G51FSE Assessed Lab 4

The Assemblers with Flip-Flops   **04/05/2018**

Unit Testing

The following documentation contains details of the tests that we have created to test the different classes. We held our first group meeting on Tuesday 24th April 2018, where we discussed the various approaches we could take to carry out the project. Among the many ideas that were discussed, we decided to use GitHub to commit our projects online. On GitHub we created 6 branches so that everyone could save changes to their own local code repository. Once our tests were build, we merged it back to the master branch. In the duration of writing the tests and developing the documentation for the tests, all the team members kept pulling and committing their work to Git. This made it easier to work as a group as this improved traceability and visibility of the project.

As a group we also decided to use paired programming while developing the JUnit tests. Each pair was assigned a different class. Therefore, we met as pairs and developed the tests so that one person is at the machine typing while the other person work on the code. The pairs kept changing roles so that there is an equal amount of input by both individuals. On Friday 27th April 2018, we met again as a team. At this stage all the pairs have completed nearly half of the tests they were assigned. In this meeting we ensured that all the pairs were documenting their work and that they were following the correct layout and testing format that was discussed during the initial meeting.

All the documents contain a list of all the constants which we created for the tests. We created this to make the program more efficient and to have better readability. In addition to this, the document contains 3 different tables- test table, change log, and bug fix list. Test table contains details of all the tests that we created. Change log contains the details of all the changes we made to the program. Bug fix list contains a list of all the bugs we found in the code and contains details as to how we fixed it. While creating the tests and developing the program, all the members of the team kept updating the document so that all the information provided is accurate. All the tables contain unique ID's so that the tests, changes and bugs can be easily identified. This also makes it easier to cross-reference the values in other tables. Alongside this, in the change table we have included a Git commit ID so that we can easily trace back to the change that was made.

All tests were performed on both Windows and Linux-based machines throughout the test phase, however they were verified at the final stage on a Windows-based system. Line breaking conventions are platform-dependent; therefore, it is advised that tests are performed on machines with both OS architectures. We have attempted to address this issue by identifying the user's platform, accessing their respective line separator using a built-in method (System.lineSeparator();), assigning this to a constant and applying this wherever a line break is required. However, despite of this, we advise further tests are performed on both platforms.

More details on the tables and the formatting of the files can be found here. (https://github.com/psyar8/FSE_CourseWork_4)

Contents

Class	Section	Page Number
CompanyEmail	Notes	2
	Unit Tests	3
	Change Log Table	10
	Bug List	11
CompanyProject	Notes	12
	Unit Tests	13
	Change Table	27
	Bug List	28
CompanyEmailSystem	Notes	30
	Unit and Integration Tests	31
	Change Log Table	42
	Bug List	45

Email Class Unit Testing

The following tests use references to constants defined in the Junit test files at the start of the document. As such for easier comparison in the place the constants are defined below and are used in the Input, Expected Output and Actual Output columns to reduce repeating data and if the test inputs change in the future the document can be updated at a single point.

kSENDER = joe.bloggs@gmail.com
kBADEMAIL1 = joe.bloggs@
kBADEMAIL2 = joe.@bloggs
kBADEMAIL3 = joe.bloggs@gmail@.com
kBADEMAIL4 = @joe.bloggs@gmail.com
kRECIPIENT = max.power@live.com
kSUBJECT = "RE: Lorem Ipsum"
kBODY1 = "Lorem ipsum dolor sit amet, consecteutur adipiscing elit."
kBODY2 = "This is a test email for unit testing"
kBODY3 = ""
kBODY4 = "Test Email"
nullEmail (CompanyEmail Object)
populatedEmail (CompanyEmail Object)
noRecipientEmail (CompanyEmail Object)
noEmailBody (CompanyEmail Object)

Email Class Unit Testing

Test ID	Function Name	Test Aim (From perspective of method/how method handles this)	Source: Spec or code inspection	Test Created By	Pre-Requisites	Inputs (+ examples)	Expected Output(s)	Actual Output	Pass / Fail	Date	Tested By	Notes (Questions/Assumptions)
101	Default Constructor	To see how the method will react when no variables are passed to the constructor.	Class Document	Ram Raja	N/A	N/A	Initialises an email ready for populating.	Stack overflow error	FAIL	26/04/2018	Ram Raja	Error as "emailMessage()" method returns itself rather than the variable "emailMessage".
								Initialised object	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE101 BUG102
102	Main Constructor	To see how the method will react when receiving all four string parameters in correct form.	Class Document	Ram Raja	N/A	Sender's Email: kSENDER Recipient's Email: kRECIPIENT Subject: kSUBJECT Email Body: kBOD1	Initialises an email ready to be sent, with a sender's email, recipient's email, subject and body	Stack overflow error	FAIL	26/04/2018	Ram Raja	Error as "emailMessage()" method returns itself rather than the variable "emailMessage".
								Initialised object with correct values that were passed	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE101 BUG102
103	Main Constructor	To test interactivity between both the Default and Main Constructor when all parameters are not populated. In this case all but the recipient's email has been given.	Code Inspection	Ram Raja	N/A	Recipient's email is null.	Initialises an email with all but the recipient's email given, ready to be populated.	Stack overflow error as	FAIL	26/04/2018	Ram Raja	Error as "emailMessage()" method returns itself rather than the variable "emailMessage".
								Initialised object without email	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE101 BUG102

104	Main Constructor	To test interactivity between both the Default and Main Constructor when only one parameter is given, in this case the sender's email.	Code Inspection	Athullya Roy	N/A	**Sender's Email:** **kSENDER**	Initialises an email with the sender's email; with recipient's email, subject and body as null, ready to be populated.	Stack overflow error	FAIL	26/04/2018	Ram Raja	Error as "emailMessage()" method returns itself rather than the variable "emailMessage".
								Initialised object with just senders email set	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE101 BUG102
105	Getter for Sender's email address	To ensure the getter outputs the sender's email when specified.	Class Document	Ram Raja	N/A	**Sender's Email:** **kSENDER**	Returns the sender's email as a string.	The given sender's email is returned.	PASS	26/04/2018	Ram Raja	
106	Getter for Sender's email address	To test how the method will respond when the sender's email is not set.	Class Document	Athullya Roy	N/A	N/A	Returns sender's email as null.	The sender's email is returned as null.	PASS	26/04/2018	Ram Raja	
107	Getter for Recipient's Email Address	To ensure the getter outputs the recipient's email when specified.	Class Document	Ram Raja	N/A	**Recipient's Email:** **kRECIPIENT**	Returns the recipient's email as a string.	The given recipient's email is returned.	PASS	26/04/2018	Ram Raja	
108	Getter for Recipient's Email Address	To test how the method will respond when the recipient's email is not set.	Class Document	Athullya Roy & Ram Raja	N/A	N/A	Return's recipient's email as null.	The recipient's email is returned as null.	PASS	26/04/2018	Ram Raja	
109	Getter for Subject Line	How the method will respond when there is a subject line.	Class Document	Athullya Roy & Ram Raja	N/A	**Subject:** **kSUBJECT**	**kSUBJECT**	**kSUBJECT**	PASS	26/04/18	Athullya Roy	

110	Getter for subject Line	How the method will respond when there is no subject line	Class Document	Athullya Roy & Ram	N/A	null	null	null	PASS	26/04/18	Athullya Roy	
111	Getter for Email body	How the method will respond when body text has been given.	Class Document	Athullya Roy & Ram	N/A	**Message:** **kBODY1**	**kBODY1**	Stack over flow	FAIL	26/04/18	Athullya Roy	StackOverFlow error
								kBODY1	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE101 BUG102
112	Getter for Email body	How the method will respond when there is no body text	Class Document	Athullya Roy & Ram	N/A	null	null	Stack overflow error	FAIL	27/04/18	Athullya Roy	StackOverFlow error
								Null	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE101 BUG102
113	Setter for Senders Email	To see if it could take a string as a parameter, ensuring that it follows the email format	Class Document	Athullya Roy & Ram	N/A	**Sender:** **kSENDER**	null	null	PASS	27/04/18	Athullya Roy	
114	Setter for Senders Email	To check if class variable is set to null and it fails if invalid email address is entered.	Class Document	Athullya Roy & Ram	N/A	Joe.bloggs	Function returns false	Null	FAIL	27/04/18	Athullya Roy	Fails because it doesn't return the correct type. Also assumes fails means returning error message
								Function returns false	PASS	02/05/18	Athullya Roy	Passes because the function setFrom has been changed. See change CHGE104
115	Setter for Receivers Email	To see if it could take a string as a parameter, ensuring that it follows the email format	Class Document	Athullya & Ram	N/A	**Recipient:** **kRECIPIENT**	Null	Null	PASS	27/04/18	Athullya Roy	
116	Setter for Receivers Email	To check if class variable is set to null and it fails if invalid email address is entered.	Class Document	Athullya & Ram	N/A	"Max.power"	Warning Message – Return false	Null	FAIL	27/04/18	Athullya Roy	Fails because it doesn't return the correct type. Also assumes fails means returning error boolean value false.
								Function return False	PASS	02/05/18	Athullya Roy	Passes because the function setTo has been changed. See change CHGE104

