resource types than libraries. For example, a framework can include any relevant header files and documentation.
- Multiple versions of a framework can be included in the same bundle. This makes it possible to be backward compatible with older programs.
- Only one copy of a framework's read-only resources reside physically in-memory at any given time, regardless of how many

processes are using those resources. This sharing of resources reduces the memory footprint of the system and helps improve performance.

The Darwin layer contains many static and dynamic libraries but otherwise, most OS X interfaces are packaged as frameworks. Some key frameworks—including Carbon, Cocoa, Application Services, and Core Services—provide convenient groupings of several smaller but related frameworks. These framework groups are called *umbrella frameworks* and they act as an abstraction layer between a technology and the subframeworks that implement that technology.

In addition to using the system frameworks, you can create your own frameworks and use them privately for your own applications or make them publicly available to other developers. Private frameworks are appropriate for code modules you want to use in your own applications but do not want other developers to use. Public frameworks are intended for use by other developers and usually include headers and documentation defining the framework's public interface.

Short Answer Questions

1.Explain about IOS?
2.Objectives of IOS?
3. what are the features of IOS?
4.Write a short note on touch frameworks?
5.Explain about UI implementation?

Long Answer Questions

1.Describe about technology -II?
2.Write about data persistence using core data and SQLite?
3.Explain location aware applications?
4.Explain about calender and address book with social media applications?
5.What is mapkit?Explain about it?

Department of Computer Science

MASTER OF COMPUTER APPLICATIONS

MOBILE APPLICATION DEVELOPMENT

FIRST INTERNAL EXAMINATIONS

MAX.MARKS-30

TIME:2 HOURS

SECTION-A

Answer any five from the following. 5*2=10m

1. What is embedded system?
2. What are the requirements of mobile applications?
3. Expalin about delivery of mobile applications?
4. what is embedded os?
5. Explain architecture of mobile applications?
6. what are quality constraints?
7. Expalin about GPS?
8. What are the patterns for mobile application?

SECTION-B

Unit-1

Answer any one question from each unit 2*10=20

9. What is embedded system? Explain about drivers of mobile applications?

Or

10. What are the user interfaces for mobile applications?

UNIT-2

11.Expalin about social media networking applications?

Or

12.What are the design patterns for mobile applications?

Department of Computer Science

MASTER OF COMPUTER APPLICATIONS

MOBILE APPLICATION DEVELOPMENT

Second INTERNAL EXAMINATIONS

MAX.MARKS-30

TIME:2 HOURS

SECTION-A

Answer any five from the following. 5*2=10m

1. Explain about android architecture?
2. Define the establishing the development environment?
3. Explain about GPS and wifi?
4. Define packaging and deployment?
5. Explain about IOS features?
6. What are the touch frame works?
7. Define integrating calendar?
8. Write a short note on address book?

SECTION-B

Unit-1

Answer any one question from each unit

2*10=20m

9. Explain about android architecture and interacting with UI?

Or

10. Define interaction with server side applications and integration with social media applications?

Unit-2

11. Define IOS features and UI implementation?

Or

12(a).Write a short note on data persistence using core data and SQ Lite?

(b).Explain about integrating calender and address book with social media application?

MASTER OF COMPUTER APPLICATIONS DEGREE EXAMINATIONS,

AUGUST-2022

THIRD SEMESTER

PAPER-MCA:305C-MOBILE APPLICATION DEVELOPMENT

(Under c.b.c.s.revised regulations w.e.f. 2021-2022)

(common paper to university and all affiliated colleges)

Time:3hrs max.marks:70

Part-A

(COMPULSORY)

Answer any five of the following questions.Each questions carries two marks(5*2=10)

1.a) Define embedded system?

b) Explain user interfaces for mobile applications?

c) What are the drivers for mobile applications?

d) Write a short note on web access applications?

e) Explain GPS and wifi?

f) Explain about quality constraints?

g) Write a short note on android architecture?

f)Explain touch frame works?

Part-B

Answer any one full question from each unit.Each questions carries 12 marks(5*12=60)

UNIT-1

2. Explain market and business drivers for mobile applications?

Or

3. Define about requirements gathering of mobile applications and validation for mobile applications?

UNIT-2

4. Explain design constraints for mobile applications?

Or

5. Explain design of embedded systems and user interfaces for mobile applications?

UNIT-3

6. Write about integration with GPS and social media networking applications?

0r

7. Explain web access applications and write about accessing applications hosted in cloud computing?

UNIT-4

8. Explain interaction with user interface and server side applications?

Or

9. Explain GPS and wifi integration with social media applications?

UNIT-5

10. Explain data persistence and location aware applications using code data?

Or

11. Explain a)UI implementation

    b)integrating calendar

    c)address book