Portfolio Report

COS30017 - Software Development for Mobile Devices

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November 3, 2014

1. Overview

2. Evidence

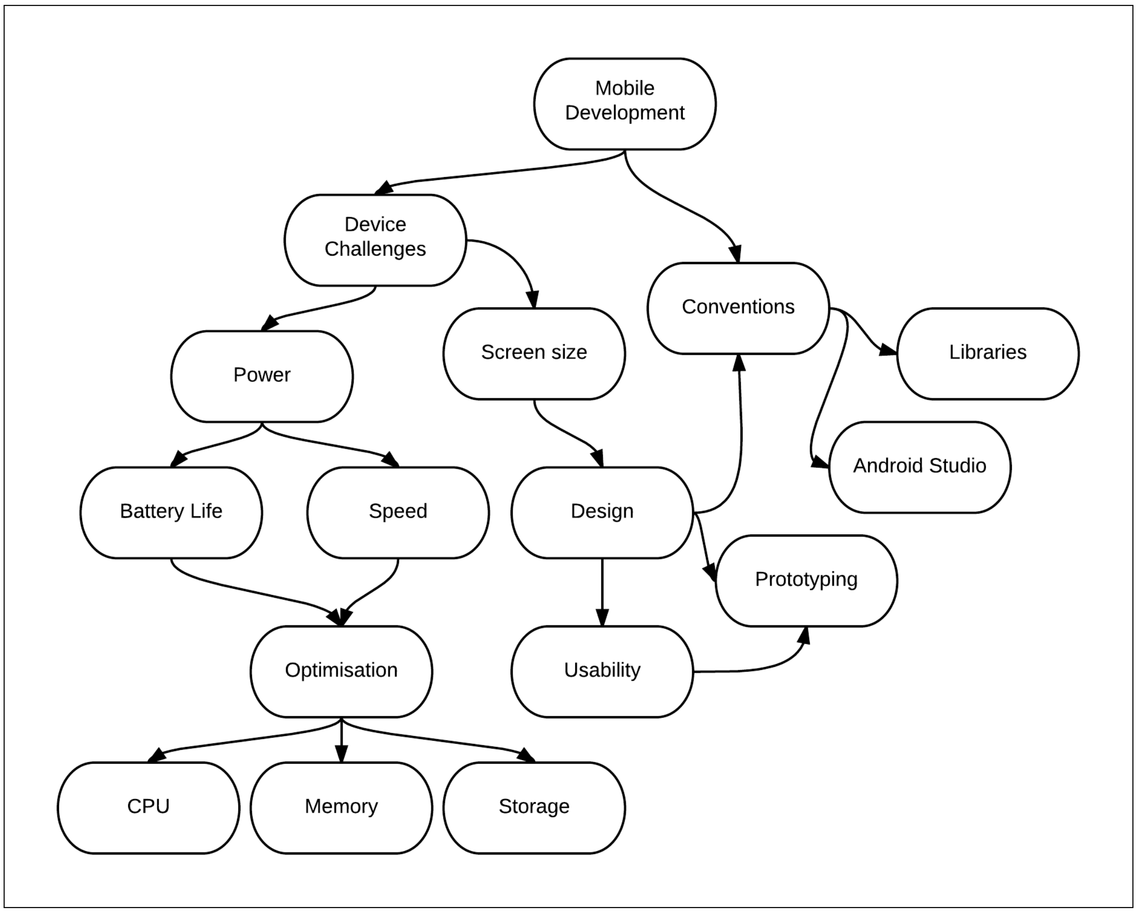
- = *in progress*

Assessment	Completed
Core Assignments (for Pass)	✓
Extension Tasks (for Credit)	✓
Custom Application (for Distinction)	-
Research Report (for HD)	-

Project brief has been submitted for custom application and I also intend on completing the HD research report as well.

3. Reflection

3.1. Concept Map



3.2. Mobile Application Development Process

The process to developing a mobile application is in a lot of ways a combination of web development and conventional desktop application development. From desktop application development comes the usual development methodologies such as agile, scrum etc., which are proven in providing a good and reliable framework for delivering applications. The web development processes that are also inherited by mobile development are those of iterative app design, user interface and usability testing, and then heavy design implementation.

At a high level the resulting process for designing mobile applications is as follows:

1. Ideation - Exploring the app's idea, what it will do, features etc.

2. Exploration - User stories/scenarios, constraints, UI sketches and heuristic evaluation.
3. Initial Clarification - Navigation flow, hi-fi prototype and usability test.
4. Executable Prototype - Create prototype, validate the app.
5. Iterative Development - Continue developing features, run usability tests and other validation methods to assist with refining.