#	Test	Description	Doc	Tester	Precondition	Test Data	Expected	Actual	Result	Date	Tester	Comments
117	Set method for Subject Line	To check if it takes a String as a parameter.	Class Document	Athullya & Ram	N/A	**Subject:** **kSUBJECT**	Null	Null	PASS	27/04/18	Athullya Roy	
118	Set method for Subject Line	To check if warning produced if null is passed.	Class Document	Athullya Roy & Ram	N/A	null	Warning Message – return false	null	FAIL	27/04/18	Athullya Roy	Fails because system doesn't respond to null being passed to function.
								Warning Message – return false	PASS	27/04/18	Athullya Roy	Fixed after changes made inn BUG103
119	Setter for Email Message Body (setMessage)	Test the method correctly sets the email message and then compare that to what is retrieved from getMessage method	Class Document	Aidan Reed & Ram Raja	Uses **noEmailBody** Object with Message set using setMessage method and **kBODY1** Constant	**Message:** **kBODY1**	**kBODY1** After calling the getMessage method once the message has been set	Stack overflow error	FAIL	26.04.2018	Aidan Reed	Unable to determine if message was set correctly as when trying to retrieve the message using emailMessage method received a stack overflow error.
								kBODY1	PASS	27/04/2018	Ram Raja	Test passed after change to code with ChangeID CHGE101 BUG102
120	Setter for Email Message Body (setMessage)	Test the method correctly sets the email message to an empty string "" and then compare that to what is retrieved from getMessage method	Class Document	Ram Raja & Aidan Reed	Uses **noEmailBody** Object with Message set using setMessage method and **kBODY3** Constant	**Message:** **kBODY3**	**kBODY3** After calling the getMessage method once the message has been set	Stack overflow error	FAIL	26.04.2018	Aidan Reed	Unable to determine if message was set correctly as when trying to retrieve the message using emailMessage method received a stack overflow error.
								kBODY3 i.e. an empty string	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE101 BUG102
121	Check Validity of Email Function (isValid)	Tests the email object with no attributes set in the constructor meaning they are null	Class Document	Aidan Reed & Ram Raja	Uses **nullEmail** Object	N/A	False	False	PASS	26.04.2018	Ram Raja	The worst case where no values are set
122	Check Validity of Email Function (isValid)	Tests the email object with All attributes set in the constructor	Class Document	Ram Raja & Aidan Reed	Uses **populatedEmail** object created with **kSENDER**, **kRECIPIENT**,	**Sender:** **kSENDER** **Recipient:** **kRECIPIENT**	True	True	PASS	26/04/2018	Aidan Reed	The best case where all values are set

					kSUBJECT, and **kBODY1** constants	**Subject:** **kSUBJECT** **Message:** **kBODY1**						
123	Check Validity of Email Function **(isValid)**	Tests the email object with one attribute set – the from address	Class Document	Aidan Reed & Ram Raja	Uses **nullEmail** object and setFrom method passing **kSENDER** constant	**Sender:** **kSENDER**	False	False	PASS	26.04.2018	Ram Raja	The following 4 tests of similar nature test the individual cases for each attribute to ensure all attributes are checked in the isValid Function
124	Check Validity of Email Function **(isValid)**	Tests the email object with one attribute set – the To address	Class Document	Ram Raja & Aidan Reed	Uses **nullEmail** object and setTo method passing **kRECIPIENT** constant	**Recipient** **kRECIPIENT**	False	False	PASS	26/04/2018	Aidan Reed	
125	Check Validity of Email Function **(isValid)**	Tests the email object with one attribute set – the Subject	Class Document	Aidan Reed & Ram Raja	Uses **nullEmail** object and setSubject method passing **kSUBJECT** constant	**Subject:** **kSUBJECT**	False	False	PASS	26.04.2018	Ram Raja	
126	Check Validity of Email Function **(isValid)**	Tests the email object with one attribute set – the message body	Class Document	Ram Raja & Aidan Reed	Uses **nullEmail** object and setMessage method passing **kBODY1** constant	**Message:** **kBODY1**	False	False	PASS	26/04/2018	Aidan Reed	
127	toString() override **(toString)**	Checks the toString override method returns a value of type string	Class Document	Aidan Reed & Ram Raja	Uses **populatedEmail** object created with **kSENDER**, **kRECIPIENT**, **kSUBJECT**, and	N/A	(String)	(String)	PASS	26.04.2018	Ram Raja	

#	Method	Description	Type	Testers	Setup	State	Expected	Actual	Result	Date	Tester	Comments
					kBODY1 constants							
128	toString() override **(toString)**	Checks the correct subject is returned when set during the test	Class Document	Ram Raja & Aidan Reed	Uses **nullEmail** object and setSubject method passing **kSUBJECT** constant	**Subject:** **kSUBJECT**	**kSUBJECT**	**kSUBJECT**	PASS	26/04/2018	Aidan Reed	
129	toString() override **(toString)**	Checks the correct subject is returned when set during the test to an empty string	Class Document	Aidan Reed & Ram Raja	Uses **nullEmail** object and setSubject method passing "" empty string	Subject: ""	"[no subject]"	"no subject"	PASS	26.04.2018	Ram Raja	
130	toString() override **(toString)**	Checks the correct subject is returned when not set i.e null	Class Document	Ram Raja & Aidan Reed	Uses **nullEmail** object	N/A	"[no subject]"	Null pointer exception	FAIL	26/04/2018	Aidan Reed	This fails as the method tries to return null as type string and causes a null pointer exception. Although the class description does not include this behavior the test was included to find potential bugs that cause the system to crass
								"[no subject]"	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE102
131	Check class member variables are private	Checks from address, to address, subject line and email message variables are all set to private	Code review	Ram Raja & Aidan Reed	N/A	N/A	True for all 4 variables	True	PASS	27.04.2018	Ram Raja	
132	Check validity of Full email in setFrom **(setFrom)**	Checks the validity of the email address instead of just checking for a @	Code Review	Ram Raja & Aidan Reed	Uses **nullEmail** object	**Sender** **kBADEMAIL1** **kBADEMAIL2** **kBADEMAIL3** **kBADEMAIL4**	Null when calling fromAddress	**kBADEMAIL1** **kBADEMAIL2** **kBADEMAIL3** **kBADEMAIL4**	FAIL	27/04/2018	Aidan Reed	
								Null	PASS	27/04/2018	Aidan Reed	Test passed after change to code with ChangeID CHGE103

| 133 | Check validity of Full email in setTo (setTo) | Checks the validity of the email address instead of just checking for a @ | Code Review | Ram Raja & Aidan Reed | Uses **nullEmail** object | **To**

kBADEMAIL1
kBADEMAIL2
kBADEMAIL3
kBADEMAIL4 | Null when calling toAddress | **kBADEMAIL1**
kBADEMAIL2
kBADEMAIL3
kBADEMAIL4 | FAIL | 27/04/2018 | Aidan Reed | |
| | | | | | | | | **Null** | PASS | 27/04/2018 | Aidan Reed | Test passed after change to code with ChangeID CHG003 |

