Software Requirements Specification for:
Nucleus - A P2P Image Sharing App Employing Compression

CS4089 Project

Anand M.P, Ronn George Jacob, Sreeraag Mohan Thekkepurakal
Guided By: Ms. Pournami P.N

November 9, 2015

Contents

1 Introduction

1.1 Purpose

The purpose of this Software Requirement Specification (SRS) document, is to present a detailed description of Nucleus - A P2P Image Sharing App Employing Compression. It will explain the purpose, the features, the interfaces of the application and the constraints under which it must operate and how the system will react to external stimuli. The document will also explain the functional and nonfunctional aspects of the software. The intended audience for this document are the users and developers of the software.

1.2 Scope

Nucleus will be a peer-to-peer image sharing Android application employing compression. This application will be designed to minimize data usage by compressing images to an optimum level while maintaining the necessary characteristics of the original image, provided in a simple, easy to use interface.

More specifically, the application allows the user to compress an image; either stored locally on his device or captured with the camera, and to send the same across devices. The software facilitates the transfer by establishing an ad-hoc wireless network among the devices, hereafter referred to as a group. The software also takes into consideration the security of the network by employing a pass key which is known only to the peers in the group. It also provides a few customization options such as the ability to choose the theme.

1.3 Definitions, Acronyms and Abbreviations

Term	Definition
Nucleus	The application or the software described by this document
P2P	Peer to peer network
Group	An ad-hoc wireless network formed to enable the transfer of the images

1.4 References

IEEE. IEEE Std. 830-1998 IEEE Recommended Practice for Software Requirement Specifications. IEEE Computer Society, 1998. Software Requirement Specification, Version 1.0, April 15, 2004, Web Publishing System - Joan Team Leader, Paul Adams, Bobbie Baker, Charles Charlie.

1.5 Overview of the Document

In the next section, the Overall Description section, of this document gives an overview of the functionality of the product. It describes the Use Cases which will help us determine and provide better understanding for developing the technical aspects of the document. The third chapter, Requirements Specification section, of this document is written primarily for the developers and describes in technical terms the details of the functionality of the product.

2 Overall Description

2.1 System Environment

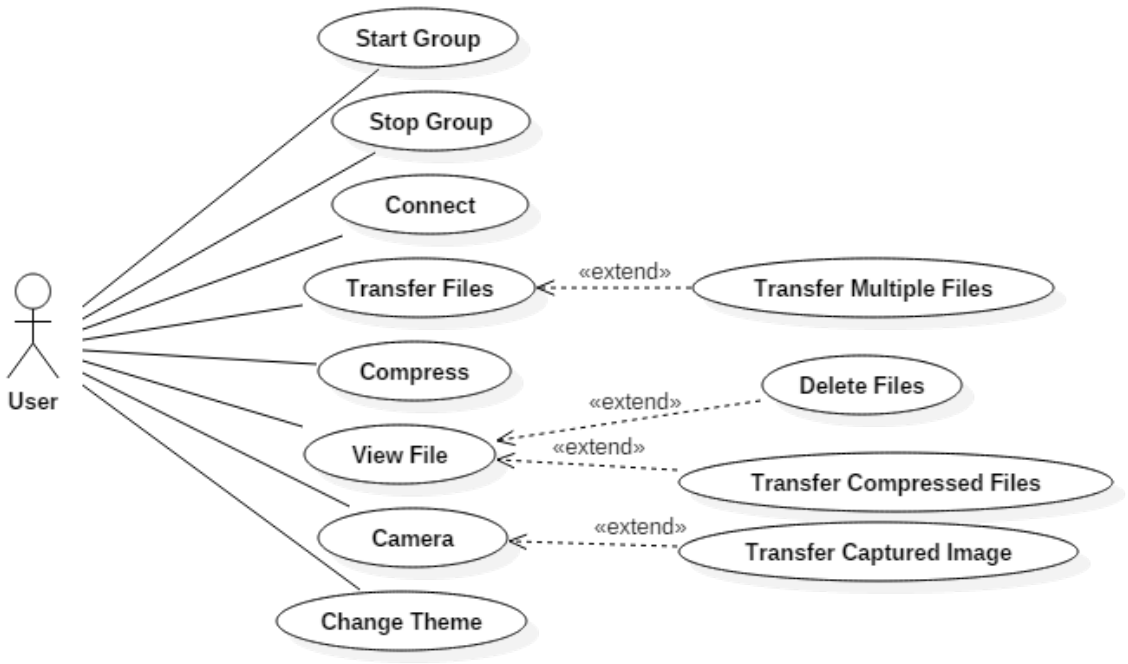

Figure 1: Use Case Diagram for the Application

The user of Nucleus can be a sender or a receiver based on which his options would change however application appears the same on all the devices. The user who creates the group would be its owner and responsible for its administration. The group is automatically destroyed when the owner of the group exits the application.

