Introduction to Mobile Applications

IT6306 - Mobile Application Development

Level III - Semester 5

Overview

- This lecture will elaborate on the following key points,
  - Evolution of different generations of mobile devices
  - Mobile ecosystem components
  - How the entire system works
  - How to define a mobile strategy when adopting a mobile solution to a particular context

Intended Learning Outcomes

At the end of this lesson, you will be able to;

- Describe history of mobile devices
- Describe what is mobile eco system
- Describe the components of mobile ecosystem
- Develop a mobile strategy by considering a particular context

List of sub topics

1.1. History of Mobile devices

1.2. Layers of mobile eco system

1.3. Developing a mobile strategy

1.1 History of Mobile Devices

1.1.1 Brick Era (1973–1988)

- First introduced in 1983
- A corded receiver connected to a portable radio the size (and weight) of a car battery
- Brick Era phones required enormous batteries to get the power needed

Motorola DynaTAC 800X

1.1.2 The Candy Bar Era (1988–1998)

- **Candy bar** is the actual term used to describe the long, thin, rectangular form factor
- The network shifted to second generation (2G) technology
- Associated with 2G GSM (Global System for Mobile communications) networks included SMS (Short Message Service) capabilities.

Nokia Candy Bar Phone

1.1.3 The Feature Phone Era (1998–2008)

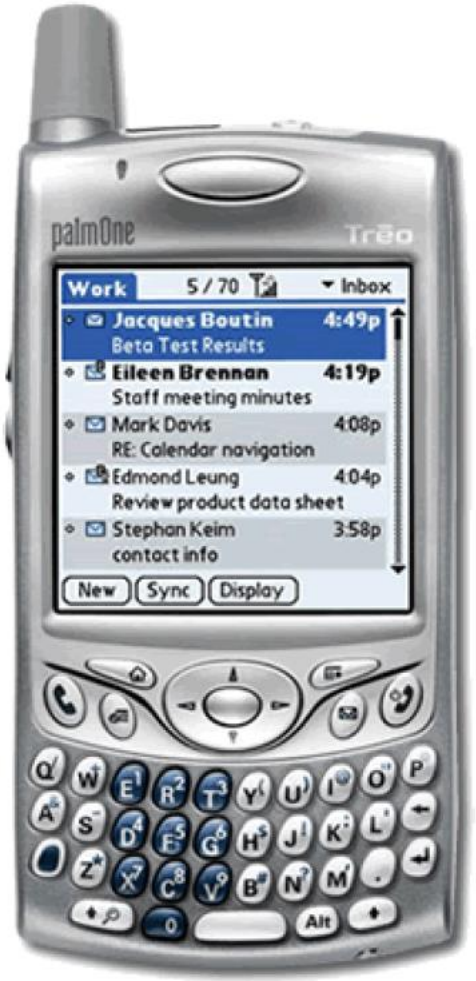
- These phones had following features,
  - make voice calls and send text messages
  - taking a picture
  - accessing the mobile web
- Play the Snake game
- Opened the floodgates to a variety of applications and services on the phone, like listening to music and taking photos, and introduced the use of the Internet on a phone
- During this era, GSM network providers added GPRS (General Packet Radio Service), allowing packet-switched data services.
- This network evolution is most often referred to as 2.5G, or halfway between 2G and 3G networks

The Motorola RAZR

1.1.4 Smart Phone Era (2002 to the present)

- Compared to the feature phones, smart phones are distinctive in following aspects
  - a common operating system
  - a larger screen size
  - a QWERTY keyboard or stylus for input
  - Wi-Fi or another form of high-speed wireless connectivity

- SymbianOS was one of the most popular operating systems jointly developed by Nokia, Motorola, Ericsson, and Psion
- The Symbian OS is used for a variety of mobile devices.
  - Eg: Nokia S60, 6260 and N95



Early smartphones came from companies like Nokia, Handspring and RIM

1.1.5 Touch Era (Present)

- Mobile devices of the Touch Era are a completely new medium capable of offering real people new and exciting ways to interact and understand information.
- These phones integrate a number of new technological advancements at a very rapid rate.
- Connects with more capable networks like 4G and 5G
- Usage of apps for a multitude of tasks,
- For example,
  - features like tracking location information
  - advanced video capturing
  - improved image quality
  - integration of various sensors
  - improved data communication capabilities

