1. **Introduction**
   1. **Abstract**
      1. The following documentation will validate the unit, component, and system requirements as specified in the Business Requirements Document. Unit testing will offer the testing if individual program units. These units include routines, handlers, and individual functions. Component testing will offer the testing of the integrated units mentioned before to create composite components. It will focus on testing the component interfaces that provide access to component functions. System testing will be handled differently as it will focus on the full scope of the system in operation. Each functional requirement is tested, and the result is reported in order to verify the expected successful and unsuccessful behavior similarly as in unit and component testing.
2. **Unit**
   1. **Unit – Introduction**
      1. This section will focus on unit testing for the requirements and use cases specified in the Business Requirements Document (**2.3**) and (**3.3**). The units derive from the class objects defined in the Architecture and Design Documentation (**4.1.5**). First, all the controller class’s units will be tested. Then the units of the Session abstract class, SSHSession, SFTPSession, and SessionManager will be tested respectfully. The testing will not include activity initializers as they are handled by the android operating system and should not be called manually within the system. The tests will focus on the following:
         1. *Correct functioning of a method under normal operating conditions and expected input.*
         2. *Proper error handling of a method when invalid input is received, or an unexpected operating scenario of the software is encountered.*
   2. **Unit – Controller Testing**
      1. Main Controller
         1. Testing Unit – New Session Activity

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| Scope: | On the current instance of the main android-activity, the purpose of the goToNewSession(View view) method as it allows the user to create a new activity only based on the button that launched it. |
| Test Cases: | 1. The parameter passed is native to the main controller. (Test **2.1.1.1**) 2. The parameter passed is null. (Test **2.1.1.2**) |
| Test Results: | For both, the New Session activity was created an put on the android activity stack. |

* + - 1. Testing Unit – Update Session list in view

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| Scope: | The scope of this unit is to retrieve and update the main activity’s view with sessions pulled from the Session Manager. This is through the updateSessionList() method. |
| Test Cases: | 1. The method is called to refresh the view. (Test **2.1.1.1**) 2. The method is called with an empty list. (Test **2.1.1.2**) |
| Test Results: | In the case of 1, the method will update the view with the sessions pulled from the session manager. In the case of 2, the view of sessions will be blank. |

* + 1. New Session Controller
       1. Testing Unit – Session Creation with view’s inputs

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| Scope: | The scope of this unit is to create a new session by utilizing the inputs given from the view. This unit is invoked through the createSession(View view) method. |
| Test Cases: | 1. The credentials are valid to create a session. (Test **2.1.1.1**) 2. One or more credentials are invalid. (Test **2.1.1.2**) |
| Test Results: | In the case of 1, the activity will be presented with a “Connecting…” dialog to state the progress of the session and then immediately transfer the activity into the respective session activity. In the case of 2, the activity will create a dialog that states the exception/error back to the user and the system will continue functioning normally. |

* + 1. SFTP Controller

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| Scope: | Creating a transaction between the selected files in the view and the files. |
| Test Case: | 1. Selecting several files from the view and transmit them. (Test **2.1.1.1**) 2. Receiving files from the remote server on the device with limited space. (Test **2.1.1.2**) |
| Test Results: | For the first case, the files are transmitted successfully and may be edited on the remote end. For the second case, the system will terminate the transfer of the file that could not be downloaded onto the system. The system in both cases will continue functioning normally. |

* + - 1. Testing Unit – Starting a transaction
      2. Testing Unit – Verifying Permissions

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| Scope: | To verify if the system has permissions to read and write data from the device. |
| Test Case: | 1. The system does have permission to read and write file storage.   (Test **2.1.1.1**)   1. The system is denied permission to read and write on the device’s file storage. (Test **2.1.1.2**) |
| Test Results: | For the first case, the unit will not interfere with the view to request permissions from the user. For the second case, the android operating system will request permissions from the user. |

* + 1. SSH Controller

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| Scope: | This unit will forward the command to the SSHSession to process. |
| Test Case: | 1. The command is a valid shell command that can be interpreted by the remote server. (Test **2.1.1.1**) 2. The command is an invalid string. (Test **2.1.1.2**) |
| Test Results: | In the case of 1, the controller will pass the command and the remote server’s response is logged into the terminal. For case 2, the controller is passing the command to the remote server and the remote server responds to the string and logs the response to the terminal. |

* + - 1. Testing Unit – Send Command
  1. **Unit – Session Testing**
     1. SFTPSession
        1. Testing Unit – Thread Connecting

