



InfraDrone Android Application

Team Number 07

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The Team

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Blake Agey - Scrum Master

David Schmadeke - Quality Assurance



Introduction

- InfraDrone LLC
- Project Plan
 - Deliverables, Specification, Requirements, Diagrams, Proposed Methods, Technical Challenges, Gantt Chart
- Design Document
 - Intended Users/Uses, Limitations, Demo Dates, Proposed Design and Analysis, Testing, Results
- Demo
 - Baseline structure of Android application
 - Sample VR application
- Conclusion

InfraDrone LLC

- Company that gathers data on structures through the use of Drones.
- Data is in the form of HD and thermal images as well as 3D models of the structures.
- This information can then be used to determine the integrity of structures.



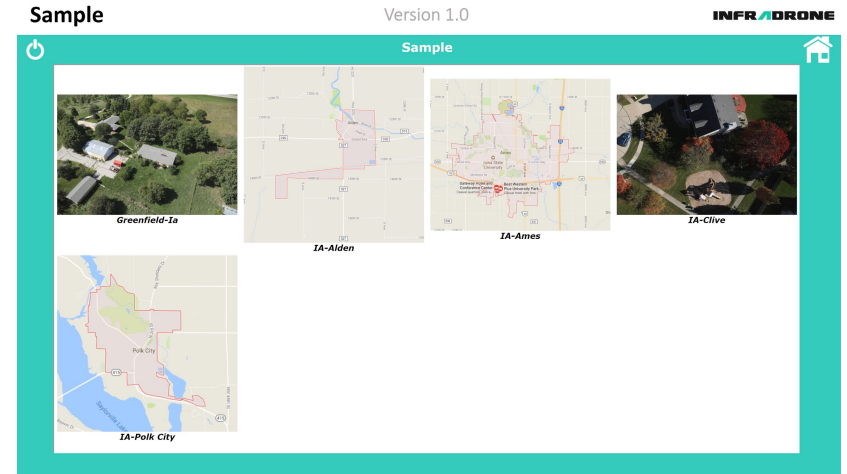


Project Plan

- For this project, we are to design an Android application to display data that has been collected by a drone.
- The types of data to be displayed are images, reports, and 3D models.
- The application should also have the capability to function on mobile VR devices. The VR component of this project will be used to view the 3D models as well as to navigate through the application itself.

Client Assigned Deliverables

- Similar display features as current InfraDrone web portal.
- Standard InfraDrone style GUI and design.
- Data should be extracted from AWS folder structure.
- User friendly 3D model viewing on application.
- Ability to view images, reports, and locations on application.
- VR visualization using Google Cardboard or Daydream system.