1.2 Layers of Mobile Ecosystem

1.2 The Mobile Ecosystem

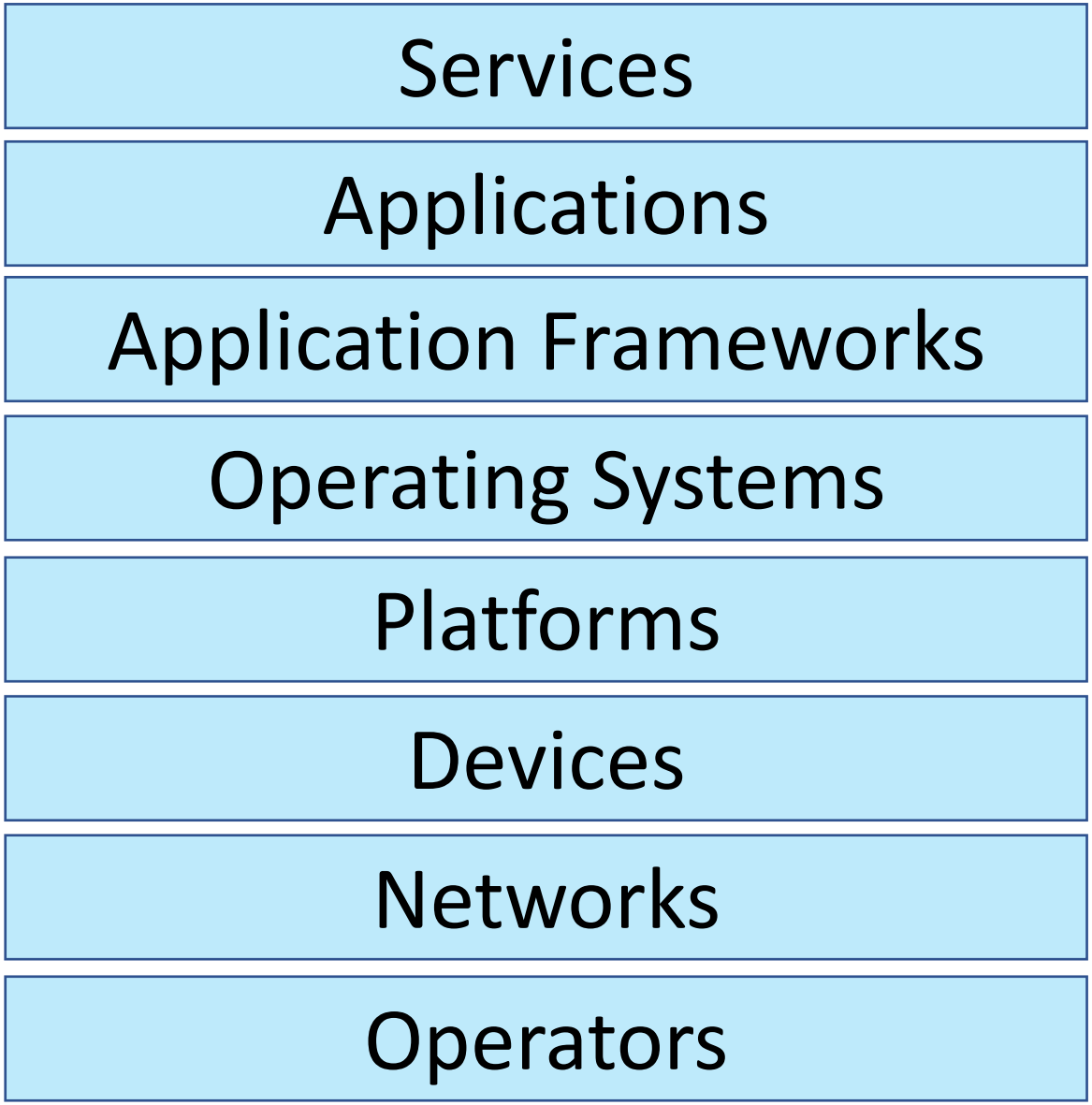
- Mobile is an entirely unique ecosystem and, like the Internet, it is made up of many different parts that must all work seamlessly together.

- In this section, we are going to look at how and using which components Mobile Ecosystem relies on in the big picture.

- When you are working with a mobile phone, you will not see the underlying complexity.

- It is worth knowing what happens in the underlying layers for us to experience a whole bunch of luxury on our finger tips.

Layers of the Mobile Ecosystem



1.2.1 Operators

- The base layer in the mobile ecosystem is the operator.
- Operators can be referred to as,
  - Mobile Network Operators (MNOs); mobile service providers, wireless carriers, or simply carriers
  - Mobile phone operators; cellular companies
- The operator's role in the ecosystem is to create and maintain a specific set of wireless services over a reliable cellular network.
- Operators involved in following activities,
  - install cellular towers,
  - operate the cellular network,
  - make services (such as the Internet) available for mobile subscribers,
  - maintain relationships with the subscribers,
  - handling billing and support,
  - offering subsidized device sales and a network of retail stores.