2.2 Functional Requirements Specification

This section outlines the use cases for various functions of the application.

2.2.1 Start Group Use Case

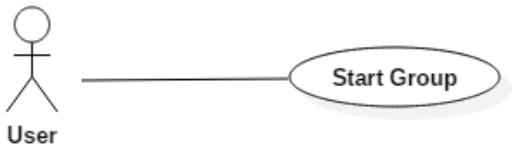

Figure 2: Start Group Use Case

Brief Description

The user wants to start a group with him/her as the owner.

Initial Step-By-Step Description

1. The user selects the option to create a group.
2. He is then provided with a dialogue box to set the grups name and passkey.
3. The application then attempts to create the network with the specified parameters.
4. If the application succeeds the user id notified about the event

2.2.2 Stop Group Use Case

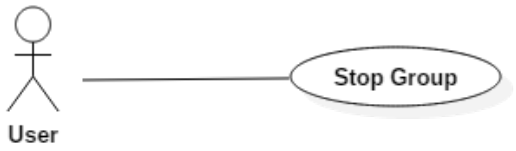

Figure 3: Stop Group Use Case

Brief Description

The user wishes to stop the hotspot under his ownership.

Initial Step-By-Step Description

1. The user selects the option to stop the hotspot.
2. If there are other users connected to the hotspot, the owner is notified about the same and is asked to verify if he still wants to stop the hotspot.
3. If the user selects YES at the previous dialog box, the application stops the network.
4. All the parameters related to the group are set to NULL.

2.2.3 Connect Use Case

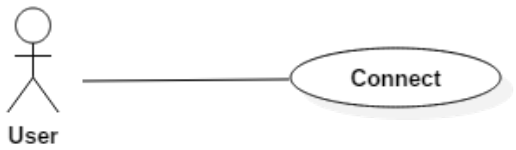

Figure 4: Connect Use Case

Brief Description

It enables a user to connect to an already existing group.

Initial Step-By-Step Description

1. The user selects the option to connect to an existing group.
2. The application scans the periphery and lists out the groups in the area.
3. The user selects the group which he wants to join, and is asked to enter the passkey for the same.
4. The application then verifies the users credentials and notifies the user if the connection is successful.
5. The application also sends a notification to the owner of the group about the addition of a member to the group.

2.2.4 Transfer Files Use Case

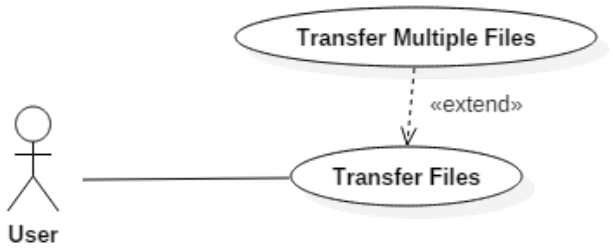

Figure 5: Transfer Files Use Case

Brief Description

The user wishes to transfer file(s) across the group.

Initial Step-By-Step Description

1. The user selects the option to transfer files.
2. The application then provides the user with a file picker to select the file(s) which he/she wants to transfer.
3. The user, once he selects the file(s), confirms the same by pressing the SEND button.
4. The application then attempts to send the file(s) across to all the devices in the group. The number of devices in any given group can range from 2 to n, the theoretical limit.
5. Upon completion of the transfer, the user is notified of the same.
6. The application also notifies the receivers of the file about the reception of files. Additional data such as the number of files, their size and the sender of the files will also be provided.

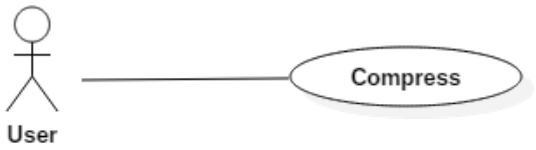

Figure 6: Compress Use Case

2.2.5 Compress Use Case

Brief Description

The user wishes to compress a file.

Initial Step-By-Step Description

1. The user selects the option to compress a file.
2. The user is then asked to pick image(s) from the provided gallery.
3. The application then compresses the selected image(s) and saves a copy to the working folder of the application.

2.2.6 View Files Use Case

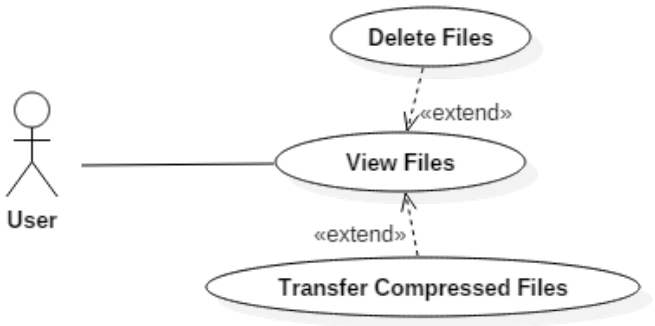

Figure 7: View Files Use Case

Brief Description

The user is able to view the files present in the working directory of the application.