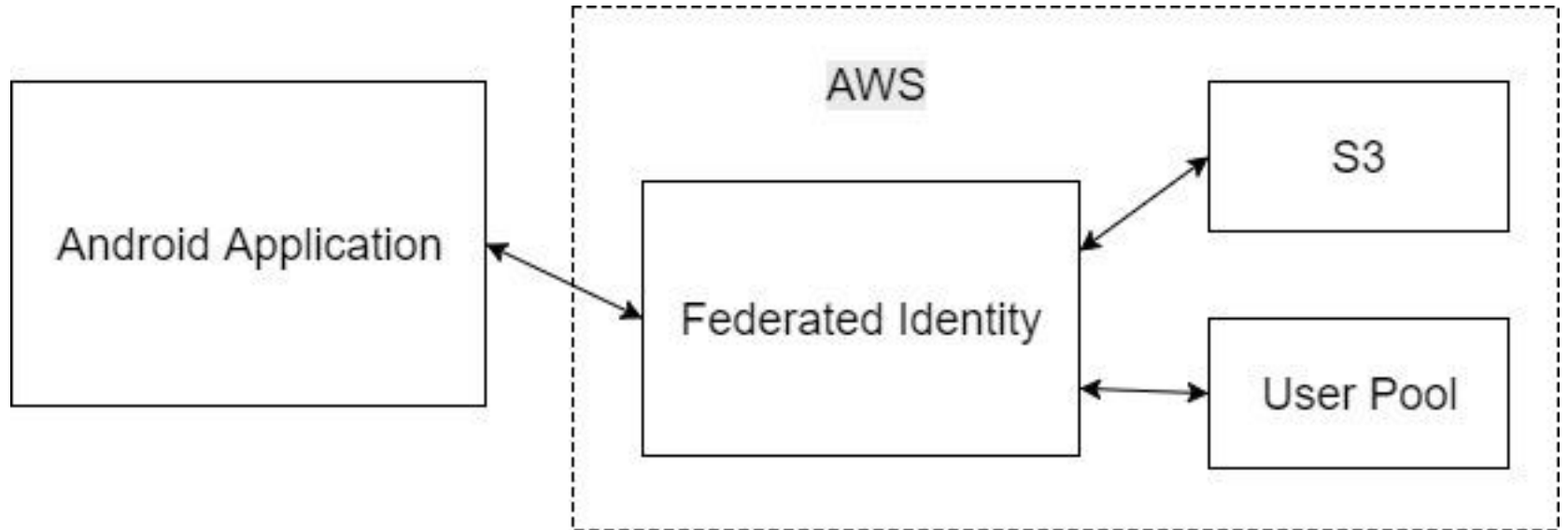




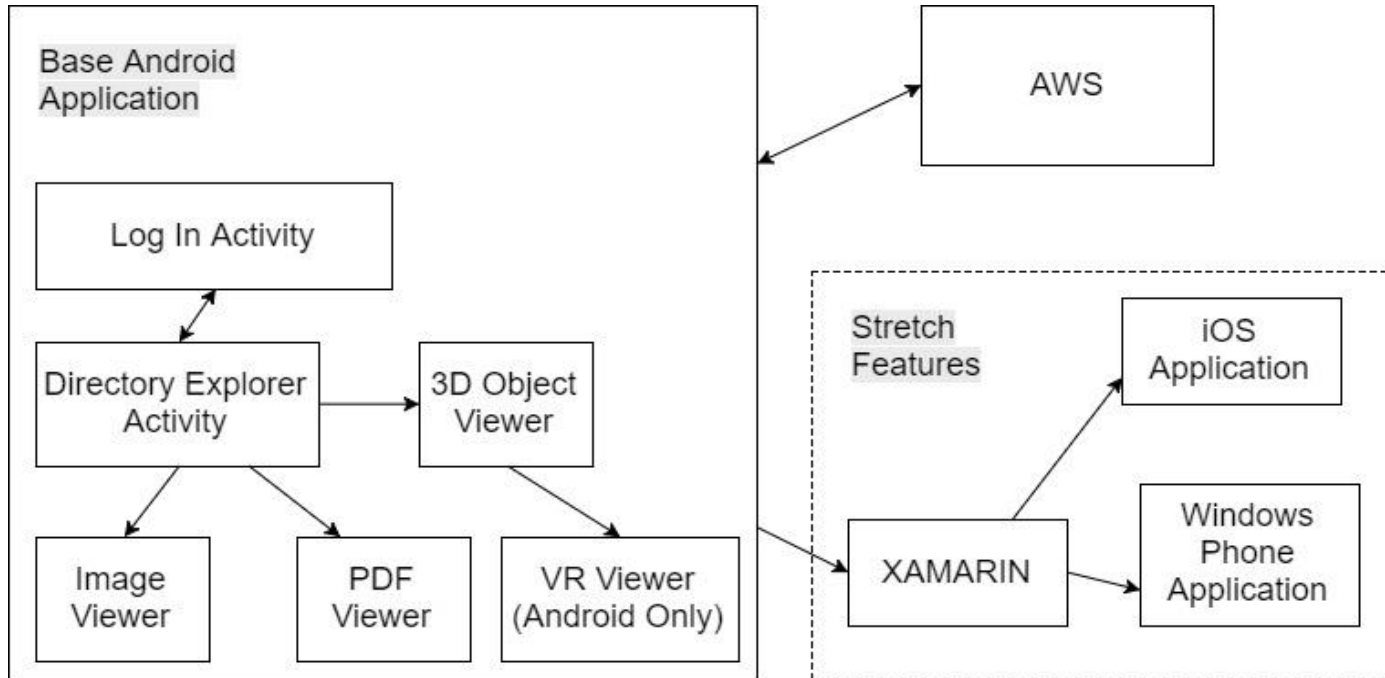
Project Specifications and Requirements

- Create an application equivalent to display features of Web-Portal.
- Apply the company's GUI and design styles.
- Navigate a user friendly application.
- View images, reports, and locations.
- Interact with user friendly 3D models.
 - Display three types of 3D models.
 - Ability to rotate and zoom 3D models.
 - User can click on points on 3D model to view notes/annotations.
- Application will extract the necessary data from Amazon Web Services folder structure.
- Ability to use Google Cardboard or Daydream System for VR visualization.

