

Improvements:

- Command pattern is integrated to segregate the front-end from the back-end. This design pattern was chosen because of the nature of the application (command reliant). There are a few advantages in using this design pattern:
 - Greatly decouples the application as each individual command will have their own classes (Invoker).
 - Easier to add new commands as it doesn't require a lot of changing existing code.
 - Creates a structure for the entire application. It's easier to determine which commands are available based on the files contained within the project.
 - Removes the staircases of if-statements in the front-end class Editor.
- Singleton pattern is also integrated to create a global shared resource within the application (called Resources) which can be used by front-end and back-end classes. This design pattern was chosen so the invoker classes can work with the same image being operated on.
- There are new commands that has been implemented based on the user requirements in the specification:
 - A 'put' command has been implemented to store copies of modified images in the image cache.
 - A 'get' command has been implemented to retrieve an image from the image cache.
 - An 'undo' command has been implemented to remove the recently added filter from the image.
- On top of these, there are also new commands to demonstrate the extendibility of the application:
 - A 'flipH' command filter has been implemented which flips an image horizontally.
 - A 'flipV' command filter has been implemented which flips an image vertically.
 - A 'cache' command has been implemented to show the list of images currently stored in the image cache.
- There are also a few improvements on existing commands:
 - The 'script' command can now use the third word from the user input which refers to the file location of the script file.
 - The 'help' command will now give a detailed instruction on how to use each command.
- As requested in the specification, the entire application has now been internationalised which makes localisation possible. Language files are placed within the properties files which are referenced throughout the entire code. (Current languages are UK English and French)
- Unhandled exceptions have now also been appropriately handled. This includes the exception thrown by applying filters on a non-existing image. Multiple user input possibilities have been thought out and dealt with to avoid run time errors.

- CLI exclusive print lines has now been removed within each command implementation. Instead message outputs are returned, and changes done to the image are achieved using the Resources class. This makes GUI extendability possible.
- Better practices of programming have been used such as using arrays when applicable and avoiding code repetition using for loops if possible. Fields that didn't have access modifiers are now set to private. Classes and methods are encapsulated to increase code cohesion. Unrelated classes were also segregated to reduce coupling.
- Packages are used to appropriately separate source files. (e.g. command invokers have their own package called 'commands')
- Thorough documentation has been done throughout the entire code. This includes both source files and test files for better understandability. **The full generated Javadoc can be found in /javadocs/javadoc/index.**
- Unit Tests has been integrated to the project to increase the reliability of the application. Tests includes message outputs, localisation and image outputs (ensuring that the filter has been applied correctly)
 - Code coverage was also used to ensure the entire code has been tested. **The full results of the code coverage can be found in /.jacocoverage/report.html/index.**
- A System Analysis report has been generated to reveal any bad software development practices. The results of the full report are shown below this document.
- Git-hub has been used for version control and team collaboration purposes. The list of commits is also shown below this document.

Bugs and Issues:

- The usage of Singleton pattern in the Resources class makes it difficult to perform unit testing as each test cases should be independent. To fix this, a method to reset the resources were made which is executed before each test runs. This approach however isn't ideal as picked up by the static analysis report.
- Code coverage wasn't completely 100%
 - In the 'ScriptCommand' class, there is an IOException handler which is triggered by a BufferedReader. This wasn't tested because the requirements to trigger this exception are difficult to reproduce in the test environment. They are caused by external factors that cannot be easily simulated e.g. the sudden deletion of a source file being used in the test.

Limitations:

- Testing that the image output contains the correct filter applied to it are difficult to achieve especially for filters which changes the colour value of each pixel (mono). This is because the actual image output is not exactly the same as its version while it was still being processed by the application. The saving process may result in resolution changes thus changing their pixel colour value. More on this in TestUtility.java file.

Future Improvements:

- In the future, it would be ideal to be able to increase the maximum of filters that can be applied on an image by changing just one parameter. Currently, changes in multiple files needs to be made to attain this.

