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Functional requirements

Name	FR#1	Add music libraries
Summary	Add folders in which the user has stored their audio files. The paths of the directories that the user will be adding to the program will be saved in a serialized file to be loaded each time the application is opened.	
Input	A directory chosen by the user through the directory chooser	
Output	None	

Name	FR#2	Play mp3 audio files
Summary	The user will be able to listen to their songs while continuing to browse the application or through other programs unrelated to it and will see in real time the time that the song has covered	
Input	An int that represents the position of the requested song in the playlist	
Output	None	

Name	FR#3	Remove directories from current libraries
Summary	Allow to remove music directories from the current libraries so that they are no longer loaded at the start of the application. The music folder will not be removed if the songs in it are being played right now or is the demo folder	
Input	The music folder to remove	
Output	None	

Name	FR#4	Allow to sort the songs of the playlist by different criteria
Summary	The program allows you to sort the playlist by criteria such as: title, name of the mp3 file, duration, name of the artist, album, genre and size of the mp3 file	
Input	The sorting criterion	
Output	The current playlist has been sorted according to the criterion	

Name	R1. Load images from directories chosen by the user.
Summary	The program allows to load customized images from file system and draw them on the canvas.
Input	Directoy from file system
Output	The image is drawn on the canvas.

Name	R2. Save the changes made in the canvas
Summary	The actual state of the canvas is saved as an image in a chosen by the user directoy file.
Input	Directoy from file system
Output	The image is saved successfully in the chosen directory.

Name	R3. Allow to chose a color and shape to draw over the canvas.
Summary	The user can choose a color and shape from the displayed options and draw with them over the canvas.
Input	Wanted color and shape
Output	None

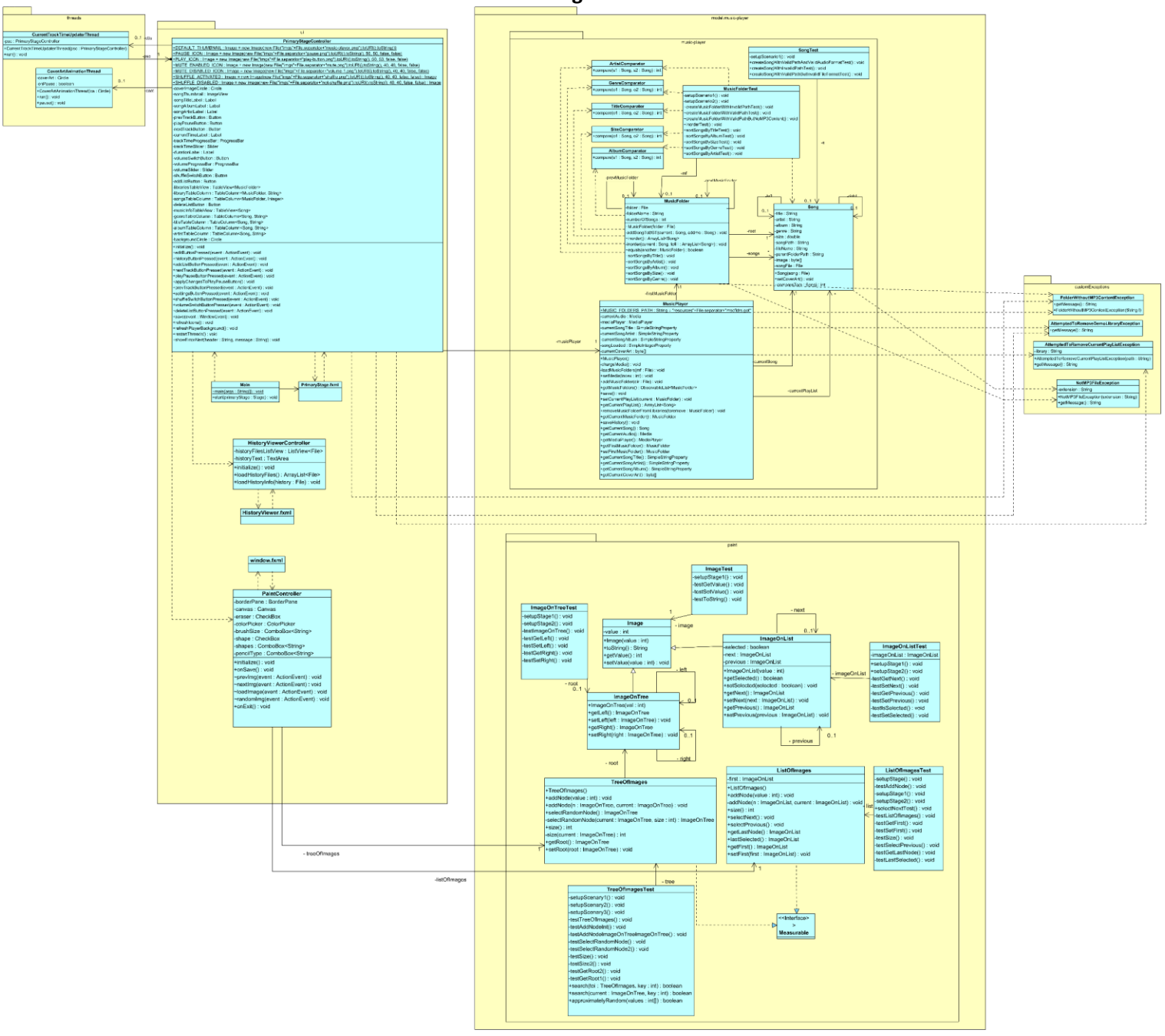
NAME	R4. Load random images
Summary	A randomly chosen image from a binary tree data structure is drawn on the canvas.
Input	None
Output	The image is shown on screen.