Email Class Change Log

Change ID	GIT Commit ID	Bug ID	Description of Change	Files Changed	Date Received	Date Changed	Initiator By (Who Changed)	Change Checked By	Notes
CHGE101	D2c7cf7	BUG102	Return statement of emailMessage() getter method changed from "emailMessage()" method to "emailMessage" variable.	CompanyEmail (emailMessage)	26/04/2018	27/04/2018	Aidan Reed		Changed code removing method call and setting return value to emailMessage member variable
CHGE102	5aa2fcf	BUG103	Null Pointer exception when using toString when the subject has not been set. Add a condition to the method to check if null and print "[no subject set]" if null	CompanyEmail toString()	26/04/2018	27/04/2018	Aidan Reed		Added a null check to toString method to prevent null pointer exception
	2239fe2		The conditions for the if statement in the function toString has been reversed. It now checks if the string if null before checking if its an empty string. If its null, it goes onto execute the statements inside the if statement.	CompanyEmail	02/05/18	02/05/2018	Athullya Roy	Aidan Reed	
CHGE103	Edd9154	BUG101	SetTo and From methods check for @ in address but not position. Include regular expression to validate combinations of addresses. To do so I have added a new function called Email Parser which takes an address as input and returns true or false depending on whether it is valid or not. I have updated setTO and setFom methods to use the boolean result of email parser in the if statement	CompanyEmail	26/04/018	27/04/2018	Aidan Reed	Ram Raja	The regular expression included validates all possible combinations of emails. The set to and from methods were updated to include to call on this new regular expression and return a true or false value
CHGE104	4e4f97b	N/A	The return value of the functions setTo and setFrom has been changed from void to Boolean. It now returns true if the email format is correct and false if its incorrect.	CompanyEmail	27/04/2018	02/05/2018	Athullya Roy	Aidan Reed	See test IDs 114 and 116

Email Class Bug Fix List

Problem ID	Problem Description	Line of code -	Test ID (if created)	Change ID	Proposed Fix	Priority High, Med, Low	Date Problem identified	Fixed? (Yes / No)	Date Problem fixed	Who identified/fixed the test?	Who Fixed it	Does the bugged code relate to other functions?	Notes
BUG 101	The setFrom() and setTo() email methods only check for a "@" being present in the entered string, not at any specific position. Therefore, an incorrect email address could be entered. i.e. "psyrr1nottinghamac.uk@"	Lines 65-71 Lines 87-93	132 133	CHGE103	Specify clearly where the @ should be.	Med	09/03/2018	Yes	27/04/2018	Ram Raja	Aidan Reed	N.A	Added new method email parser to validate emails using regular expressions
BUG 102	emailMessage() method returns itself, not the value stored in the variable "emailMessage". The method should be performing as a getter for the variable "emailMessage".	Lines 46-48	101 102 103 104 111 112 119 120	CHGE101	Change return statement to the variable "emailMessage", instead of the method "emailMessage()".	High	26/04/2018	Yes	27/04/2017	Ram Raja Athullya Roy Aidan Reed	Aidan Reed	Both main and default constructors within the CompanyEmail class.	Found whilst performing tests on default/main constructors, Test IDs 101-104 – Ram Raja Found this when performing tests 119-120 -Aidan Reed
BUG 103	Null Pointer exception when trying to print the subject of a email that has not been set	Line 138	130	CHGE102	Perform a check to see if the member variable is null and return the no subject string	High	26.04.2018	Yes	27/04/2018	Aidan Reed	Aidan Reed	N/A	Although the class description does not include this behavior the test was included to find potential bugs that cause the system to crash 27/04/2018 – Added OR condition to toString if statement

Project Unit Testing

The following tests use references to constants defined in the Junit test files at the start of the document. As such for easier comparison in the place the constants are defined below and are used in the Input, Expected Output and Actual Output columns to reduce repeating data and if the test inputs change in the future the document can be updated at a single point.

kPTITLE1 = "12345678"
kPTITLE2 = "123456789000"
kDEFAULTTITLE = "New Project"
kCONTACT1 = "test@gmail.com"
kCONTACT2 = "raiu9s@gmail.com"
kCONTACT3 = q39ikdf@outlook.com
companyProjectFirst_Empty (CompanyProject Object)
companyProjectSecond_Phases (CompanyProject Object) – Empty used for testing the phases
companyProjectThird_Complete(CompanyEmail Object) – Title: **kPTITLE1** Contacts: **kCONTACT1, kCONTACT2, kCONTACT3**)
companyProjectForth_Phases (CompanyProject Object) – Used for phase testing adding emails and moving between stages

Project Unit Testing

Test ID	Function Name	Test Aim	Source: Spec or code inspection	Test Created By	Pre-Requisites	Inputs	Expected Output(s)	Actual Output	Pass / Fail	Date (Completed)	Tested By	Notes
201	Company Project Constructor	Checks if default constructor sets up correctly with array lists initialized	Class Document	Justin Ng & Christian Stubbs	Uses **companyFirst_Empty** object no values have been set	N/A	1 (Int) - PID **kDEFAULT TITLE** (String) True (Boolean) -Empty Contacts 0 (Int) - PhaseID 0 (Int) – Number Emails	1 (Int) - PID **kDEFAULT TITLE** (String) True (Boolean) - Empty Contacts 1 (Int) - PhaseID 0 (Int) – Number Emails	FAIL	27.04.2018	Christian Stubbs	The test failed as the output for the phase id was initialized to 1 not the start of the array bug created– JNG
								Same as above with Phase ID = 0 (INT)	PASS	02/05/2018	Aidan Reed	The test ow produces the correct output after the BUG201 and CHGE201 were acted up on. AR – 02/05/2018

13

| 202 | Company Project Constructor | Checks if main constructor sets up correctly with title parameter passed | Class Document | Justin Ng & Christian Stubbs | Uses **companyFirst _Empty** object no values have been set | N/A | 3 (Int) - PID **kPTITLE1 TITLE** (String) False (Boolean) -Empty Contacts 0 (Int) - PhaseID 0 (Int) – Number Emails | 3 (Int) - PID **kPTITLE1 TITLE** (String) False (Boolean) - Empty Contacts 1 (Int) - PhaseID 0 (Int) – Number Emails | FAIL | 30.04.2018 | Christian Stubbs | The test failed as the output for the phase id was initialized to 1 not the start of the array bug created– CS |
| | | | | | | | | Same out put as above apart from Phase ID was 0 (Int | PASS | 02/0/.2018 | Aidan Reed | The test ow produces the correct output after the BUG201 and CHGE201 were acted up on. AR – 02/05/ 2018 |

14

203	getPID	Checks if the correct project ID is returned when a project is 1st created	Class Document	Justin Ng & Christian Stubbs	Uses **companyFirst _Empty** object no values have been set	N/A	1 (Int)	1 (Int)	PASS	25.04.2018	Christian Stubbs	
204	getPID	Checks if the project ID increments correctly with the addition of two new projects	Class Document	Justin Ng & Christian Stubbs	Uses **companyThird _Complete** object	N/A	3 (Int)	3 (Int)	PASS	27.04.2018	Christian Stubbs	Objects for these tests are created using the before class when the unit test is initiated
205	getPTitle	Checks if the correct project Title is returned when a project is 1st created	Class Document	Justin Ng & Christian Stubbs	Uses **companyFirst _Empty** object	N/A	**kPDEFAULTTIT LE** (String)	**kDEFAULT TITLE** (String)	PASS	25.04.2018	Christian Stubbs	
206	setPTitle	Checks if it is possible to set a project title which is less than 10 characters long	Class Document	Justin Ng & Christian Stubbs	Uses **companyFirst _Empty** object set title method and **kPTITLE1**	**kPTITLE1** (String)	**kPDEFAULTTIT LE** (String)	**kPDEFAULT TITLE** (String)	PASS	25.04.2018	Christian Stubbs	

207	setPTitle	Checks if it is possible to set a project title which is more than 10 characters long	Class Document	Justin Ng & Christian Stubbs	Uses **companyFirst_Empty** object set title method and **kPTITLE2**	**kPTITLE2** (String)	**kPTITLE2** (String)	**kPTITLE2** (String)	PASS	25.04.2018	Christian Stubbs	
208	isContact	Checks if specified contact exists in project	Class Document	Justin Ng & Christian Stubbs	Uses **companyFirst_Empty** object	**kCONTACT1** (String)	False (Boolean)	False (Boolean)	PASS	25.04.2018	Christian Stubbs	
209	isContact	Should add new contact then check if it can be read back	Class Document	Justin Ng & Christian Stubbs	Uses **companyFirst_Empty** object and add contact method	**kCONTACT1** (String)	True (Boolean)	True (Boolean)	PASS	25.04.2018	Christian Stubbs	
210	addContact	Should be able to add two new contacts and use isContact to check if they exist in the Array List	Class Document	Justin Ng & Christian Stubbs	Uses **companyFirst_Empty** object and add contact method	**kCONTACT2** (String) **kCONTACT3** (String)	True (Boolean) True (Boolean)	True (Boolean) True (Boolean)	PASS	25.04.2018	Christian Stubbs	
211	getEmailForPhase	Tests to see if the function returns the emails in the current phase of a new project with no emails.	Class Document	Christian Subbs	Uses **companyForth_Phases**	N/A	0 (Int)	0 (Int)	PASS	27.04.2018	Christian Stubbs	