Git-hub Commits

Commits on Mar 21, 2019

Merge pull request #16 from iblobtouch/TestDocumentation ...	Verified	44b5b23	<>
GerronT committed 17 hours ago			
updated changes		cec1e1a	<>
GerronT committed 17 hours ago			
added test documentation and update javadoc, fixed some static analys... ...		5978a53	<>
GerronT committed 17 hours ago			























































Commits on Mar 19, 2019

Merge pull request #15 from iblobtouch/StaticAnalysis ...	Verified	5addb55	<>
GerronT committed 3 days ago			
Generated a static analysis report and made changes to the critique a... ...		5a34b87	<>
sohail786b committed 3 days ago			
Merge pull request #14 from iblobtouch/LocalisationTest ...	Verified	00d75fd	<>
GerronT committed 3 days ago			
added Localisation test		9376e45	<>
GerronT committed 3 days ago			
Merge pull request #13 from iblobtouch/UnitTests ...	Verified	22ece02	<>
GerronT committed 3 days ago			

Add Cache tests and updated javadoc		7f918dd	<>
GerronT committed 3 days ago			
update UnitTests branch		94b9dfd	<>
GerronT committed 3 days ago			
changed the Resources class a little		894e268	<>
GerronT committed 3 days ago			
removed a failing test		825e925	<>
GerronT committed 3 days ago			
segregated tests appropriately		4be681a	<>
GerronT committed 3 days ago			
Code coverage should now be complete, but we still need more tests		146ca92	<>
GerronT committed 3 days ago			

Commits on Mar 18, 2019

added more tests		73e930b	<>
GerronT committed 4 days ago			
Added a few message output tests		999ee95	<>
GerronT committed 4 days ago			
Help command will give more information		82b580a	<>
GerronT committed 4 days ago			

Merge pull request #12 from iblobtouch/AddJavaDoc ...  GerronT committed 4 days ago	Verified	 8ec54c1	
Finished documentation and added the generated javadoc  GerronT committed 4 days ago		 43b3fe2	
Added all javadoc  GerronT committed 4 days ago		 2a8b077	
Commits on Mar 17, 2019			
generated javadoc for all methods  GerronT committed 5 days ago		 aa81484	
Merge pull request #11 from iblobtouch/refactorForTest ...  GerronT committed 5 days ago	Verified	 618126a	
Refactor changes. Fixed some bugs and some issues. Code should be all...  GerronT committed 5 days ago		 6d2f398	
added message output tests  GerronT committed 5 days ago		 6e7c4bd	
all filters image output should now be tested  GerronT committed 5 days ago		 5f1d2cc	
Refactored documentation  GerronT committed 5 days ago		 8c711b2	
Added some documentation  GerronT committed 5 days ago		 c745ad3	
added and automated some tests  GerronT committed 5 days ago		 664d564	
Commits on Mar 16, 2019			
Refactor code to make image output testable  GerronT committed 6 days ago		 ad5057a	
Merge pull request #10 from iblobtouch/Image-Cache-and-Undo ...  iblobtouch committed 6 days ago	Verified	 af60bff	
Added renaming to put, removed implementation from resources.  iblobtouch committed 6 days ago		 d54ef11	
Commits on Mar 13, 2019			
Added requested changes from pull request.  iblobtouch committed 9 days ago		 fe9800a	
Added image cache and an undo feature ...  iblobtouch committed 9 days ago		 2d4c8fb	
Merge pull request #9 from iblobtouch/TestClass ...  GerronT committed 9 days ago	Verified	 3dbda87	
readed french properties file  GerronT committed 9 days ago		 35d296a	

Commits on Mar 13, 2019

added some tests and created a package for the classes; GerronT committed 9 days ago	70fb677	<>
Merge pull request #8 from iblobtouch/FlipFilterRefactor ... GerronT committed 9 days ago	Verified 00cb1dc	<>
added french localisation for flipV GerronT committed 9 days ago	69401b2	<>
Added implementation for flipping horizontally and vertically GerronT committed 9 days ago	5c023e2	<>
Merge pull request #7 from iblobtouch/RemoveSystemOutInBackEnd ... GerronT committed 9 days ago	Verified e057087	<>

Commits on Mar 10, 2019

Removed most runtime errors GerronT committed 12 days ago	43575e8	<>
Fixed some issues and spelling mistakes GerronT committed 12 days ago	54a97d7	<>
remove print lines in the command classes to make GUI extendability p... GerronT committed 12 days ago	581d713	<>

