CMER

Centre for Mobile Education and Research

Game Design & Development for Mobile Devices

Week 1

Overview

- Introduction
- Phone Differences
- Approaches
- Challenges
- Development

Introduction

- JavaME is relatively easy to learn
- It is misleading to suggest that mobile game development is simpler than on the PC or console
- Ideally, a J2ME game developed for one device should run on all devices with the same APIs

Phone Differences

- There are several reasons why there are so many phone models
  - Mobile phones are highly personal; each one is designed for a specific usage pattern
    - I.e. enterprise users, messaging teenagers, gamers, price conscious people, etc
  - Manufacturers need to differentiate their product
    - They adopt different CPUs, memory sizes, UIs, operating systems, screen sizes, etc

Phone Differences (Cont.)

- **Providers need to differentiate their offerings**
  - **Customizing their hardware or software**
    - **Enabling/disabling functionality (i.e. NexTel disallows consumers to run 3rd party Java applications)**
- **Mobile phones are evolving faster than Moore's Law.**
  - **Hundreds of new models every year.**

Phone Differences (Cont.)

- Supporting all the popular devices will maximize the game's chance of success
- Java games ported for different devices need to be tested and optimized on each device
- Example; Nokia devices series 60 and series 40 have very different screen sizes, memory sizes and CPUs

Phone Differences (Cont.)

- Different devices have different bugs, or problems in their Thread or memory management implementations

Approaches

- Java is object-oriented
- Object-oriented approach provides maintainability and extensibility.
- This is normally a good thing
- In the mobile world memory is expensive
  - **It is best to avoid multiple objects unless necessary**
- Do not write one massive super class

Approaches (Cont.)

- Write your game in the simplest manner that is comfortable
- Afterwards, merge classes that do not provide much gain in functionality

Challenges

- Supporting many different devices in a fragmented market
- Different hardware limitations
  - CPU
  - Screen size
  - memory
- Cost of porting games (if needed)

Memory Limitations

- 3 Times of memory
  - Working, storage, and application memory
- Working memory is where the game is in runtime
  - A game too big will throw a out of memory error
- Storage memory is where all the high scores, user options, and other state data.

Memory Limitations (Cont.)

- The game itself takes up storage (application) memory
- Application memory takes into account all of the games and applications stored
- Code the game accordingly to memory constraints
  - Consult manufacturer specifications
- Check the maximum size a game can be during runtime and memory storage available

Screen Limitations

- A fairly big challenge
- Displays differentiate not only from manufacturer to manufacturer, but from model to model too
- Consider
  - Screen size
  - Frame rate
  - Colour

Screen Limitations (Cont.)

- Target devices to design games for
- Good idea to create games generically, then make alternate versions for different mobile devices

Improve Performance

- Decide which type of model you will develop for.
  - Lower end or higher end
  - Lower end have most of the market
- Optimization
  - Use shorter variable, method and class names
  - Avoid unnecessary protocols
  - Reuse objects rather then instantiating new ones
  - Merge graphics into one sheet instead of several separate graphics
  - Obfuscate your code to
    - Prevent reverse engineering
    - Significantly reduce final jar size

Development

- **Beginners should start development with a higher end device that has the least amount of API constraints.**
- **This allows the developer to focus on proper game design and API usage**
  - **Without worrying about limitations**

Development (Cont.)

- **A good start:**
  - **Start with a device that has MDIP 2**
- **As a developer becomes more experienced, moving to an older or more restrictive device would be a good idea**

Development (Cont.)

- Porting a game from strong device to a more restrictive device requires
  - Reworking the graphics
  - Changing the game play
- A strength in mobile games is large volume that it occupies in the market
- Mostly low end devices are in the market