16

212	getEmailForPhase	Tests to see if the function returns the emails in the current phase of a new project after adding one email	Class Document	Christian Stubbs & Justin Ng	Uses **companyForth_Phases** and adds email with **kSENDER, kRECPIENT, kSUBJECT, kBODY**	N/A	1 (Int)	1 (Int)	PASS	27.04.2018	Justin Ng	
213	getEmailForPhase	Tests when moving to next stage email count is 0 when moving to next stage after adding 1000 emails at the previous stage	Class Document	Christian Stubbs & Justin Ng	Uses **companyForth_Phases** and adds 1000 email with **kSENDER, kRECPIENT, kSUBJECT, kBODY**	N/A	0 (Int)	Error: null pointer	FAIL	02.05.2018	Justin Ng	This fails due to a bug in the program where the array list is not initialized at the next stage. See BUG204
								0 (Int)	PASS	03.05.2018	Justin Ng	After the changes made in BUG204 the null pointer exception no longer appears
214	getEmailForPhase	Iterates through the phases creating emails for each phase checking the size is equal to the number created and cycling through all stages – each stage has different number of emails	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth_Phases** and adds 0 – first stage 1 – second – 2 third – 3 forth – 4 fifth and 5 in 6th STAGE	Each stage should have the number of emails outlined in pre requisite column	0 1 2 3 4 5	Error: Null pointer exception	FAIL	02.05.2018	Justin Ng	This fails due to a bug in the program where the array list is not initailsed at the next stage. See BUG204
								0 1 2 3 4 5	PASS	03.05.2018	Justin Ng	After the changes made in BUG204 the null pointer exception no longer appears

215	getEmailsForPhase(**int** thePhase)	Test to see if this function returns a value of 0 when accessing a new project in the first phase	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth_Phases** with no emails in first phase (0)	N/A	0 (Int)	Error: Null pointer exception	FAIL	02.05.2018	Justin Ng	Failed initially because the constructor initializes the Emails array at value 1 not 0 – see BUG201
							0 (Int)	PASS	03.05.2018	Justin Ng	The test passes after the BUG201 was rectified. See Change ID for bug for futher details.
216	getEmailsForPhase(**int** thePhase)	Iterates through all phases adding emails at each stage and moving to the next phase in the outer loop moves to the next stage and checks the previous stage	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth_Phases** adds 0 – first stage 1 – second – 2 third – 3 forth – 4 fifth and 5 in 6th STAGE	Each stage should have the number of emails outlined in pre requisite column	0 1 2 3 4 5	Error: Null pointer exception	FAIL	02.05.2018	Justin Ng	This fails due to a bug in the program where the array list is not initialised at the next stage. See BUG204
							0 1 2 3 4 5	PASS	03.05.2018	Justin Ng	The test passes after the BUG201 was rectified. See Change ID for bug for further details.
217	getEmailsForPhase(**int** thePhase)	Adds email to first phase and then moves to next stage and checks the previous stage size is equal to 1	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth_Phases** and adds email with **kSENDER,**	N/A	1 (Int)	Error: Null pointer exception	FAIL	02.05.2018	Justin Ng	Failed initially because the constructor initializes the Emails array at value 1 not 0 – see BUG201

					kRECPIENT, kSUBJECT, kBODY			1 (Int)	PASS	03.05.2018	Justin Ng	The test passes after the BUG201 was rectified. See Change ID for bug for further details.
218	nextPhase()	Tests to ensure the function moves a project from it's initial stage to the next phase once	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth_Phases**	N/A	1 (Int)	2 (Int)	FAIL	02.05.2018	Justin Ng	Failed initially because the constructor initializes the ProjectPhase to 1
								1 (Int)	PASS	03.05.2018	Justin Ng	This test further identified issues that were found in constructor tests. Issue was fixed by fixing BUG201
219	nextPhase()	Test moves a project from the initial stage until the last stage and ensures it's phase id is 5 -phases 0 - 5	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth_Phases**	N/A	5 (Int)	7 (Int)	FAIL	02.05.2018	Justin Ng	Failed because the PhaseID is initialized to 1 not 0 – Arrays go from 0 – 5 in this implementation and because the project phase is incremented before checking
								5 (Int)	PASS	03.05.2018	Justin Ng	Test now produces the successful result as a result of the issue been fixed in the constructor in BUG201 and BUG202 the issue was fixed

220	nextPhase()	Test moves project to final stage and tries to go past the final stage	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth _Phases**	N/A	5 (Int)	7 (Int)	FAIL	02.05.2018	Justin Ng	The reason this failed is because the project phase is incremented before the conditional check
								5 (INT)	PASS	03.05.2018	Justin Ng	After the implementation of changes in BUG202 the projects cannot move past the last phase. AR – 03.05.2018
221	getPhaseName e	Will see if the correct name of the first phase is returned	Code Inspection	Christian Stubbs & Justin Ng	Uses **companyForth _Phases** object with no emails added in initial stage	N/A	Feasibility	Design	FAIL	02.05.2018	Justin Ng	The test fails as it appears to miss the first stage of names form the project phases array – JNG 02.05.2018
								Feasibility	PASS	03.05.2018	Justin Ng	The initialization of project set the phase to 1 instead of 0 – as such the fixes in BUG 201 have rectified this issue – JNG 03.05.2018
222	getPhaseName e	Will see if the correct name of phase is returned on the second phase after moving along 1 phase	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth _Phases** object with no emails moved to next stage	N/A	Design	Implementati on	FAIL	02.05.2018	Justin Ng	The test fails as it appears to miss the first stage of names form the project phases array – CS 02.05.2018

ID	Method	Description	Reference	Tester	Test Data	Input	Expected	Actual	Result	Date	Tester	Comments
								Design	PASS	03.05.2018	Justin Ng	The initialization of project set the phase to 1 instead of 0 – as such the fixes in BUG 201 have rectified this issue
223	getPhaseName	Will see if the last name of phase is returned even though attempted moving past the last phase	Class Documents	Christian Stubbs & Justin Ng	Uses **companyForth _Phases** object with no emails moved to next stage	N/A	Completed	Null	FAIL	02.05.2018	Justin Ng	The test fails as it appears to miss the first stage of names form the project phases array
								Completed	PASS	03.05.2018	Justin Ng	The initialization of project set the phase to 1 instead of 0 and the next phase method allowed the phase id to move past the end of the project phases array. When BUG201 and BUG202 were fixed the system produced the correct result.
224	Get Phase ID	Checks if the correct phase ID is returned when a project is 1st created - should be	Class Documents	Aidan Reed & Christian Stubbs	Uses **companyFirst _Empty** object	N/A	0	1 (Int)	FAIL	25.04.2018	Christian Stubbs	This is because the constructor initialises it to 1 instead of 0

							Result				
		initialized to represent start of array						0 (Int)	PASS	03.05.2018	Christian Stubbs	Following the changes made to resolve Bug 201 the initial id is now correct
225	Get Phase ID	Checks if the correct phase ID is returned when project is moved from the 1st stage to the next	Class Document	Aidan Reed & Christian Stubbs	Uses **companyFirst _Empty** object and moves to next stage	N/A	1 (Int)	2 (Int)	FAIL	25.04.2018	Christian Stubbs	The tests fails for the same reasons test 224 fails for relating to BUG201
								1 (Int)	PASS	03.05.2018	Christian Stubbs	After Justin made the amendments for BUG201 the system now produces the correct result – CS 03.05.2018
226	Get Phase ID	Checks the phase ID moving the project through all stages	Code Inspection	Aidan Reed & Christian Stubbs	Uses **companySecond _Phases** object and checks id at all stages	N/A	0 1 2 3 4 5	1 2 3 4 5 6	PASS	25.04.2018	Christian Stubbs	The phase ID is one off in all stages due to a bug logged as BUG201.
								0 - 5	PASS	03.05.2018	Christian Stubbs	Produces correct output after bug fix CS – 03.05.2018