Commits on Mar 10, 2019













Removed most runtime errors GerronT committed 12 days ago	43575e8	<>
Fixed some issues and spelling mistakes GerronT committed 12 days ago	54a97d7	<>
remove print lines in the command classes to make GUI extendability p... GerronT committed 12 days ago	581d713	<>

Commits on Mar 9, 2019











Merge pull request #6 from iblobtouch/IntegrateDesignPattern ... iblobtouch committed 13 days ago	Verified 5d84c46	<>
Tidied up the code and added javadocs GerronT committed 13 days ago	df26d58	<>

Commits on Mar 8, 2019















integrate design pattern to segregate operation methods GerronT committed 14 days ago	23f1714	<>
Merge pull request #5 from iblobtouch/CommandMethods ... GerronT committed 14 days ago	Verified 81bb2a1	<>
Merge branch 'CommandMethods' of https://github.com/iblobtouch/Softwa... GerronT committed 14 days ago	b7cb8c4	<>





















makes sure its up to date with master GerronT committed 14 days ago	 4a5821b	
Changed asigness on Agenda. iblobtouch committed 14 days ago	 575bb39	
Command words is now automatically generated via reflection iblobtouch committed 14 days ago	 febb8aa	
Merge pull request #4 from iblobtouch/CommandMethods ... GerronT committed 14 days ago	Verified  7e4c3fb	
Changed exceptions to use checked exceptions instead of runtime. iblobtouch committed 14 days ago	 70a6827	
Split methods in Editor into a second file ... iblobtouch committed 14 days ago	 f6b0f26	

Commits on Mar 6, 2019

Merge pull request #3 from iblobtouch/Internalisation ... iblobtouch committed 16 days ago	Verified  41ae451	
removed initialisation of ResourceBundle in Parser class. (Its not used) GerronT committed 16 days ago	 275194f	
made fields private in Editor class GerronT committed 16 days ago	 d16c96d	
Made resourceBundle available for CommandWords and made valid command... ... GerronT committed 16 days ago	 0b7ecd3	
added internalisation (Current languages: UK English, French) GerronT committed 16 days ago	 b5b4ea8	

Commits on Mar 4, 2019

Merge pull request #2 from iblobtouch/ParserRefactor ... GerronT committed 18 days ago	Verified  abe13f6	
Reviewed changes. sohail786b committed 18 days ago	 885f554	
Merge branch 'master' into ParserRefactor sohail786b committed 18 days ago	 142f2f3	
Merge branch 'master' of https://github.com/iblobtouch/Software-Engin... ... sohail786b committed 18 days ago	 f43711b	
Individual Variables now in array collection, refactored if statement... ... sohail786b committed 18 days ago	 77b360f	
Updated the improvements file. iblobtouch committed 18 days ago	 75c4825	
'sample' sohail786b committed 18 days ago	 ca2edc2	

-	Commits on Mar 1, 2019			
	Added agenda, added people to improvements ...		c362a60	
	 iblobtouch committed 21 days ago			
-	Commits on Feb 22, 2019			
	Added improvements for the fotoshop coursework	Verified		a5ddc40
	 GerronT committed 28 days ago			
-	Commits on Feb 11, 2019			
	Finalised team.pdf		0bcfdfd	
	 iblobtouch committed on 11 Feb			
	Updated team.doc		6712857	
	 iblobtouch committed on 11 Feb			
-	Commits on Feb 11, 2019			
	Added word drocs to fill out.		4a480f3	
	 iblobtouch committed on 11 Feb			
	Start of project		fac1c8a	
	 iblobtouch committed on 11 Feb			
	Initial commit		3b8e57d	
	 iblobtouch committed on 11 Feb			

Static Analysis Report for the refactored version of the code – findBugs Tool

The image displays a static analysis report generated by the findBugs tool for a Java project named 'fotoshop'. The report is organized into a hierarchical tree structure on the left, showing the project's package structure. The right side of the image lists the specific bugs found, each with a line number, a description, and a severity level indicated by a red bug icon.