Name	R5. Navigate on a list of images
Summary	An image from a doubly linked list data structure can be chosen by the user and it's possible to visualize the next and the previous image of the actual one in the list.
Input	Name of the figure
Output	The figure is painted on the canvas

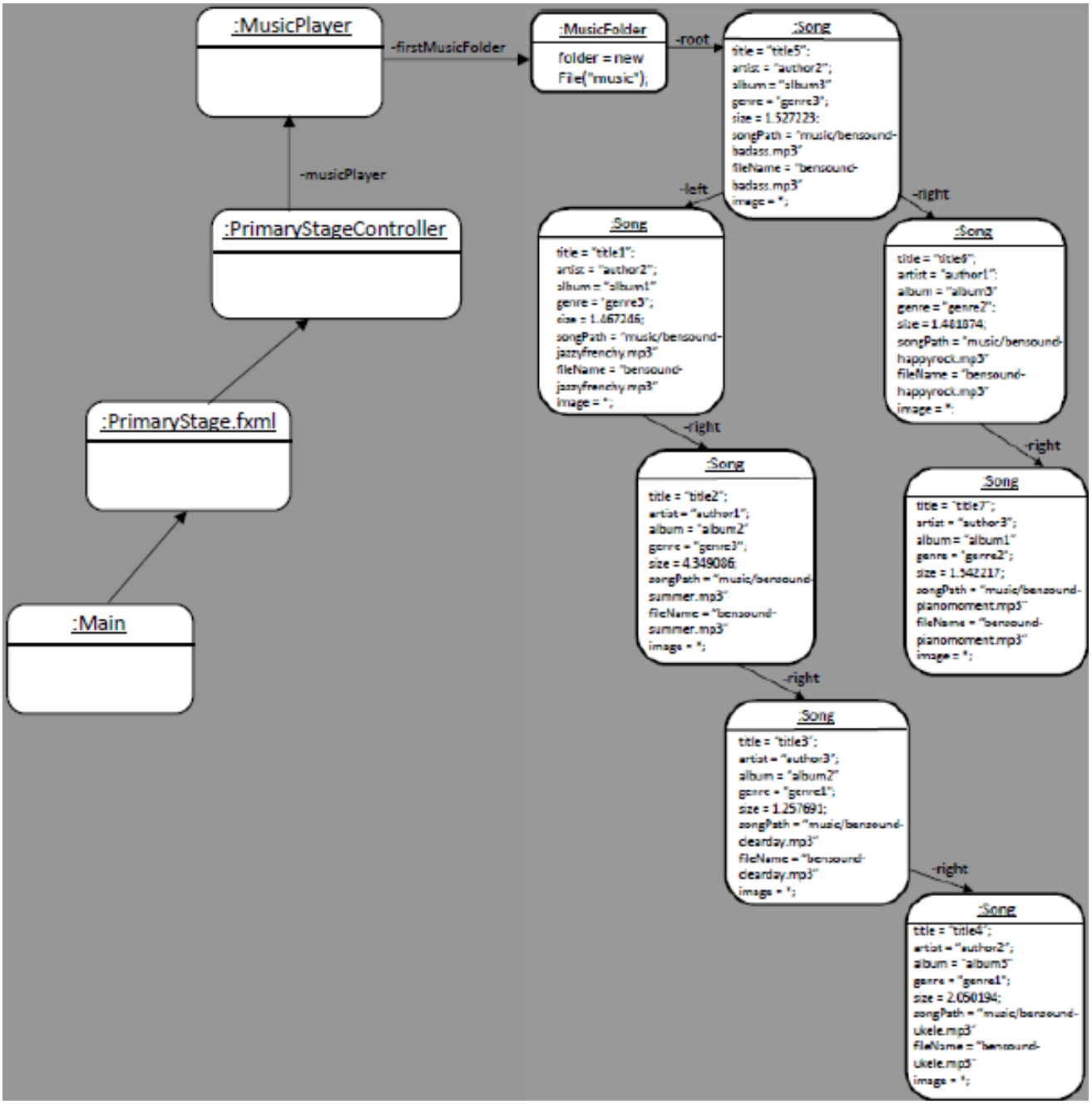
Non-functional requirements

ID	Description
NFR#1	Create the graphic user interface using JavaFX
NFR#2	Save information from music folders so that the program is persistent