3.3. Analysis and Problem Solving Approaches

Software engineering like other engineering disciplines requires that certain problems are solved. These problems are usually open-ended, vague, or have an inherent difficulty to them. The process of solving these problems usually involves some analysis of a problem, redefining of the problem to improve clarity and outline constraints, and then solving that problem using existing technical knowledge and research. This is an iterative process, and can take some time if the problem is complex or large.

Example: *'A chat program where users on mobile devices and also on a desktop browser webapp can send instant messages to each other without a long delay.'*

Analysis: There are two key requirements in this sentence that will shift the way that the system is designed. The first is that the messages have to be sent without a long delay, and the second is that this must be true across mobiles and web browsers. A question that arises straight away is how long is a 'long delay'? Also unknown is which web browsers need to be supported in this case and also what mobile OS and form factors need to be supported.

Refinement: *'A chat program where users of Android tablets (7 inch +) and desktop web browsers; Chrome, Safari and Internet Explorer 11 can communicate using instant messages where a message takes no longer than 5 seconds on average to reach the other user.'*

Constraints: The redefined problem has enabled the extraction of concrete constraints:

- The messages must reach their destination within 5 seconds.
- Must support Android tablets larger than 7 inches.
- Must support the browsers Chrome, Safari, and Internet Explorer 11.

Re-analysis: Now that some of the ambiguities have been removed and initial constraints identified, the actual problem can be considered in more detail. A key issue that is already visible is that of having any message received no more than 5 seconds after being sent. A naive solution to this is to have a persistent connection open between a server and all clients, however this introduces a lot of overhead to the server. In this case, due to there not being a minimum number of users required, it's arguable that this would be an easy solution.

If there was a requirement for a minimum number of users then another solution is available which only took a small amount of online research to find. Socket.io is a project which allows for socket-like communcation in web browsers and other devices including Android. If socket.io didn't exist, then research would have to begin into how to build that kind of cross-platform and browser support.

Iterate...

3.4. Comparison and Contextual Placement

Mobile development is different to developing command line processing software and is even different to developing websites, though it does have characteristics from both areas and is in may ways a combination of them. Mobile development requires the kind of design approaches long used in web development, but also commonly requires some module of complex underlying logic written in an OOP language. This makes mobile development quite different as a result and as such there are slight differences in the way that the development is practised.

One aspect of Android development in particular that's accentuated heavily on is the concept of 'Convention over Configuration', and this is apparent when using the newest Android integrated development environment, Android Studio. Every part of an Android application has it's place in the structure of the project, to the point where if it's not in that location, then the app may not compile correctly or at all. Anything to do with layout, design, dimensions, string constants and much more must be placed in their respective directories and xml files within the 'res' directory, whereas any application logic needs to go in the 'java' directory.

Mobile development also requires that there is a greater emphasis on validating the UI decisions made. This is usually in the form of user tasks and usability tests both on prototypes and on a working executable of the app whilst it's in development. Design and usability of an app is paramount to it's success in the market of smartphone users, and if the app is either difficult to use or doesn't function exactly as required then it isn't likely to succeed. This is true of any application, however it seems to be a lot more important in mobile development, and much less likely to be excusable.

The process of creating and designing mobile applications, both for Android and iOS has been somewhat simplified by the design guidelines and conventions that Google and Apple produce to assist developers in creating good apps for their platforms using their development kits.

3.5. Generalization

As was stated in an earlier section Android development makes heavy point of 'Convention over Configuration'. This is something which is beneficial to development on that platform, due to the removal of many small decisions from the developer, increasing productivity and also the understandability of the codebase between developers, even those who aren't on the same team. Convention over Configuration would be hugely beneficial if it was more readily used in other areas of software development.

Another aspect of Android development that could be used more generally in UI interface development is the pattern and abstraction of an Activity and Fragment. Android development requires that the Activity or Fragment classes are subclassed to create specific screens or screen components. That means that the subclass has the same lifecycle concepts as the superclass and any specific lifecycle events that need to be customised can just be overridden.

The final generalization that would be beneficial is the Annotations library. Annotations allow the developer to quickly indicate some known functionality using an @ tag which is then compiled to its' known implementation. This is used for getting references to view objects, quickly register click handlers and various other functions which are considered to be boilerplate or heavily repeated code.

3.6. Challenges in Mobile Development

3.7. Explorations