Initial Step-By-Step Description

1. The user selects the option to view the files.
2. The application then provides the user with a file picker, and he can then view, delete or choose to send the already compressed image(s).

2.2.7 Camera Use Case

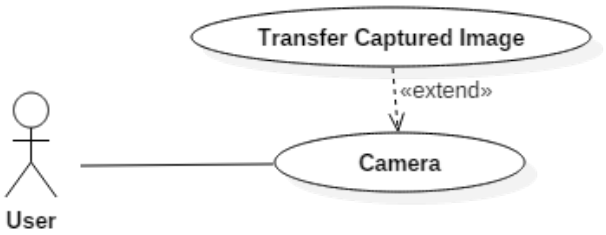

Figure 8: Camera Use Case

Brief Description

The user is provided with an option to capture an image, which can be then shared over the network.

Initial Step-By-Step Description

1. The user selects the camera menu.
2. The control is then handed over to the application registered to handle the event.
3. Once the user captures the image, Nucleus then asks the user whether he wants to discard the image and click another one, or continue with the same image.
4. If the user continues with the image, control is now handed over to the COMPRESS module.

2.2.8 Change Theme Use Case

Figure 9: Change Theme Use Case

Brief Description

The user is able to change the theme of the application.

Initial Step-By-Step Description

1. The user is selects the menu to change the theme of the application.
2. The user is then provided with the option to choose between a light and a dark theme.

3. Upon selection, the application restarts with the chosen theme. The default theme is the dark theme.

3 Requirements Specification

3.1 External Interface Requirement

The application has external interfaces to hardware of the devices such as the camera as well as the Wi-Fi which enables the users to establish connection and plays a pivotal role in the transfer of files between peers present.

The *Start Group* use cases interacts with the Wi-Fi to initiate connection and have peers start a group. While *Stop Group* use case is responsible for terminating the established connection. *Camera* use case interacts with the system camera to capture images and save the images if the user wishes to do so.

3.2 Functional Requirements

3.2.1 Start Group

Use Case Name	Start Group
Xref	2.2.1
Trigger	Initialization of the application
Precondition	WiFi adaptor of device is switched on
Basic Path	1. The user selects the option to create a group. 2. He is then provided with a dialogue box to set the groups name and passkey. 3. The application then attempts to create the network with the specified parameters. 4. If the application succeeds the user is notified about the event.
Alternate Path	1. In step 2, if the user fails to set the groups name and passkey , alert the user that the name and passkey are mandatory. 2. In step 3, if the application fails to create the network, notify the user that the creation of group failed.
Post Condition	A group with specified parameters has been created enabling peers to connect to the group.
Exception Path	If the network is not set up successfully the user is requested to try again.
Other	None

3.2.2 Stop Group

Use Case Name	Stop Group
Xref	2.2.2
Trigger	The user selects the option to stop the group.
Precondition	The user has to be the owner of the group and the hotspot is active.
Basic Path	1. The user selects the option to stop the hotspot. 2. If there are other users connected to the hotspot, the owner is notified about the same and is asked to verify if he still wants to stop the hotspot. 3. If the user selects YES at the previous dialog box, the application stops the network. 4. All the parameters related to the group are set to NULL.
Alternate Path	1. In step 2, if the user selects NO, the application breaks from this use case flow. 2. In step 3, if the application fails to stop the network, notify the user and request him to try again.
Post Condition	The group successfully terminates and is ready to start a new group.
Exception Path	If the network failed to terminate or if the user tries to terminate a non-existent group
Other	None

3.2.3 Connect to a group

Use Case Name	Connect to a group
Xref	2.2.3
Trigger	The user selects the option to connect to a group.
Precondition	WiFi adaptor of the device is active
Basic Path	1. The user selects the option to connect to an existing group. 2. The application scans the periphery and lists out the groups in the area. 3. The user selects the group which he wants to join, and is asked to enter the passkey for the same. 4. The application then verifies the users credentials and notifies the user if the connection is successful. 5. The application also sends a notification to the owner of the group about the addition of a member to the group.
Alternate Path	1. In step 1, if the WiFi modem is switched off,alert the user and request him to turn on the WiFi modem. 2. In step 2, if there are no groups in the area, alert the user that there are no groups in the area and exit the use case flow. 3. In step 3, if the user fails to enter the passkey alert the user that the passkey is mandatory to connect to the group.
Post Condition	The user has coonnected to an existing group using the valid passkey
Exception Path	if the application fails to connect to the network, notify the user about the same and restart the use case work flow from step 2.
Other	A list of peers present in the group is maintained.