Proposed System Block Diagram



Event Diagram





Proposed Methods

- Development Frameworks
 - Visual Studio + Xamarin Framework (C#)
 - Cross-platform development
 - Much harder to integrate with Google VR API (Java)
 - Android Studio (Java)
 - Much more familiar
- 3D Object parsers and renderers
 - ModelViewer-080
 - Does not parse .mlt files for textures
 - Rajawali
 - Easier to implement .mlt parsing
- Data structure for storing data from AWS S3
 - Recursive method
 - Network response took too long
 - Hashmap & Priority Queue
 - Sorts data automatically
 - Much faster accessing and writing data



Challenges

- Rendering object files using .mtl file textures
- Parsing 3D object .obj files into a model object
- Authenticate user with Cognito Federated Identity
- Data structure for data pulling from AWS

InfraDroneVR

Start Project

- Meet with client
- Project goals and scope defined
- Team web site created
- M0

Start Planning

- Development plan created
- Initial UI created
- M1

Start Execution

- Begin development of project
- Project design document created
- M2

Data extraction

- Data link from AWS
- Back end development
- M3

Improve project development

- Project development process improv...
- Project plan reviewed
- M4

Data displaying and VR

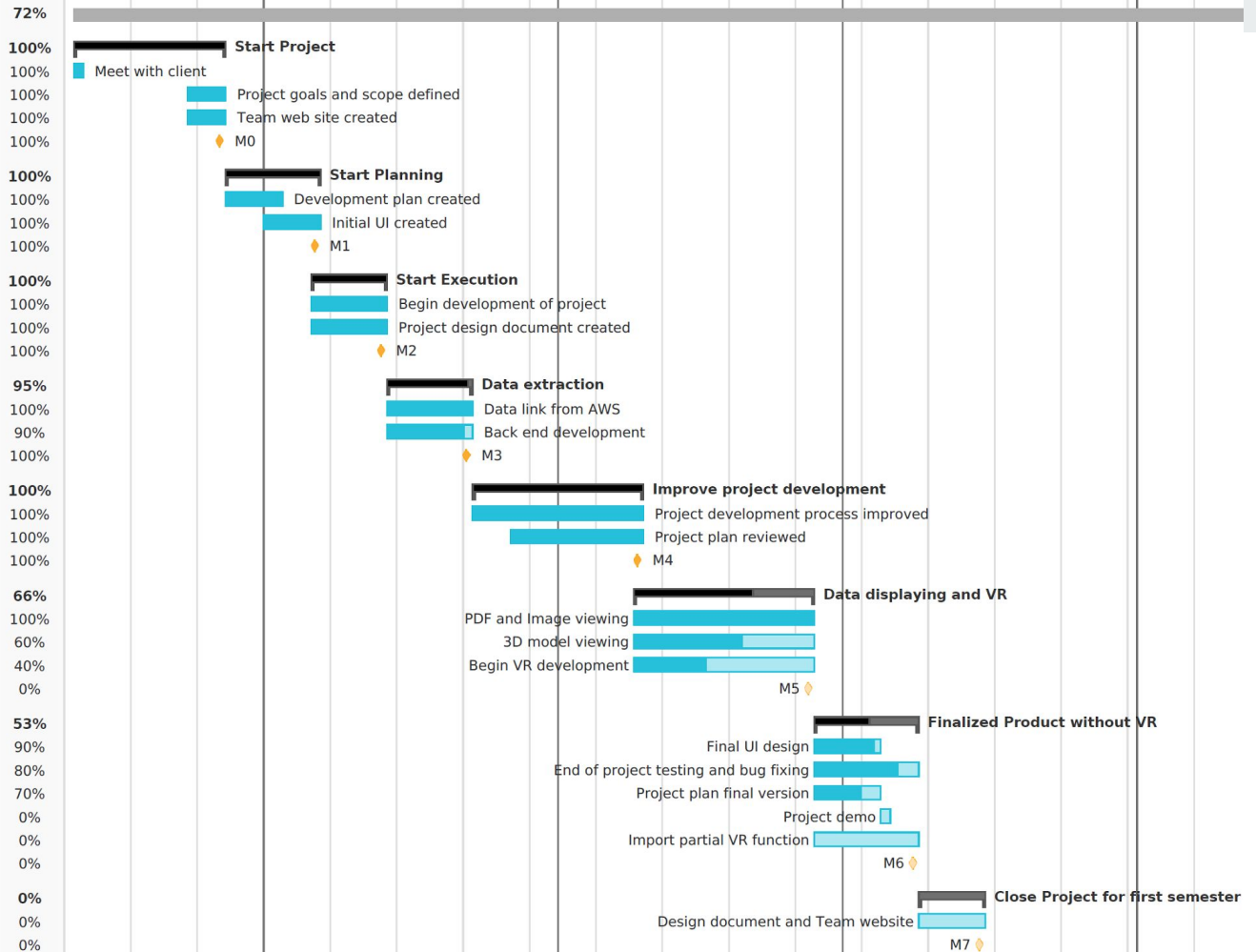
- PDF and Image viewing
- 3D model viewing
- Begin VR development
- M5

