Introduction to Mobile Development: Challenges

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Unique Challenges: Discussion

- What are the unique challenges for creating mobile applications?

Unique Challenges: Limited Computational Resources

- Mobile devices have limited computational resources
  - Directly accessible memory and computational capacity will be categorically less than desktop and server computers
- Implications for developers
  - Applications must be designed to run efficiently

Unique Challenges: Limited Power Resources

- Mobile devices are constrained limited power supplies
  - They are often powered by batteries and cannot be always recharged conveniently
- Implications for developers
  - Applications must be optimized efficiently without draining battery power

Unique Challenges: Intermittent Network Connectivity

- Mobile devices are wirelessly connected and are mobile
  - Network connectivity are often intermittent or the devices are often experience varying network latency and bandwidth
  - Data usage sometimes carries a monetary cost.
- Implications for developers
  - Developers must handle offline scenarios and optimize data usage.

Unique Challenges: User Experiences – Touch Experiences

- Mobile users often rely on touch screen interactions
  - Mobile apps rely heavily on touch gestures, which is different from traditional mouse and keyboard interactions.
- Implications for develops
  - Developers will need think about intuitive and responsive UI designs that are different from traditional desktop computers

Unique Challenges: User Experiences – Small Screens

- Mobile devices often have limited screen space
  - Limited screen real estate means limited content can be displayed
    - Must be large enough for eyes, and big enough for your fingers
    - Can lead to excessive and complex navigation
- Implication for developers
  - developers must prioritize content and functionality

Unique Challenges: Device Diversity

- Mobile devices are diverse
  - Device hardware. They come with different screen sizes, resolutions, and computational capabilities.
- Implication for developers
  - Developers must balance supported devices and maintenance cost.
  - Developers must ensure their apps work seamlessly across this wide range of devices they support.

Unique Challenges: Platform Diversity

- Mobile operating systems are dominant by two major players (Android vs. iOS)
  - Different design guidelines, development environments, and programming languages (Swift/Objective-C for iOS and Kotlin/Java for Android)
  - Each can have different API versions
- Implication for developers
  - Developers must ensure their apps work seamlessly across this wide range of platforms and versions they support.
  - Developers must weigh in: maintaining separate codebases vs. using cross-platform frameworks.

Unique Challenges: Security and Privacy

- Security & privacy
  - Mobile apps are used by everyone and have access to sensitive data, which heightens the security and privacy concerns
  - Mobile operating systems require apps to request permissions for accessing certain features (e.g., camera, location, contacts).
- Implication for developers
  - Developers must implement the best practices, e.g., encryption, secure authentication, and data storage practices to protect user information.
  - Developers should consider balancing functionality with user privacy concerns.

Unique Challenges: Development Tools and Framework

- Development tools and framework are often fragmented and evolve quickly
  - Native vs. cross-platform development
  - Rapidly changing ecosystems – demanding to keep up with the changes
- Implications for developers
  - Developers must decide whether to build native apps (or use cross-platform solutions (e.g., Flutter, React Native, Ionic Framework).
  - Developers need to develop solid foundations, form communities, and foster life-long learning

Summary

- Mobile development poses some unique challenges for
  - Mobile operating systems
  - Mobile applications
  - Developers