227	Get Phase ID	Checks if the correct phase ID is returned when project attempted to be moved passed 6th stage	Class Document	Aidan Reed & Christian Stubbs	Uses **companySecond _Phases** object and moves to last stage using for loop	N/A	5 (Int)	7 (Int)	FAIL	25.04.2018	Christian Stubbs	Fails due to BUG201 and because the next phase is incremented before it is checked BUG202
								6 (Int)	FAIL	02.05.2018	Christian Stubbs	Test still fails due to a bug in comparison of nextPhase – BUG202 see changelog for bug for more information
								5 (Int)	PASS	03.05.2018	Christian Stubbs	Passes after later change made for BUG202 – Change ID 202
228	Get Phase ID	Checks if the correct phase ID is returned when project is moved from the last stage to the previous	Class Document	Aidan Reed & Christian Stubbs	New Project Object	N/A	4 (Int)	7 (Int)	FAIL	25.04.2018	N/A	Currently no functionality to go to previous stage. Feature Not implemented – Test commented out on line 512 – CS 03.05.2018
229	Get Project Contacts	Checks if the get project contacts method returns an object of type array list	Class Document	Aidan Reed & Justin Ng	Uses **companyFirst _Empty** object	N/A	(Array List) Instance of Array List = true	Instance of Array List = true	PASS	25.04.2018	Justin Ng	

230	Get Project Contacts	Checks the get project contacts method returns a string equal to the first element input using the add contact method	Class Document	Aidan Reed & Justin Ng	Uses **companyThird _Complete** object which has 3 contacts kCONTACT 1/2/3	**kCONTACT1** (String)	**kCONTACT1** (String)	**kCONTACT1** (String)	PASS	25.04.2018	Aidan Reed	Note the constant for the input is named : kCONTACT1 located in top of unit test
231	Get Project Contacts	Checks the type of the first element added into the contacts array list is of type string	Class Document	Aidan Reed & Justin Ng	Uses **companyThird _Complete** object which has 3 contacts kCONTACT 1/2/3	**kCONTACT1** (String)	(String)	(String)	PASS	25.04.2018	Justin Ng	
232	toString Overide	Checks the type of the return value is of type string	Class Document	Aidan Reed & Justin Ng	Uses **companyFirst _Empty** object	N/A	(String)	(String)	PASS	25.04.2018	Aidan Reed	
233	toString Overide	Checks the toString is in the format Project Title [Phase Name]	Class Document	Aidan Reed & Justin Ng	Uses **companyThird _Complete** object with title **kPTITLE1** with the	N/A	"**kPTITLE1** [Feasibility]" (String)	"**kPTITLE1** [Design]"	FAIL	25.04.2018	Justin Ng	kPTITLE1 is a constant defined in the unit test. Fails due to BUG201 where phase id is 1 not 0 and misses the first element from project phases

							Expected	Actual	Result	Date	Tester	Comments
					phase in the initial stage			"**kPTITLE1** [Feasibility]"	PASS	03.05.2018	Justin Ng	After the code was reviewed and bug 201 was fixed the test produces correct result. Will update unit test comments
234	toString Overide	Checks the toString is in the format Project Title [Phase Name] for all stages of the project lifecycle	Class Document	Aidan Reed & Justin Ng	Uses **companyThird _Complete** object with title **kPTITLE1** with the phase in the initial stage but will be incremented to the last stage	N/A	"**kPTITLE1** [Feasibility]" "**kPTITLE1** [Design]" "**kPTITLE1** [Implementation]" "**kPTITLE1** [Testing]" "**kPTITLE1** [Deployment]" "**kPTITLE1** [Completed]" All of type (String)	"**kPTITLE1** [Design]" "**kPTITLE1** [Implementation]" "**kPTITLE1** [Testing]" "**kPTITLE1** [Deployment]" "**kPTITLE1** [Completed]" Missing the first stage	FAIL	25.04.2018	Aidan Reed	All constants used are defined in this document above this table and also at the beginning of the Unit tests. The test fails because of an issue with the phase id which results in the wrong phase name been pulled back – AR 25.04.2018

								Same as expected result	PASS	02.05.2018	Aidan Reed	Fixed following changes on 02.05.2018 by Justin

Project Change Log

Change ID	Bug ID	GIT Commit ID	Description of Change	Files Changed	Date Received	Date Changed	Initiator By (Who Changed)	Change Checked By	Notes
CHGE 201	BUG 201	f51dc08	The ProjectPhase is to be set to 0 in both CompanyProject constructors so that "Feasibility" is not skipped in CompanyEmailSystem	CompanyProjcet.java (line 23)	02.05.2018	02.05.2018	Justin Ng	Aidan Reed	
CHGE 202	BUG 202	f51dc08	The comparison statement is changed to be compared to the length of project phases - 1 and the project phase incrementor was moved inside the else statement	CompanyProjcet.java (line 91 & line 94)	02.05.2018	02.05.2018	Justin Ng	Aidan Reed	The change didn't fully resolve the issue as the project could still go past the end of the array because the conditional was not >= - AR 02.05.2018
		fbea9fd	The conditional only checked when the phase was greater than which resulted in the phase going 1 past the length of the array. The conditional should include a = parameter for greater or equals.	CompanyProjcet.java (line 91 & line 94)	02.05.2018	02.05.2018	Justin Ng	Aidan Reed	This now passes the test and ensures the phase does not go past the end of the projects array. - AR 02.05.2018
CHGE203	BUG 204	ca6ce13	Add a statement to initialize the next phase of the ProjectEmail array list after the phase has been checked and incremented	CompanyProjcet.java (line 94-95)	02.05.2018	03.05.2018	Justin Ng	Christian Stubbs	The change included a new line of code after changing phases to initialize the next part of the array list. – CS 03.05.2018

27

Project Bug List Fix

Problem ID	Problem Description	Line of code	Test ID (if created)	Change ID	Proposed Fix	Priority High, Med, Low	Date Problem identified	Fixed? (Yes/No)	Date Problem fixed	Who identified/fixed the test?	Does the bugged code relate to other functions?	Notes
BUG 201	Project Phase Name set to Design when created instead of Feasibility - This also impacts the default constructor and Phase ID tests	Line 23 & 38: Company Project.class	201 202	CHGE201	Set the Project phase to 0 more details in CHGE201	Med	25.04.2018	YES	02.05.2018	Justin NG	N/A	The tests listed in test id are tests that first outlined this bug.
BUG 202	Project Phase ID goes over the number of different phases when going to next stage.	Lines 97-105: Company Project.class	219	CHGE202	Move the phase++ inside the else clasue and change condition to length - 1	Med	25.04.2018	YES	02.05.2018	Aidan Reed / Christian Stubbs	N/A	The initial fix put in place did not fully fix the issue as the project phase was still incremented before the condition. After the second amendment the code was correct. – AR 02.05.2018
BUG 203	No method to go to previous phase inside the CompanyProject Class					Low	25.04.2018			Aidan Reed	N/A	Low priority as description does not directly say such functionality should exist but was flagged during testing as test failed. This has been put on hold to be included in next

											iteration for manageability with new features
BUG204	When moving the project to the next stage the program fails with a null pointer exception when adding an email. This is because the constructor only initializes the first part of the Projects email array.	Line 102: CompanyProj ect. Class	213	CHGE203	Add a statement to initialize the current phase after it has moved	High	02.05.2018	YES	03.05.2018	Christian Stubbs	N/A	

Company Email System Unit / Unit Testing

The following tests use references to constants defined in the Junit test files at the start of the document. As such for easier comparison in the place the constants are defined below and are used in the Input, Expected Output and Actual Output columns to reduce repeating data and if the test inputs change in the future the document can be updated at a single point.