Class Diagram



Objects Diagram



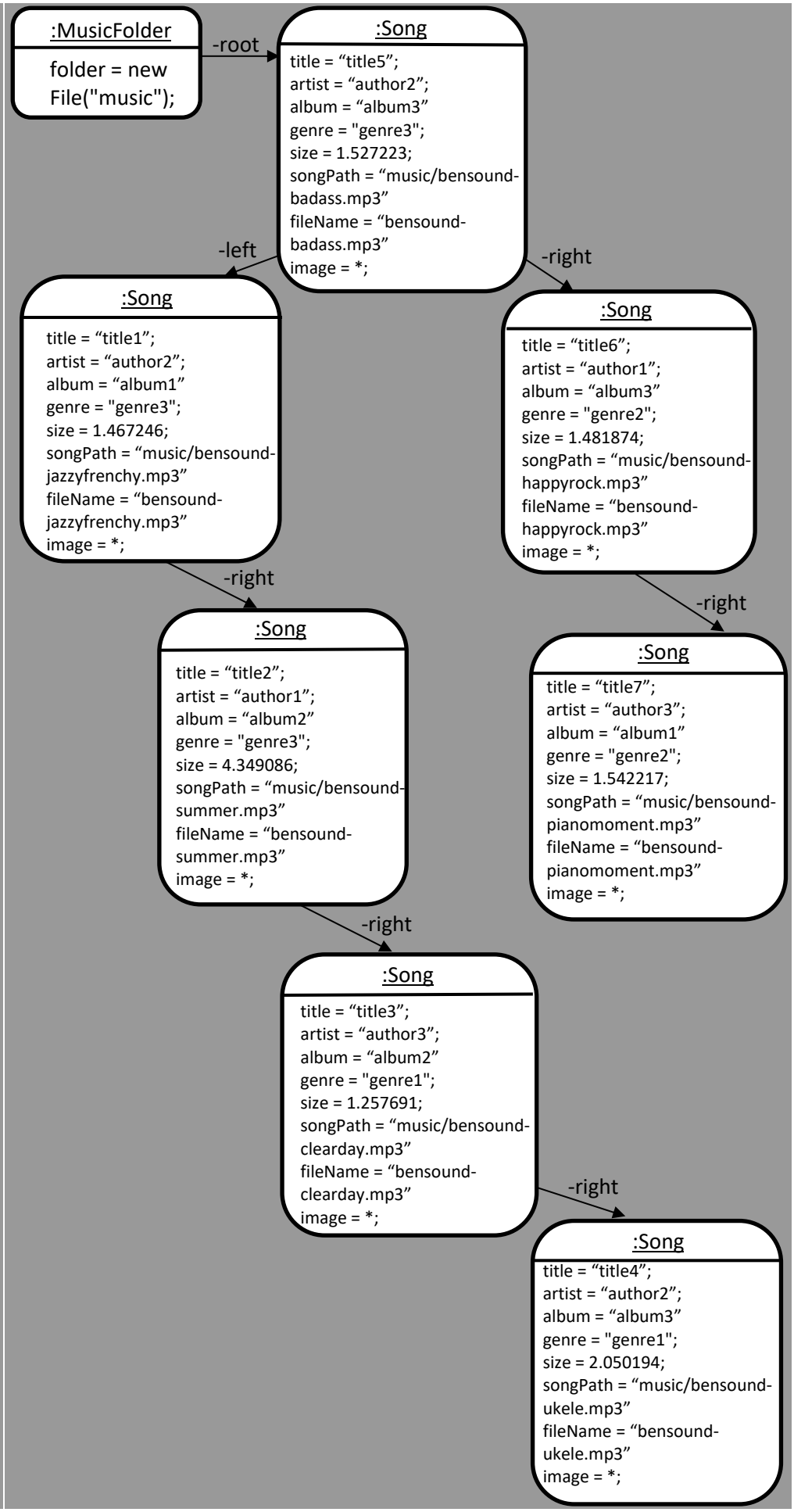
Unitary Tests Design

(Scenarios Setting)

Name	Class	Scenario
setupScenario1	Song	Empty
setupScenario1	MusicFolder	Empty

setupScenario2

MusicFolder



setupStage1()	ImageOnListTest	A new instance of ImageOnList is created with a value of 10
setupScenary2()	ImageOnListTest	A new list is created with the following objects: Object 1: ● Value = 10 ● next = Object 2 ● Previous = null Whetherject 2: ● value = 30 ● next = Objeto3 ● previous = objeto1 Object 3: ● value = 4 ● next = Object 4 ● previous = Object2 Bothct 4: ● value = 14 ● next = null ● previous = Object 3
setupStage1()	ImageOnTreeTest	The root reference is initialized with a value of 50
setupScenary2()	ImageOnTreeTest	The following objects are created: ∉ left1 as a new object of type ImageOnTree, with a value of 30 ∉ left11 as a new object of type ImageOnTree, con valor de 20 ∉ right12 as a new object of type ImageOnTree, con valor de 40 ∉ right2 as a new object of type ImageOnTree, con valor de 60 ∉ right22 as a new object of type ImageOnTree, con valor de 70 These references are added to the binary tree as it is shown in the following image: Tree distribution
setupStage1()	ImageTest	A new object of type Image with value of 3 is instanced.
setupStage()	ListOfImages	Empty
setupScenary1()	ListOfImages	A new object of type ListOfImages with its first reference equals to null.
setupScenary2()	ListOfImages	A new object of type ListOfImages and 6 new objects are added to the list with where their correspondent values are the described down below: 1. 3 2. 6 3. 2 4. 5 5. 4
setupScenary1	TreeOfImages	Empty
setupScenary2	TreeOfImages	An object of type TreeOfImages is initialized but with its < root > null attribute.
setupScenary3	TreeOfImages	The relationship with the class to be tested is initialized. 7 nodes are added to the tree with the following values: 5, 2, 4, 1, 7, 6, 8

Unitary Tests Design

(Tests Development)

Test Objective: This test verifies that a Song is created successfully when a valid path and audio format are delivered as parameters in the constructor.				
Class	**Method**	**Scenario**	**Input**	**Result**
Song	Song	setupScenario1	new File("music"+File.separator+"bensound-happyrock.mp3")	The song was created successfully.

