

# Emerging Technologies: Mobile Development for Android Devices

## Mobile Application Development



# Introduction

- Developing for mobile platforms is significantly different to developing for desktop computers.
- Device hardware is different.
- The way that devices are used is different.
- The environment in which they are used is also different.
- In addition, mobile devices must deal with significant constraints not present on desktop computers.
- All of this affects the work of the developer in terms of how mobile applications are designed and implemented.

# Key Differences

- Device hardware is portable → smaller form factor, lighter in weight etc.
- Processing capability is typically significantly less than that available on a desktop computer.
- Graphics processing capability is not as great.
- There are differences in screen size, resolution and density.
- User interaction modes are different. For example, the absence of input devices such as keyboard or mouse.
- Energy constraints
- Network/Connectivity constraints.
- Storage constraints

# Implications for Developers

- Applications need to be created so that they use the available processing resource as efficiently as possible.
- Algorithm efficiency is a much more important consideration in mobile applications.
- Developers need to be mindful of the graphics capability and screen size.
- Carefully consider screen size, modes of user interaction and appropriate selection of user interaction (UI) components/widgets.
- Network connectivity can not be taken for granted. An application should be able to operate to some degree even without network support.
- Consider what storage may be required by the application including installation size and application data storage.
- Processing requires energy. Create applications so that they are energy efficient.
- User location and other context is changing.



# The Graphical User Interface (GUI)

- The nature of the graphical user interface on a mobile device needs careful consideration.
- On a mobile phone, for example, the screen is a smaller size. Components are also smaller.
- The pointer (a finger) has less precision than the desktop mouse which has almost single pixel precision. Selecting small components is more difficult for the user.
- Components need to be sufficiently large to be selected by a finger.
- Avoid densely packing graphical user interfaces with small components.

# Energy Constraints

- Energy constraints are not a pressing concern for developers of desktop computer applications.
- These are machines that typically have a connection to a mains source or otherwise have ample energy supply.
- Mobile applications are battery powered where the batteries have limited capacity.
- Battery time between charges is a major concern for users.
- Applications that do not use the available battery capacity efficiently will tend to be avoided or uninstalled by users.

# Network Constraints

- Network support is wireless. Network availability is less predictable than on wired networks.
- This is especially the case when a user is on the move.
- Obstacles, urban canyons, remote areas affect network availability.
- Try to design applications so that they are at least tolerant of poor network availability.
- Consider also the overall amount of data that the application downloads over the network and if this is strictly necessary (possible cost).

# Graphics & Data Processing Constraints

- Desktop computers tend to have significant processing capability.
- Performance is a key criterion.
- Mobile devices tend to prioritize energy efficiency above sheer performance.
- Mobile processor transistor count is typically lower (Because of energy, form factor).
- The graphics processing unit (GPU) is typically packaged together with the CPU on a single chip.
- If intensive processing can not be avoided, one possible solution might be to offload to the cloud, given network availability.



# Storage Constraints

- Desktop secondary storage can be spinning platter, solid state storage or both with capacity currently varying from about 500Gb up to about 8Tb.
- Mobile storage at the current time is typically from about 16Gb to 128Gb.
- Applications need to have a small storage footprint.
- The data storage requirement of mobile applications must also take account of the limited local storage available.
- Again, a possible solution might be offered by storage in the cloud.
- However, take account of the need to balance network constraints.
- Consider carefully what can be stored in the cloud and what needs to be stored locally.

# Summary

- Developing for mobile requires the developer to address concerns that do not arise in developing for desktop computers.
- Constraints that must be taken into account include energy, network, processing, graphics, user interface (UI) and storage.
- Try to create apps that are small, focussed, efficient and avoid bloat.
- Don't rely on network availability for critical resources.
- Create UIs with sufficiently large components and avoid densely packing UIs so that a user has difficulty selecting.