1.2.2 Networks

- Operators operate wireless networks
- The type of radio and antenna determines the capability of the network and the services you can enable on it
- Although the core technology that empowers voice communication has stayed relatively the same, network generations are most often used to describe the data speeds the network is capable of delivering.
- Generations help to study different developments in this domain.
- Mobile network evolution can be studied based on the generations defined like 2G, 3G, 4G, etc.
- Each generation has different capabilities and improvements

1.2.2 Networks (1G)

First Generation (1G)

The first generation mobile technology was entirely analog. Japan's NTT (NTT Nippon Telegraph and Telephone) first launched the first generation automatic cellular network in 1989.

Key features:

- The first generation used analog technology.
- Circuit-switched networks were used for voice calls.
- This system could only talk.

1.2.2 Networks (1G) contd..

Key Issues identified in first generation mobile networks:

- Low voice call quality
- Phone size was much larger due to power requirement
- Security risk associated with the network
- Frequent call dropping disturbs communication
- Capacity of the network was very limited

1.2.2 Networks (2G)

Second Generation (2G)

- The structure of first-generation and second-generation cellular networks was similar.
- Digital technology is used for the first time in second-generation compared to its predecessor (1G)
- Caller Identity (showing the name and phone number of the caller) and Text SMS (SMS Short Message System) was first introduced on second-generation mobiles

Standards used in 2G,

- GSM (Global System for Mobile Communications)
- GPRS (General Packet Radio Service)
- EDGE (Enhanced Data rates for GSM Evolution)
- HSCSD (High-Speed Circuit-Switched Data)

1.2.2 Networks (2G) contd..

Key features of 2G includes,

- Text SMS (SMS Short Message Service) using the phone as well as talking on the phone, MMS (MMS Multimedia Message Service), fax, e-mail, etc. can be exchanged.
- It is possible to use the internet with a mobile phone.
- Camera phones appeared in the second generation.
- Data rates are much higher than the first generation.

Issues faced:

- The signal is very weak as low base stations are used in sparsely populated areas. Due to this, GSM phones cannot be used in rural areas.
- The speed of the internet in second-generation mobile phones is quite slow.

1.2.2 Networks (3G)

Third Generation (3G)

- The third generation is the mobile telephone system used in modern times.
- Much more applications can be used on third-generation mobile phones than previous generations.

Standards used in 3G:

- W-CDMA (Wideband Code Division Multiple Access)
- UMTS (Universal Mobile Telecommunications System)
- UMTSTDD (UMTS +Time Division Duplexing)
- TD-CDMA (Time Divided Code Division Multiple Access)
- HSPA (High-Speed Packet Access)
- HSDPA (High-Speed Downlink Packet Access)
- HSUPA (High-Speed Uplink Packet Access)

1.2.2 Networks (3G) contd...

Key features of 3G include,

- Supports Global Roaming.
- Larger emails can be exchanged.
- Any website can be easily browsed.
- GPS can be found anywhere.
- Video calls and video conferencing are possible.
- It is possible to watch high-resolution TV.
- Possible to play online multiplayer games.

Issues:

- Building third-generation networks is quite expensive.
- It is quite expensive for the user to use the third generation service.

1.2.2 Networks (4G)

The introduction of 4G went one step further than the revolutionary 3G mainly in terms of speed.

Based on GSM/EDGE(2G) and UMTS/HSPA(3G) network technologies that are existing with certain improvements

Most of the mobile models released from 2013 onwards support this network

Under 4G, users can experience.

- less buffering
- higher voice quality
- easy access to instant messaging services
- social media
- quality streaming
- faster download speeds

1.2.3 Devices

- Devices include any instrument that can communicate or connect to a network.
- Devices depend on the connection network.
- The capabilities of the device will be determined by the inbuilt support for connecting to various networks
- Devices and connectivity plays a major role in successful communication

1.2.4 Platforms

- A mobile platform's primary duty is to provide access to the devices.
- To run software and services on each of these devices, you need a platform
- In simple terms, you need a core programming language to develop software for your devices
- Like all software platforms, split into three categories:
  - Licensed
    - A common platform of development Application Programming Interfaces (APIs) that work similarly across multiple devices
  - Proprietary
    - Vendor specific platforms for their own devices
  - Open source
  - Open source platforms are mobile platforms that are freely available for users to download, alter, and edit

1.2.4 Platforms (Examples)

Licensed (General platforms for any vendor to work on)

- Java Micro Edition (Java ME)
- Binary Runtime Environment for Wireless (BREW)
- Windows Mobile
- LiMo

Proprietary (Vendor specific platforms)

- Palm
- BlackBerry (Java-based platform for BlackBerry Devices)
- iPhone (Apple uses a proprietary version of Mac OS X)

Open source

- Android

1.2.5 Operating Systems

Operating systems often have core services or toolkits that enable applications to talk to each other and share data or services.