Test Objective: This test verifies that a Song is not created successfully when an invalid path is delivered as parameter in the constructor.				
Class	**Method**	**Scenario**	**Input**	**Result**
Song	Song	setupScenario1	new File("idonotexist.mp3")	The song wasn't created successfully due to "idonotexist.mp3" is not a valid path.

Test Objective: This test verifies that a Song is not created successfully when a valid path but an invalid audio format are delivered as parameters in the constructor.				
Class	**Method**	**Scenario**	**Input**	**Result**
Song	Song	setupScenario1	new File("data"+File.separator+"testfile.txt")	The song wasn't created successfully due to testfile.txt is not a valid audio format.

Test Objective: This test verifies that a MusicFolder is created successfully when a non-existent folder path is given as parameter in the constructor.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	MusicFolder	setupScenario1	new File("idonotexist")	The music folder wasn't created successfully due to "idonotexist" is a folder that doesn't exist.

Test Objective: This test verifies that a MusicFolder is created successfully when a valid folder path with mp3 files is given as parameter in the constructor.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	MusicFolder	setupScenario1	new File("music")	The music folder was created successfully.

Test Objective: This test verifies that a MusicFolder is not created successfully when a valid folder path without mp3 files is given as parameter in the constructor.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	MusicFolder	setupScenario1	new File("test"+File.separator+"model")	The music folder wasn't created successfully due to test->model is a folder that doesn't have mp3 files inside.

Test Objective: This test verifies if the method inorder() from the Song BST returns a sorted list of songs.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	inorder()	setupScenario2	None	The returned list of songs is in order.

Test Objective: This test verifies if the method sortSongsByTitle() returns a list of songs sorted by title.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	sortSongsByTitle()	setupScenario2	None	The list is sorted by title.

Test Objective: This test verifies if the method sortSongsByAlbum() returns a list of songs sorted sorted by album.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	sortSongsByAlbum()	setupScenario2	None	The list is sorted by album.

Test Objective: This test verifies if the method sortSongsBySize() returns a list of songs sorted by size.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	sortSongsBySize()	setupScenario2	None	The list is sorted by size.

Test Objective: This test verifies if the method sortSongsByGenre() returns a list of songs sorted by genre.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	sortSongsByGenre()	setupScenario2	None	The list is sorted by genre.

Test Objective: This test verifies if the method sortSongsByArtist() returns a list of songs sorted by artist.				
Class	**Method**	**Scenario**	**Input**	**Result**
MusicFolder	sortSongsByArtist()	setupScenario2	None	The list is sorted by artist.

Test Objective: It is verified that the next is the one that should be.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnList	getNext()	setupStage2()	ImageOnList second = new ImageOnList(30); ImageOnList third = new ImageOnList(4); ImageOnList fourth = new ImageOnList(14);	The following of the reference "imageOnList" is equal to second, Next second is equal third, Next third is fourth.

Objective Test: It is verified that the following object was correctly placed in the list.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnList	setNext()	setupStage2()		Empty If the following object was correctly placed.

Test Objective: It is verified that the previous one in the list is the one that should be.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnList	getPrevious()	setupStage2()	None	Empty If you got the previous object correctly.

Objective Test: It is verified that the previous one was correctly set.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnList	setPrevious()	setupStage2()	None	Empty If you put the previous object correctly.

Objective Test — Check that the status of the objects is indicated.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnList	isSelected()	setupStage2()	None	Empty If the states of each object are the corresponding ones.

Objective Test — verifies that the status of objects is correctly changed.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnList	getPrevious()	setupStage2()	None	Empty If you put the following object correctly

Objective test: Proving that the root is not NULL after adding the first object.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnTree	ImageOnTree(int value)	setupStage2()	value = 50	Empty If the root is different from null

Objective test: Test whether the objects on the left are correctly obtained.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnTree	getLeft()	setupStage2()	None	Empty If the corresponding objects are returned and Null in the cases that apply.