3.2.4 Transfer Files

Use Case Name	Transfer Files
Xref	2.2.4
Trigger	The user selects the option to transfer files.
Precondition	The user should be connected to and be a member of a group.
Basic Path	1. The user selects the option to transfer files. 2. The application then provides the user with a file picker to select the file(s) which he/she wants to transfer. 3. The user, once he selects the file(s), confirms the same by pressing the SEND button. 4. The application then attempts to send the file(s) across to all the devices in the group. The number of devices in any given group can range from 2 to n, the theoretical limit. 5. Upon completion of the transfer, the user is notified of the same. 6. The application also notifies the receivers of the file about the reception of files. Additional data such as the number of files, their size and the sender of the files will also be provided.
Alternate Path	1. In step 4, if the user is unable to open the selected files to compress them or if the compression fails, notify the user that the application is unable to open the requested file. 2. In step 4, if there are no members in the group (other than the user himself, who is the owner of the group), then notify the user that there are no members in the group. The application then breaks this use case work flow. 3. In step 5, if the transfer isnt complete due to technical glitches, the application attempts to restart the transfer and goes to step 4 of the basic path.
Post Condition	The files have been received by the peers and they are saved at respective folder
Exception Path	If the transfer fails user is notified and requested to try again
Other	None

3.2.5 Compress

Use Case Name	Compress
Xref	2.2.5
Trigger	The user selects the option to compress files.
Precondition	There should be space above a minimum threshold available on the device.
Basic Path	1. The user selects the option to compress a file. 2. The user is then asked to pick image(s) from the provided gallery. 3. The application then compresses the selected image(s) and saves a copy to the working folder of the application.
Alternate Path	1. In step 3, if the application fails to compress the image or save the image to the gallery, the user is notified about the same. The use case work flow then restarts from the beginning. 2. In step 2, if the file is already compressed, then it is not recompressed. The application exits this work flow without proceeding to step 3.
Post Condition	The chosen file(s) is compressed and saved to the working directory.
Exception Path	If the compression failed, the user is notified and requested to try again. If there is no sufficient storage space the compressed image will not be saved and user will be notified.
Other	None

3.2.6 View Files

Use Case Name	View Files
Xref	2.2.6
Trigger	The user selects the option to view the compressed files.
Precondition	None.
Basic Path	1. The user selects the option to view the files. 2. The application then provides the user with a file picker, and he can then view, delete or choose to send the already compressed image(s).
Alternate Path	None.
Post Condition	None.
Exception Path	None.
Other	None

3.2.7 Camera

Use Case Name	Camera
Xref	2.2.7
Trigger	The user selects the capture image option instead of selecting an image from his local storage when he is asked to choose a file.
Precondition	None.
Basic Path	1. The user selects the camera menu. 2. The control is then handed over to the application registered to handle the event. 3. Once the user captures the image, Nucleus then asks the user whether he wants to discard the image and click another one, or continue with the same image. 4. If the user continues with the image, control is now handed over to the COMPRESS module.
Alternate Path	None.
Post Condition	None.
Exception Path	If the image is captured and there isn't enough storage capacity the user is notified
Other	None

3.2.8 Change Theme

Use Case Name	Change Theme
Xref	2.2.8
Trigger	The user selects the option to change the theme from the Settings Menu.
Precondition	None.
Basic Path	1. The user is selects the menu to change the theme of the application. 2. The user is then provided with the option to choose between a light and a dark theme. 3. Upon selection, the application restarts with the chosen theme. The default theme is the dark theme.
Alternate Path	None.
Post Condition	None.
Exception Path	None.
Other	None

4 Non-Functional Requirements

4.1 System Interfaces

This section provides a description of all inputs into and outputs from the system. It also gives a description of the hardware, software and communication interfaces and provides basic prototypes of the user interface.

4.1.1 User Interfaces

Depending on whether the user is the owner or a member of a group, they will be provided with different interfaces. An owner of a group will be provided with a page to input the group's name and passkey. Then the application can redirect them to their respective menus.

4.1.2 Hardware Interfaces

The devices on which Nucleus is installed do need camera and WiFi adapter interfaces. The application development will take place considering Android 2.2 (Froyo) as the base, and as such, the devices are expected to have at least Android 2.2 (Froyo) installed on them.

4.2 Design Constraints

This application will be developed using Java and XML. Adobe Illustrator and Adobe Photoshop would be used to work on the user interfaces. The tool used to create application mock ups would be Balsamiq. The Integrated Development Environment for the development of the application is Android Studio.

4.3 Assumption and Dependencies

- WiFi adapter should be available for the applications use.
- Application has read/write permissions to the devicess storage.
- Each group would only have one owner and the owner would be in charge of setting the passkey for authorization.