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| Scope: | The purpose of this unit to have a thread establish a connection with the remote server. |
| Test Case: | 1. The thread has established a successful connection when valid parameters are entered. (Test **2.1.1.1**) 2. The thread establishes a connection, but that connection is abruptly terminated. (Test **2.1.1.2**) |
| Test Results: | In the first case, the thread has established a connection with the remote server and has passed a null exception into the listeners. In the second case, the thread’s loop will terminate and invoke the onDisconnected() listeners. If the connection is terminated while uploading/downloading a file, a SftpException is thrown and caught by the thread. The exception is passed to the listeners and logged in the logger. |

* + 1. SSHSession
       1. Testing Unit – Getting Updates

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| Scope: | This unit will test the ability to pull updates from the remote server. |
| Test Case: | 1. Pull updated information on a connection that was established.   (Test **2.1.1.1**)   1. Attempt to pull updated information on a connection that was not established. (Test **2.1.1.2**) |
| Test Results: | For the first case, the updates from the getUpdates() method will pull any content added to the inbound IO stream and return them. For the second case, when the connection is not established, the inbound IO will not be closed, and the method will return an empty string. |

* + 1. SessionManager
       1. Testing Unit – Creating SFTP Session

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| Scope: | This unit will focus on pulling a list iterator from the collection of all sessions in the session manager. |
| Test Case: | 1. The parameters a valid. (Test **2.1.1.1**) 2. The parameters are invalid. (Test **2.1.1.2**) |
| Test Results: | The 1st case creates a new SFTPSession and returns that session after adding it to the active session list. The second case forces a JSchException that an invalid parameter has been entered which will be logged and passed up to the method that called it. |

1. **Component Testing**
   1. **Introduction** 
      1. This section will focus on component testing for the requirements and use cases specified in the Business Requirements Document (**2.3**) and (**3.3**). The components derived from the controllers interfacing with the Sessions as specified in the Architecture and Design Documentation (**4.1.7**). Every controller is paired with a session. The tests will focus on the following:
         1. *Correct functioning of a method under normal operating conditions and expected input.*
         2. *Proper error handling of a method when invalid input is received, or an unexpected operating scenario of the software is encountered.*
      2. SFTP Controller and SFTP Session
         1. Testing Component – User interface with the SFTP Session

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| Scope: | The scope is to test the relationship between the SFTP controller and the SFTP session provided within the controller. |
| Test Case: | 1. A select set of files to transfer to a remote server. (Test **3.1.1.1**) 2. Select several files, change directories, and select another set of files to transfer. (Test **3.1.1.2**) |
| Test Result: | For the first case, under normal conditions, the select files transferred and the highlighted files were reset. For the second case, the select files previous to the directory change were not included in the file transfer. |

* + - 1. Testing Component – User interface with the SSH session

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| Scope: | The scope is to test the relationship between the SSH controller and the SSH session provided within the controller. |
| Test Case: | 1. Send a valid command to the remote server for execution.   (Test **3.1.1.1**)   1. Send a command that will terminate the session. (Test **3.1.1.2**) |
| Test Result: | For case 1, the controller has sent a command through the SSH session class and immediately updates the result of the command into the terminal. For case 2, when a command was entered which terminates the session, the session will end and a dialog stating “Session lost connection” will appear. |

* + - 1. Testing Component – User interface with the Session Manager

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| Scope: | The scope is to test the relationship between the Main Controller and the Session Manager class. |
| Test Case: | 1. The session manager has active sessions to be displayed by the main controller. (Test **3.1.1.1**) 2. The session manager does not have any sessions for the main controller to display onto the view. (Test **3.1.1.2**) |
| Test Result: | For the first case, the main controller can pull the contents of the Session Manager for display. For the second case, the main controller will not present any interaction for the user to participate in; the user can only create a new session. |

1. **System Testing**
   1. **Introduction**
      1. This section will be reserved to test key functional requirements as given in the Business Requirement document. System testing will involve the full scope of the system. Each functional requirement is now tested, and the result is reported in order to verify the expected successful and unsuccessful behavior similarly to Unit and Component testing.
   2. **Functional Requirements**

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| **Business Requirement Code** | **Result** |
| **2.3.1.1** | The system does allow the ability to create new connections through the main view. |
| **2.3.1.2** | The system does present errors back to the user in the form of dialogs. |
| **2.3.1.2** | The system does handle permission requests and errors. |
| **2.3.2.1** | The system does continuously update new information. |
| **2.3.2.2** | The system does display all ongoing connections established through the main view. |