All constants referenced in the test tables are in bold and red.

kSYSTEM_LINE_BREAK = System.lineSeparator();
kPTITLE1 = "Email System";
kDEFAULTTITLE = "New Project";
kSENDER = "joe.bloggs@gmail.com";
kRECIPIENT = "max.power@live.com";
kCONTACT1 = "test@gmail.com";
kCONTACT2 = "raiu9s@gmail.com";
kCONTACT3 = "q39ikdf@outlook.com";
kBADEMAIL1 = "joe.bloggs@";
kBADEMAIL2 = "joe.@bloggs";
kBADEMAIL3 = "joe.bloggs@gmail@.com";
kBADEMAIL4 = "@joe.bloggs@gmail.com";
kSUBJECT = "RE: Lorem ipsum";
kBODY1 = "Lorem ipsum dolor sit amet, consectetur adipiscing elit.";
kBODY2 = "This is a test email for using unit testing";
kBODY3 = "";
kBODY4 = "Test Email";

To provide input into the system we have used two different approaches. The first approach is to create an input stream and then launch the main method. This is primarily used for testing the menu options of the system. The second approach used is to create a scanner object with a string inside and then pass this directly to the method. The string contains new line characters to simulate multiple user inputs for example: sysInput = "\n" + kSENDER + kSYSTEM_LINE_BREAK + kRECIPIENT + kSYSTEM_LINE_BREAK + kSUBJECT + kSYSTEM_LINE_BREAK + kBODY1;

Company Email System Unit / Unit Testing

Test ID	Function Name	Test Aim	Source: Spec or code inspection	Test Created By	Prerequisite	Inputs	Expected Output(s)	Actual Output	Pass / Fail	Date (Completed by)	Tested By	Notes
301	Main Method	Testing the user sees the correct menus when not in a project.	Class Description	Aidan Reed & Athullya Roy	N/A	N/A	A list of user options: • See a list of projects • Add a new project • Viewing a project • Exit the system	A list of user options: • See a list of projects • Add a new project • Viewing a project • Exit the system	PASS	01/05/2018	Athullya Roy	
302	Main Method	Ensures the system exists at the main menu when user types X	Class Description	Aidan Reed & Athullya Roy	Create input streams and buffer the required inputs before launching main	"X"	System should output Good Bye!	Good Bye!	PASS	01/05./2018	Athullya Roy	
303	Main Method	Tests the ArrayList can grow to large size	Class Description	Aidan Reed & Athullya Roy	Create 10,000 Projects after initializing project array	N/A	When checking size of array list should be 10000	Error: Complication	FAIL	01/05/2018	Athullya Roy	Error: Complication Error method is not public and Projects array is not public
								Error: No Line found	FAIL	02/05/2018	Athullya Roy	Failure: no line found CompanyEmailSystem - 112
								10000	PASS	03.05.2018	Athullya Roy	Passed after adding a new line to the input stream before hand

ID	Name	Description	Type	Testers	Steps	Input	Expected Output	Actual Result	Status	Date	Tester	Notes
												full notes can be found under BUG301
304	List Project	Checks that the function returns the correct number of projects created	Class Description	Aidan Reed & Athullya Roy	Initialize the Projects array and add 5 emails with constant **KPTITLE1 +** I the index of for loop	**KPTITLE1 + I** the index of for loop to create the projects	The list of projects in the format: 1) **kPTITLE1 + I** [Design] – 0 emails]	Error: Complication Error: No Line found	FAIL	01/05/2018	Aidan Reed	Error: Complication Error method is not public
								Error: No Line found	FAIL	02/05/2018	Aidan Reed	Failure: no line found CompanyEmailSystem – 112
								5 Emails created in expected output format	PASS	03.05.2018	Aidan Reed	Passed after adding a new line to the input stream before hand full notes can be found under BUG301
305	List Project	Checks projects are listed correctly with the correct stages and email count. 6 projects should be created one for each phase each with 0 email counts	Class Inspection	Aidan Reed & Athullya Roy	Creates 6 email projects and sets the correct phase	N/A	1) **kPTITLE**1 + I [Feasibility] – 0 Emails 2) **kPTITLE1** + I [Design] – 0 Emails	Error: Complication	FAIL	01/05/2018	Athullya Roy	Error: Complication Error method is not public
								Error: No Line found	FAIL	02/05/2018	Athullya Roy	Failure: no line found CompanyEmailSystem – 112 see BUG301
								... 0emails	FAIL	03/05/2018	Athullya Roy	No space between count and word emails – logged
								Expected Result	PASS	03.05.2018	Athullya Roy	After changes were made relating to BUG303 the system now produces string in correct format
306	List Project	Checks the correct formatting when	Code Inspection		Creates 1 project and	N/A		Error: Complication	FAIL	01/05/2018	Aidan Reed	Error: Complication Error method is not public

				Aidan Reed & Athullya Roy	adds 10000 emails to the project		1) kPTITLE1 [Feasibility] – 10000 emails					
								Error: No Line found	FAIL	02/05/2018	Aidan Reed	Failure: no line found CompanyEmailSystem – 112 see BUG301
								kPTITLE1 [Feasibility] – 10000 emails	PASS	03.05.2018	Aidan Reed	After changes made to inputs – see BUG301 The tests stopped producing errors and produced the correct result – Note test was run after BUG303 was fixed so formatting bug would of impacted this too
307	Add Project	Ensures the project title added as input is correctly the system provided feedback [Project added]	Class Description	Aidan Reed & Athullya Roy	Initialize the Projects array and create a project with title **KPTITLE1**	Project Title **KPTITLE1**	System output [Project added]	Error: Complication	FAIL	01/05/2018	Athullya Roy	Error: Complication Error method is not public
								Error: No Line found	FAIL	02/05/2018	Athullya Roy	Failure: no line found CompanyEmailSystem – 112 – See BUG301
								System output [Project added]	PASS	03.05.2018	Athullya Roy	After changes made to inputs – see BUG301 The tests stopped producing errors and produced the correct result
308	Add Project	Ensures the project is created and title is set correctly	Class Description	Aidan Reed & Athullya Roy	Initialize the Projects array and create a project with	Project Title **KPTITLE1**	When calling get Project title **KPTITLE1** should be displayed	Error: Complication	FAIL	01/05/2018	Aidan Reed	Error: Complication Error method is not public
								Error: No Line found	FAIL	02/05/2018	Aidan Reed	Failure: no line found CompanyEmailSystem – 112 – See BUG301

					title **KPTITLE1**			**KPTITLE1**	PASS	03/05/2018	Aidan Reed	
309	Add Project	Checks that the project is created if the user does not enter a name the project should be created with a default name "New Project"	Class Description	Aidan Reed & Athullya Roy	Initialize the Projects array and create a project with no title	N/A	When calling get Project title New project should be displayed	Error: Complication	FAIL	01/05/2018	Athullya Roy	Error: Complication Error method is not public
								Error: No Line Found	FAIL	02/05/2018	Athullya Roy	Failure: no line found CompanyEmailSystem – 112 – See BUG301
								Empty String	FAIL	03.05/2018	Athullya Roy	The system does not check the title of the project and instead creates empty string
								New Project	PASS	03/05/2018	Athullya Roy	After fixes implemented in BUG303 System now produces correct result.
310	List Emails	Tests that the function returns the emails set in the current stage – in this test this will be the initial stage	Class Description	Aidan Reed & Athullya Roy	Initialize the Projects array and create a project add email with **KSENDER kRECIPIENT KSUBJECT KBODY1** used for the inputs	N/A	Returns the sender and subject in format : From: Subject	Error: Complication	FAIL	01/05/2018	Aidan Reed	Error: Complication Error method is not public
								Error: No Line Found	FAIL	02/05/2018	Aidan Reed	Failure: no line found CompanyEmailSystem – 112
								Returns the sender and subject in format : From: Subject	PASS	03/05/2018	Aidan Reed	After input stream issues were fixed highlighted in bug 301 the test was able to run successfully
311	List Emails	Tests the function with an invalid phase ID	Code Inspection	Ram Raja	Initialize the Projects array	Phase ID 20000 into	Should not return any emails With an error message:	Error: Unknown Phase	PASS	03.05.2018	Christian Stubbs	Although system outputted error this was expected as the phaseID entered was invalid

					and create a project	method ListEmails	Error: Unknown Phase					
312	List Phase	Checks the initial phase of a project with 5 emails added to the project	Code Inspection	Ram Raja & Aidan Reed	Initialize a project and add five emails – reset output streams then call list phases	N/A	1) Feasibility – 5 Emails	[] Empty String	FAIL	03/05/2018	Aidan Reed	The system did not output anything – upon further investigation a bug within the function has been logged BUG304
								Feasibility – 5 Emails	PASS	03/05/2018	Aidan Reed	The fixes applied to BUG 304 through CHGE305
313	List Phase	Creates a project and moves it through the 6 stages adding more emails to each phase as each phase passes. E.g: Feasibility - 1 Email Design – 2 Emails At feasibility stage 1 email is added and then another 2 are added at	Code Inspection	Ram Raja & Aidan Reed	Initialize the project array and add email with **KSENDER kRECIPIENT KSUBJECT KBODY1** When iterating through the for loop	N/A	1) Feasibility - 1 Emails 2) Design – 2 Emails 3) Implementation – 3 Emails 4) Testing – 4 Emails 5) Deployment – 5 Emails 6) Completed – 6 Emails	2) Completed – 2 Emails 3) Completed – 3 Emails 4) Completed – 4 Emails 5) Completed – 5 Emails	FAIL	03/05/2018	Aidan Reed	The test result has two issues – the first is the stages are all the same with different email counts BUG304. The second is the number of phases returned back. The first and last stage are missing from the results BUG305
								Expected output – not included because lengthy	PASS	03/05/2018	Aidan Reed	After the issues were resolved in BUGS 304 and 305 the system now produces the correct result when calling this function.