Some examples for most common Operating Systems are,

- Symbian
- Windows Mobile
- Mobile platform.
- Palm OS
- Linux
- Mac OS X
- Android

1.2.6 Application Frameworks

Application frameworks often run on top of operating systems, sharing core services such as communications, messaging, graphics, location, security, authentication, and many others.

Few examples for application frameworks,

- **Java** - Applications written in the Java ME framework can often be deployed across the majority of Java-based devices
- **Windows mobile** - Applications written using the Win32 API can be deployed across the majority of Windows Mobile-based devices
- **Android SDK** - Android SDK allows developers to create native applications for any device that runs the Android platform
- **The Web** - The Web is the only application framework that works across virtually all devices and platforms

1.2.7 Applications

- Application frameworks given in the early slide are used to create applications, such as a game, a web browser, a camera, or media player, etc.

- When developing applications for mobile devices, developers find it very difficult to maintain the stability across multiple devices.

- For example,
  - if you are creating an application using the Java ME application framework, you need to know what version of Java ME the device supports, the screen dimensions, the processor power, the graphics capabilities, the number of buttons it has, and how the buttons are oriented.

- At present we see there are cross platform app development frameworks emerge to address this issue.

1.2.8 Services

- Services include tasks such as accessing the Internet, sending a text message, being able to get a location, etc.
- Simply service is anything the user is trying to do.
- Services are very important as mobile devices suffer from resource constraints.
- User can get certain things done through services rather trying to do extensive processing locally

1.3 Mobile Strategy

1.3 Mobile Strategy

- How much time, effort, and money it will cost when implementing mobile software products (apps) for a specific context?

- Early and wrong judgements based on looking at the breadth could entirely ruin the value in the long run.

- Formulating a proper strategy reduces the chances of massive failures.

- This section provides certain rules one can adhere to when developing a mobile strategy.

1.3 Mobile Strategy (Rules to follow)

Rule #1: Forget What You Think You Know

- Forget everything you think you know about mobile technology.
- Start at the beginning with your project. Ask yourself or your team the hard questions about your business, about your users, and about your development capacity, unfettered by the latest hype, tool, or technology

Rule #2: Believe What You See, Not What You Read

- Do not depend on outdated documentation
- Talk to people and understand what really happens in the real work environment.

1.3 Mobile Strategy (Rules to follow)

Rule #3: Constraints Never Come First

- Mobile projects can be hard to kick off.
- Start with the big ideas and do not let the many constraints of the medium kill your project before you have begun.
- Do not let the constraints to ruin good project ideas at early stages.

Rule #4: Focus on Context, Goals, and Needs

- Defining the users' context is the first thing to do
- Uncover the users' goals, and then try and understand how the users' context alters their goals.
- With goals understood, figure out the tasks the users want to perform.
- Look for ways to filter content by context, such as location, media, and model.

1.3 Mobile Strategy (Rules to follow)

Rule #5: You Can not Support Everything

- Don not kill yourself by trying to support everything. Start with the devices that best represent your core customer.
- Remember, the most popular device or the one that's easiest to develop for might not always be the best device for your project.
- Check your server logs for the devices currently accessing your site. These are the first devices to target.
- Go to your operator store and do a little market research to find out the recommended devices for your target customer

1.3 Mobile Strategy (Rules to follow)

Rule #6: Do not Convert, Create

- Understand your user and his context. Having an idea of how and when users will access your content will aid in understanding how to best create a tailored mobile experience.
- Do not forget that mobile is a unique medium with its own benefits. Do not try to simply apply the same rationale to mobile strategy as in the web or print strategy.

Rule #7: Keep It Simple

- It can be a big challenge, especially for larger organizations.
- Try to limit the features to only those that are most crucial to your users.
- Never put your corporate goals or objectives before the users' interests.
- Try to determine the need that will motivate users to act or interact, and build the experience around that.

Summary

(Only a suggested design for the summary slide)

History	Discussed the history and the evolution of mobile technology based on different generations and their key features
Ecosystem	Describing the components of mobile ecosystem to understand how the entire system works
Mobile Strategy	Seven rules/ tips to follow when developing a mobile strategy for a particular context.