Finalized Product without VR

- Final UI design
- End of project testing and bug fixing
- Project plan final version
- Project demo
- Import partial VR function
- M6

Close Project for first semester

- Design document and Team website
- M7





Design Document

- Use Android Studio as our Integrated Development Environment.
- Use existing credentials to collect client data from Amazon Web Service.
- Display data such as HD and thermal images, 3D models, and PDFs from AWS.
- Design application around the existing InfraDrone web portal.



Intended Users and Uses

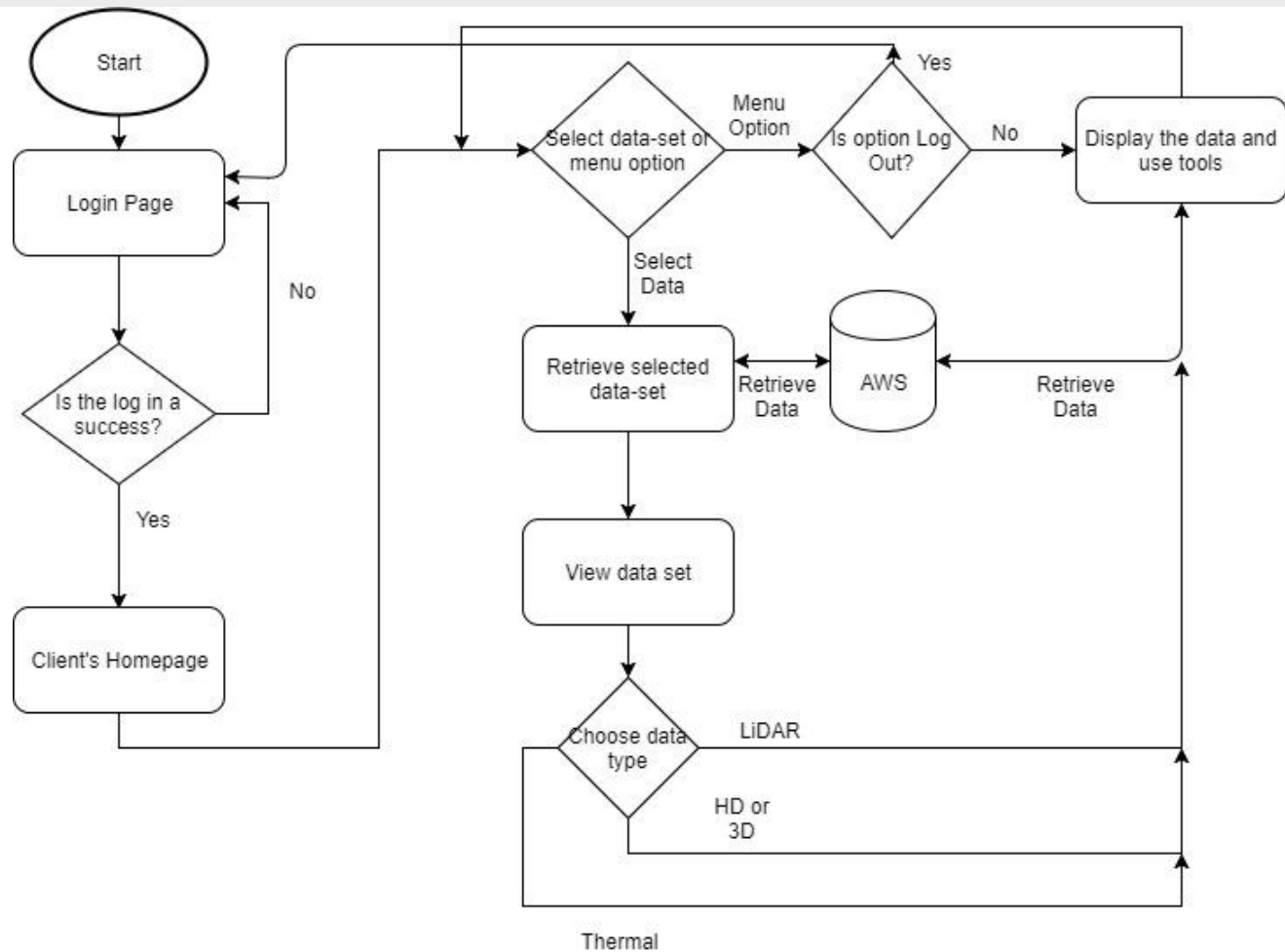
- Users
 - InfraDrone employees
 - InfraDrone's clients
- Uses
 - Current web portal functionality in a mobile solution
 - Validate structural integrity in VR