		Design – total 3 – repeat for rest of stage										
314	List Contacts	Tests the function returns the correct number of contacts added to project	Code Inspection	Ram Raja & Aidan Reed	Initialize the project array adding contacts **KCONTACT1 kCONTACT2 kCONTACT3**	N/A	1) **KCONTACT1** 2) **KCONTACT2** 3) **KCONTACT3**	1) **KCONTACT1** 2) **KCONTACT2** 3) **KCONTACT3**	PASS	03/05/2018	Ram Raja	Note Constants used in these tests can be found above this table and also in the Junit test at the top of the code.
315	Add Email	Tests the function provides the correct prompts to the user in a normal scenario	Class Description	Ram Raja & Aidan Reed	Initialize a project and with title **kPTITLE1**	**kSENDER kRECIPIENT kSUBJECT1 kBODY1**	Which email address is this from? Which email address is this to? What is the Subject? What is the Message? Email added to **kPTITLE1**	Correct question flow but the system prompt [Email added to **kPTITLE1** [Feasibility]] was not expected	FAIL	03/05/2018	Ram Raja	The test needs expected output needs editing to include the current phase – The test was did not anticipate this.
							Same as above but [Email added to **kPTITLE1** [Feasibility]]	Correct Output	PASS	03/05/2018	Ram Raja	The test was modified due to a slight formatting error in the expected output
316	Main Method	Ensure the user sees the correct	Code Inspection	Ram Raja & Aidan Reed	A project must be selected	Enter a number to	Display project menu, consisting of	Displays project menu, consisting	PASS	03/05/2018	Ram Raja	

36

		menus when in a project.				access a project	the following options: - List Emails - Add Email - List Phase Folders - Move to Next Phase - List Emails in Phase - List Contacts - Exit Project	of the following options: - List Emails - Add Email - List Phase Folders - Move to Next Phase - List Emails in Phase - List Contacts - Exit Project				
317	Next Phase	Ensures the system produces the correct system prompt when a user moves a project from the initial stage to the next	Class Document	Ram Raja & Aidan Reed	Create a project and move it to the next phase.	N/A	[Phase Changed: Email System [Design]]	[Phase Changed: Email System [Design]]	PASS	03/05/2018	Aidan Reed	
318	Next Phase	Checks that the system provides the correct feedback when	Class Document	Ram Raja & Aidan Reed	Create a project and move it to through all stages project should have	N/A	[Phase Changed: Email System [Design]]	[Phase Changed: Email System [Design]]	PASS	03/05/2018	Ram Raja	

#	Feature	Description	Type	Testers	Precondition	Input	Expected Output	Actual Output	Result	Date	Tester	Comment
		moving a project through all phases			title "Email System|		Phase Changed: Email System [Implementation]] Phase Changed: Email System [Testing]] Phase Changed: Email System [Completed]]	Phase Changed: Email System [Implementation]] Phase Changed: Email System [Testing]] Phase Changed: Email System [Completed]]				
319	Next Phase	Checks the user is presented with a message if the project is in the last stage and tries to move past	Code Inspection	Ram Raja & Aidan Reed	Create a project move to the last stage and call the next phase method one more time	N/A	Project already in last stage	Project already in last stage	PASS	03/05/2018	Ram Raja	
320	Main Method	When a user provides a invalid input the user receives "Command not recognized"	Code Inspection	Ram Raja & Aidan Reed	N/A	"Z"	"Command not recognized"	Something went wrong : exception ..	FAIL	03/05/2018	Aidan Reed	The system throws an exception when an invalid input is provided and displays this to the user. Created BUG310
								"Command not recognized"	PASS	04/05/2018	Aidan Reed	The system no longer displays exception information after BUG FIX 310
321	Main Method	Ensure the user sees the correct menus when in a project	Code Inspection	Ram Raja & Aidan Reed	A project must be selected.	N/A	Display project menu, consisting of the following options: - List Emails - Add Email	Displays project menu, consisting of the following options: - List Emails - Add Email	PASS	03/05/2018	Aidan Reed	

							- List Phase Folders - Move to Next Phase - List Emails in Phase - List Contacts - Exit Project	- List Phase Folders - Move to Next Phase - List Emails in Phase - List Contacts - Exit Project				
322	Main Method	Test the user cannot access a nonexistent project.	Code Inspection	Ram Raja & Aidan Reed	N/A	Enter non-existent project numbers. I.e. negative numbers and non-existent positive numbers. Numbers input: 1. "-1" 2. "-7" 3. "7"	Inability to access the projects requested. "Command not recognized"	Passed for input of "-1" Projects menu displayed for inputs of "-7", "7", "99".	FAIL	03/05/2018	Ram Raja	The Project menus were displayed when passing values -7 7 and 99
								Command not recognized for all out of bounds inputs	PASS	03/05/2018	Aidan Reed	The Project menus were not displayed at all after the out of bounds measures were put in place in BUG 309 Fixes

							Expected		Actual	Result	Date	Tester	Comments

323	Main Method	Return and display options to interact with existing projects.	Code Inspection	Ram Raja & Aidan Reed	projects (at least 3) must exist.	Select first project. Select second project. Select third project.	Display menu for first project. Display menu for second project. Display menu for third project.	First project not accessible. Displays main menu whenever "1" is input. Second and third projects correctly display project menus.	FAIL	03/05/2018	Ram Raja	Unable to access the first as the system decrements the input value for selection by 1. See BUG308/CHGE308.
								Display menu for first project. Display menu for second project. Display menu for third project.	PASS	04/05/2018	Aidan Reed	After the changes were made in BUG fix 308 The system now performs as expected. See BUG308 and CHGE308 for more details
324	Main Method	Be able to exit a project and return to the main menu	Code Inspection	Ram Raja & Aidan Reed	A project must exist.	Select a project. "2" Exit project. "X"	Return user to main menu from selected project.	Returns user to main menu from selected project.	PASS	03/05/2018	Ram Raja	

| 325 | Add Email Funcion | Tests when bad data is inputted into the system the system asks for the data again before moving onto the next stage. For example Invalid sender provided the system asks for the sender until it is valid. This tests should follow through the whole process | Code Inspection | Aidan Reed | A project is created and the add email function is called – project should have title **Kptitle1** | Senders: **kBADEMAIL1 kSENDER** Recipients: **kBADEMAIL2 kRECIPIENT** Subjects: **kSUBJECT1** Message: **kBODY1** | Which email address is this from? Invalid Email: Which email address is this from? Which email address is it to? Invalid Email: Which email address is this to? What is the subject? What is the Message? Email added to **Kptitle1** | Which email address is this from? Which email address is it to? What is the subject? What is the Message? Email added to **Kptitle1** | FAIL | 04/05/2018 | Aidan Reed | The test fails as there is no checking from within side the Add email method inside the main class. As such I have logged a bug for this BUG312 |
| | | | | | | | | Produces the correct output | PASS | 04/05/2018 | Aidan Reed | The test successfully passed after the fixes that were implemented to fix BUG312. The actions taken to fix the bug revolved around |