Project Structure:

- fotoshop (39)
 - Source Packages (12)
 - commands (7)
 - CommandWords.java (2)
 - 75: Can use functional operations
 - 76: commands.CommandWords.getAllCommands() concatenates strings using + in a loop
 - LookCommand.java (1)
 - 45: commands.LookCommand.execute() concatenates strings using + in a loop
 - ScriptCommand.java (2)
 - 65: Found reliance on default encoding in commands.ScriptCommand.execute(): new java.io.FileReader(String)
 - 70: commands.ScriptCommand.execute() concatenates strings using + in a loop
 - ViewImageCacheCommand.java (2)
 - 47: Can use functional operations
 - 48: commands.ViewImageCacheCommand.execute() concatenates strings using + in a loop
 - src (5)
 - ColorImage.java (3)
 - 34: Overridable method call in constructor
 - 52: Overridable method call in constructor
 - 115: src.ColorImage.getFilters() may expose internal representation by returning ColorImage.filters
 - Editor.java (1)
 - 38: Found reliance on default encoding in new src.Editor(ResourceBundle): new java.util.Scanner(InputStream)
 - Resources.java (1)
 - 156: Write to static field src.Resources.sharedResource from instance method src.Resources.resetResources()
 - Test Packages (27)
 - src (27)
 - CacheCommandTest.java (3)
 - 35: CacheCommandTest.parser not initialized in constructor and dereferenced in src.CacheCommandTest.testCacheEmptyMessageOutput()
 - 45: CacheCommandTest.parser not initialized in constructor and dereferenced in src.CacheCommandTest.testCacheMessageOutput()
 - 63: CacheCommandTest.parser not initialized in constructor and dereferenced in src.CacheCommandTest.testCacheUsage()
 - FlipHCommandTest.java (2)
 - 34: FlipHCommandTest.parser not initialized in constructor and dereferenced in src.FlipHCommandTest.testFlipHMessageOutput()
 - 46: FlipHCommandTest.parser not initialized in constructor and dereferenced in src.FlipHCommandTest.testFlipHNoImageLoaded()
 - FlipVCommandTest.java (2)
 - 34: FlipVCommandTest.parser not initialized in constructor and dereferenced in src.FlipVCommandTest.testFlipVMessageOutput()
 - 46: FlipVCommandTest.parser not initialized in constructor and dereferenced in src.FlipVCommandTest.testFlipVNoImageLoaded()
 - GetCommandTest.java (3)
 - 35: GetCommandTest.parser not initialized in constructor and dereferenced in src.GetCommandTest.testGetMessageOutput()
 - 48: GetCommandTest.parser not initialized in constructor and dereferenced in src.GetCommandTest.testGetNonExistingImageMessageOutput()
 - 60: GetCommandTest.parser not initialized in constructor and dereferenced in src.GetCommandTest.testGetNoSecondWord()
 - HelpCommandTest.java (1)
 - 34: HelpCommandTest.parser not initialized in constructor and dereferenced in src.HelpCommandTest.testHelpMessageOutput()
 - ImageOutputTest.java (2)
 - 114: ImageOutputTest.parser not initialized in constructor and dereferenced in src.ImageOutputTest.automateImageTest(String, String, String)
 - 119: Exceptional return value of java.io.File.delete() ignored in src.ImageOutputTest.automateImageTest(String, String, String)
 - LanguageLocalisationTest.java (1)
 - 35: LanguageLocalisationTest.parser not initialized in constructor and dereferenced in src.LanguageLocalisationTest.frenchLanguageTest()
 - LookCommandTest.java (2)
 - 34: LookCommandTest.parser not initialized in constructor and dereferenced in src.LookCommandTest.testLookNoFiltersMessageOutput()
 - 45: LookCommandTest.parser not initialized in constructor and dereferenced in src.LookCommandTest.testLook4FiltersMessageOutput()
 - MonoCommandTest.java (2)
 - 34: MonoCommandTest.parser not initialized in constructor and dereferenced in src.MonoCommandTest.testMonoMessageOutput()
 - 46: MonoCommandTest.parser not initialized in constructor and dereferenced in src.MonoCommandTest.testMonoNoImageLoaded()
 - QuitCommandTest.java (1)
 - 34: QuitCommandTest.parser not initialized in constructor and dereferenced in src.QuitCommandTest.testQuitMessageOutput()
 - Rotate90CommandTest.java (2)
 - 41: Exceptional return value of java.io.File.delete() ignored in src.SaveCommandTest.testSaveToValidPathOutsideProjectMessageOutput()
 - 56: Exceptional return value of java.io.File.delete() ignored in src.SaveCommandTest.testSaveToValidPathInsideProjectMessageOutput()
 - 91: Exceptional return value of java.io.File.delete() ignored in src.SaveCommandTest.testSaveMessageOutput()
 - SaveCommandTest.java (3)
 - 41: Exceptional return value of java.io.File.delete() ignored in src.SaveCommandTest.testSaveToValidPathOutsideProjectMessageOutput()
 - 56: Exceptional return value of java.io.File.delete() ignored in src.SaveCommandTest.testSaveToValidPathInsideProjectMessageOutput()
 - 91: Exceptional return value of java.io.File.delete() ignored in src.SaveCommandTest.testSaveMessageOutput()
 - UndoCommandTest.java (3)
 - 35: UndoCommandTest.parser not initialized in constructor and dereferenced in src.UndoCommandTest.testUndoMessageOutput()
 - 49: UndoCommandTest.parser not initialized in constructor and dereferenced in src.UndoCommandTest.testUndoNoFiltersMessageOutput()
 - 62: UndoCommandTest.parser not initialized in constructor and dereferenced in src.UndoCommandTest.testUndoNoImageLoaded()