Assumptions and Limitations

- Assumptions
 - Security and database connections will work the same way as the current web portal structure.
 - All usernames and passwords will be identical.
 - The design of the application will be identical to the web portal.
 - All client data will be pulled from Amazon AWS.
- Limitations
 - The application will only be expected to run optimally on current mobile devices. (Version
 - Android is the only platform that we are required to finish development on. (iOS and Windows mobile platforms are stretch goals).

Design Decision Diagram





Proposed Design

- IDE and Platform
 - Android and IOS.
 - Xamarin.
- UI Design
 - Match the provided webapp.
- Backend
 - Amazon Web Service (AWS).
- Data Viewing
 - Images, PDF files, and 3D models.
 - External API.
- Virtual Reality
 - Google VR SDK.
 - External API for parsing 3D object files.



Design Analysis

- IDE and Platform
 - Android - based on client's' need, we may start IOS development next semester.
- UI Design
- Backend
 - Authentication problem.
 - AWS account access is limited.
- Data Viewing
 - Have problems with parsing mtl.
- Virtual Reality
 - Simple application showing object.
 - Also having problem with parsing mtl.

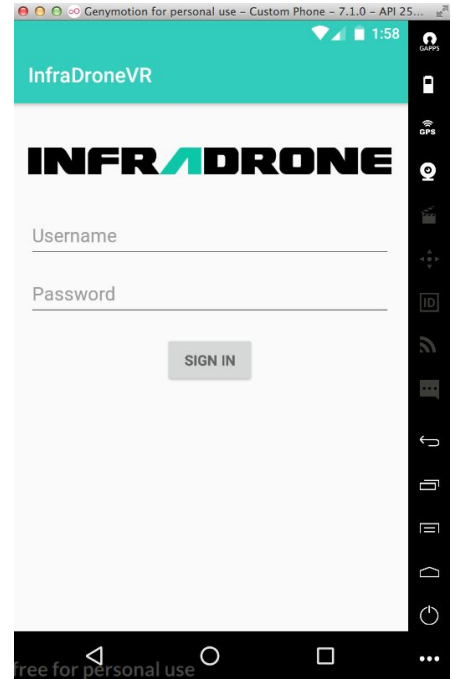


Testing and Implementation

- Interfaces
 - IDE: Android Studio
 - Amazon Web Services
- External APIs
 - ModelViewer-080
 - Google VR
 - Rajawali
- Testing
 - Ways
 - Software
 - Hardware
 - Images, PDF files, and 3D models.
 - VR

Results

- Clients can log into their account.
- Ability to access clients data from AWS.
- We can download and track progress of data in application.
- Ability to display images and PDFs from AWS.
- Basic VR functionality without textures.





Demo

Android application demo & VR application



Next Semester Goals

- Implement textures into 3D object viewing
- VR functionality
 - 3D object VR viewing with textures
 - Connect with Android application
 - Daydream controller functionality
- Testing
 - In depth user testing
 - Automation testing
- Filter by image / document type
- Stretch Goals
 - Implement XAMARIN for cross-platform development (iOS & Windows Phone)



Conclusion

- Goal of project is to create an Android application to display data collected from a drone and intended for InfraDrone's clients and employees.
- App should be similar to current InfraDrone web portal in design and UI.
- Current application functionality:
 - Access to clients data through AWS.
 - Ability to view images and PDFs.
 - Basic VR without textures.



Questions?