Company Email System Change Log

Change ID	GIT Commit ID	Bug ID	Description of Change	Files Changed	Date Received	Date Changed	Initiator By (Who Changed)	Change Checked By	Notes
CHGE301	B2283df	N/A	All methods inside the main class are set to private aswell as data member variables. To be able to perform email unit testing on each method the methods need to be made available without running the main class. - AllProjects – made public - currentProjShowing – made public - listProjects – made public - addProject – made public - listEmails – made public - listPhases – made public - listContacts – made public - addEmail – made public - ChangeProjectPhase – made public	CompanyEmail System (emailMessage)	01/05/2018	02/05/2018	Aidan Reed	Ram Raja	Junit tests that were created and failing as a result of this should now start to work – Ram Raja.
CHGE302	N/A	BUG301	In method add project and add email there is a call to in.nextline that removes the user input and results. After looking at this further the line is required to prevent the program trying to add projects with no input as such for testing a \n needs to be added to the inputs	CompanyEmail System (emailMessage	01/05/2018	N/A	Aidan Reed	N/A	This change was not required
CHGE303	7c9152a	BUG302	Add an additional space into the string formatting of the List Projects Method	CompanyEmail System Line 112	03/05/2018	03/05/2018	Christian Stubbs	Aidan Reed	After this change the tests now pass successfully with a change to the formatting – CS 03.05.2018

CHGE304	7e70150	BUG303	User can create project with no subject. No checking is performed to see if the length of the title is less than 10. If so the default constructor for Company Project should be called.	CompanyEmail System Line 120	03/05/2018	03/05/2018	Christian Stubbs	Aidan Reed	After implementing the condition in add project the projects are created either with titles that are greater than 10 characters or with new project otherwise
CHGE305	6a2c8a8	BUG304	The for loop inside the List Phases method uses the less than operator this means that the method cuts off the first project phase and the last phase when calling the method. The comparison operator should be <=.	Line165	03/05/2018	03.05.2018	Christian Stubbs	Aidan Reed	The original condition meant the first stage was never printed as the first phase id is 0 and also the last one never printed – this has now been resolved. – AR 03/05/2018
CHGE306	1cc84dd	BUG305	Create a overloaded method for getPhaseByName that takes an integer and checks if the phase id passed is less than the current phase id if so it should return the phase name for that phase otherwise return the current phase – preventing been able to access past the end of the phase.	Company Project Class -119	03/05/2018	03/05/2018	Aidan Reed	Christian Stubbs	The new function allows access to historical phases. This is only the first stage to fixing BUG305 as changes now need to be made in the ListPhase method – AR 03/05/2018
CHGE307	37859f0	BUG305	The ListPhase method should pass a parameter to the newly created getPhaseByName method in CHGE306	CompanyEmail System Line 177	03/05/2018	03/05/2018	Aidan Reed	Christian Stubbs	The for loop now produces the correct phase names when listing the project phases. – AR 03/05/2018
CHGE308	4cf18f3 & 670fca8	BUG308	Set the default state for current Project variable to -1 as it isn't attainable by what the user needs to access – then update the conitionals for menus to only display when the variable is -1. When X is selected inside a project it should se it back to -1	CompanyEmail System Line Main Method	03/05/2018	03/05/2018	Aidan Reed	Ram Raja	The system still works as intended but now allows a user to enter 1 and select the first element instead of been displayed with a menu again. In future versions the menu should be it's own method with simpler logic RR 03/05/2108

CHGE309		BUG309	Add bounds when selecting a project. The value input must be greater than 0 and less than/equal to the number of existing projects in the ArrayList.	CompanyEmailSystem (Main Method)	03/05/2018	03/05/2018	Ram Raja	Aidan Reed	
CHGE310	5bf53c8	BUG310	The system displays the exception outputs to the user when a simple system out and a helpful message can be used. Change includes a message saying "Command Unknown"	CompanyEmailSystem (Main Method) line 127	03/05/2018	04/05/2018	Aidan Reed	Ram Raja	
CHGE311	715d2cc	BUG311	When the test data is created the current project remains at the first project and should be reset back to the none project state -1.	CompanyEmailSystem (Main Method) line 78	03/05/2018	04/05/2018	Aidan Reed	Ram Raja	
CHGE312	709a1f4	BUG312	The add email method inside the Main method has been re-implemented to loop through each data input until the correct values are provided. This is done by calling the set methods on the Email object that provide validation of email addresses with regular expressions	CompanyEmailSystem (Main Method)	04/05/2018	04/05/2018	Aidan Reed	Ram Raja	This is likely to be the largest change to the overall structure of the system. The method has been implemented using the helper function provided from the email objects class rather than reinventing the wheel.

Company Email System Bug Fix

Prob lem ID	Problem Description	Line of code -	Test ID (if created)	Change ID	Proposed Fix	Priority High, Med, Low	Date Problem identified	Fixe d? (Yes / No)	Date Problem fixed	Who identified/fi xed the test?	Who Fixed it	Does the bugged code relate to other functions?	Notes
BUG 301	Error when adding new project to the system. Receives No Line found. There is a method call nextLine on the scanner object passed into the Add Project method which is removing the input and in fact needs to be entered twice	165	304-310	CHGE302	Remove the nextLine method call on line 110	Med	01/05/2018	YES	03/05/2018	Aidan Reed	N/A	No – other functions call this method	No fix was required a new line needed to be added to th test inputs before hand.
BUG 302	The format of the list projects function is slightly off – should output Title – number email instead of Title – numberemail	151	305	CHGE303	Add an additional Space into the formatting of string	Low	01/05/2018	YES	03.05.2018	Aidan Reed	Christia n Stubbs	N/A	See GIT and CHANGE ID for more details but a space was added to formatting
BUG 303	When a project is created an no title is provided the project should be called New Project- currently system produces empty subject	Line 168	308	CHGE304	Add a check for the length of the title provided in add projects function	Med	03/05/2018	YES	03.05.2018	Aidan Reed	Christia n Stubbs	N/	After implementing the proposed fix the system now adds projects correctly
BUG 304	When calling list phases function from a project in it's initial stage it does not display the current phase and it's email count it just displays the menu options again.	Line 223	312	CHGE305	Change for loop condition from < to <=	Med	03/05/2018	YES	03.05.2018	Aidan Reed	Christia n Stubbs	N/A	
BUG 305	When Calling List phases function when a project has gone through all the stages it should list each	Line 120 in EmailPr	313	CHGE306 CHGE307	Create an overloaded function for getPhaseByName in	Med	03/05/2018	YES	03/05/2018	Aidan Reed	Aidan Reed	getPhaseByNa me in	After implementing the changes proposed in CHGE306 and CHGE307

	stage and the email count. The email count is correct but the phase name for each stage is the same for all stages meaning it reflects the current phase i.e. 1) Completed – 1 Emails 2) Completed – 2 Emails 3) Completed – 3 Emails	oject class			\EmailProjects Class – That should output the phase name						CompanyProje cts	the system now behaves as expected and produces the correct phase – AR 03/05/2018
BUG 308	User is unable to access the first project, as well as methods in the correct order as "-1" is always being applied to the user's inputted project selection. This also creates ambiguity when selecting other projects, as selecting project 3 could take the user to project 2, etc.	Lines 86 & 112	323	CHGE308	~~Remove "-1" from value input/read by system when selecting project.~~ ~~Change: "currentProjShowing = Integer.parseInt(s)-1;"~~ ~~To: "currentProjShowing = Integer.parseInt(s);"~~ Change the not in project state from 0 to -1 and change some of the conditionals	High	03/05/2018	Yes	03/05/2018	Ram Raja	Aidan Reed	N/A
BUG 309	User is shown project menu when inputting non-existent project values.	71	322	CHGE309	Add bounds to project selection. User should only be able to select a project with a value greater than 0 in the	Med	03/05/2018	Yes	03/05/2018	Ram Raja	Ram Raja	N/A

					ArrayList, and a value less than or equal to the size of the ArrayList. Change: "else if (Integer.parseInt(s) != -1);" To: "else if (Integer.parseInt(s) > 0 && Integer.parseInt(s) <= AllProjects.size());"								
BUG 310	When a user provides an invalid input the user receives an exception presented to the screen	127	320	CHGE310	Instead of outputting message to user the system should display "Command Unkown"	Med	03/05/2018	YES	04/05/2018	Aidan Reed	Ram Raja	N/A	
BUG 311	During the main method when test data is created The current project is left in a state of the first project.	78	N/A	CHGE311	Before the while loop the system should initialize the currentProject back to -1	Low	03/05/2018	YES	04/05/2018	Aidan Reed	Ram Raja	N/A	
BUG 312	Emails added to projects through the main method are not subject to validation and are added regardless	Compa nyEmail System Add Email Method 246-312	325	CHGE312	Reimplement the add email method to check for validation at each stage of user input	High	04/05/2018	YES	04/05/2018	Aidan Reed	Aidan Reed	N/A	The current method includes no validation. The proposed fix ensures emails have no errors at any stage before adding the email.