Below shows further description given by findBugs found by the static analysis report. Each reference in each class in the table is listed in order they appear in the report above.

1. Use functional operations instead of imperative style loop.
2. The method seems to be building a String using concatenation in a loop. In each iteration, the String is converted to a StringBuffer/StringBuilder, appended to, and converted back to a String. This can lead to a cost quadratic in the number of iterations, as the growing string is recopied in each iteration. Better performance can be obtained by using a StringBuffer (or StringBuilder in Java 1.5) explicitly
3. Found a call to a method which will perform a byte to String (or String to byte) conversion and will assume that the default platform encoding is suitable. This will cause the application behaviour to vary between platforms. Use an alternative API and specify a charset name or Charset object explicitly.
4. Calling methods that can be overridden can be dangerous in the constructor because in the moment when the overridden method is called the object is not fully initialized.
5. Returning a reference to a mutable object value stored in one of the object's fields exposes the internal representation of the object. If instances are accessed by untrusted code, and unchecked changes to the mutable object would compromise security or other important properties, you will need to do something different. Returning a new copy of the object is better approach in many situations.
6. This instance method writes to a static field. This is tricky to get correct if multiple instances are being manipulated, and generally bad practice.
7. This field is never initialized within any constructor and is therefore could be null after the object is constructed. Elsewhere, it is loaded and dereferenced without a null check. This could be a either an error or a questionable design, since it means a null pointer exception will be generated if that field is dereferenced before being initialized.
8. This method returns a value that is not checked. The return value should be checked since it can indicate an unusual or unexpected function execution. For example, the File.delete() method returns false if the file could not be successfully deleted (rather than throwing an Exception). If you don't check the result, you won't notice if the method invocation signals unexpected behavior by returning an atypical return value.

src.commands.CommandWords – 1, 2	src.commands.LookCommand – 2
src.commands.ScriptCommand – 2, 3	src.commands.ViewCommand – 1, 2
src.src.ColorImage – 4, 5	src.src.Editor – 3
src.src.Resources – 6	test.src.CacheCommandTest – 7

test.src.FlipHCommandTest – 7	test.src.FlipVCommandTest – 7
test.src.GetCommandTest – 7	test.src.HelpCommandTest – 7
test.src.ImageOutputTest – 7, 8	test.src.LanguageLoclisationTest – 7
test.src.LookCommandTest – 7	test.src.MonoCommandTest – 7
test.src.QuitCommandTest – 7	test.src.Rotate90CommandTest – 7
test.src.SaveCommandTest – 8	test.src.UndoCommandTest – 7