Objective Test: Test If you put an object correctly on the left.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnTree	setLeft(imageOnTree toAdd)	setupStage2()	ImageOnTree TMP type Object, valued at 35 ImageOnTree TMP2 type Object, valued at 55	Empty If objects were successfully added to the left

Objective test: Test if the corresponding object is obtained on the right.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnTree	getRight method()	setupStage2()	None	Empty If the corresponding objects were obtained and null when applied.

Objective test: Proving that an object was successfully added to the right.				
Class	**Method**	**Scenario**	**Input**	**Result**
ImageOnTree	setRight(imageOnTree toAdd)	setupStage2()	ImageOnTree TMP type Object, valued at 55 ImageOnTree TMP2 type Object, valued at 45	Empty If the corresponding objects were successfully added

Objective test: Proving that the value corresponding to the instantiated object is obtained.				
Class	**Method**	**Scenario**	**Input**	**Result**
Image	getValue()	setupStage1()	None	Empty If the value of the obtained object is equal to the value that was assigned.

Objective test: Proving that the value was successfully changed to an already created Image object.				
Class	**Method**	**Scenario**	**Input**	**Result**
Image	setValue(Int value)	setupStage1()	value = 50	Empty If you put the value, you passed by parameter correctly.

Objective test: Proving that the value of the Image-type object was converted to String.				
Class	**Method**	**Scenario**	**Input**	**Result**
Image	toString()	setupStage1()	None	Empty If the text strings of the instantiated object are equal to what it should be when you convert it to String.

Objective test: Proves that the next object Fuand selected.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	selectNext()	setupStage2()	None	Empty If the state of the next object of the first is selected.

Objective test: Proves that a new ListOfImages type object is successfully created.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	ListOfImages()	setupStage()	None	Empty If the list is different from null.

Objective test: Proving that the objects were added in the specified order.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	addNode()	setupStage2()	Those of the setupStage2 ()	Empty If the nodes that were added are not null and if the objects were added the specified order

Objective test: Proving that the first object is equal to the first aggregate and is different from null.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	getFirst()	setupStage2()	None	Empty If the value of the first object is the corresponding one and is different from null.

Objective test: Proving that a new element was put as the first element.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	setFirst(ImageOnList toAdd)	setupStage2()	An object type ImageOnList temp with a value of 21	Empty If the first is different from null and first is the same as the one that was just placed as new first.

Objective test: Prove that the size of the ListOfImages is correct.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	size()	setupStage2()	None	Empty If the size of the list is equal to the corresponding value.

Objective test: Test the previous object was selected to run.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	selectPrevious()	setupStage2()	None	Empty If the object was successfully selected .

Objective test: Proving that the last item in the list is successfully obtained.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	getLastNode()	setupStage2()	None	Empty If object taken is the same as last.

Objective test: Proving that the last item in the list is selected.				
Class	**Method**	**Scenario**	**Input**	**Result**
ListOfImages	lastSelected()	setupStage2()	None	Empty If the state of the last object corresponds to the one that should have

Objective test: Proving that the constructor of the TreeOfImages class creates asuccessful instance.				
Class	**Method**	**Scenario**	**Input**	**Result**
TreeOfImages	TreeOfImages	setupScenary1	None	An instance of the TreeOfImages class is created correctly. Its (root) attribute is null.

Objective test: Proving that a node is successfully added to the image tree.				
Class	**Method**	**Scenario**	**Input**	**Result**
TreeOfImages	addNode(value:int)	setupScenary3	- value = 10	A node is added to the ImageOnTree type tree whose Attributo (value) is equal to 10.
TreeOfImages	addNode(n:ImageOnTree, current: ImageOnTree)	setupScenary3	ImageOnTree n: ● value = 9	Add the input node, taking as the start node the root of the tree that, in the current scenario, is the one whose attribute < value > is 5.

Objective test: Proving that when a random node is selected, it belongs to the tree.				
Class	**Method**	**Scenario**	**Input**	**Result**
TreeOfImages	selectRandomNode	setupScenary3	None	It looks for the value of the resulting node within the tree and verifies that the node actually belongs to the tree.

Objective test: Proving that extreme cases do not happen when you select a random node many times from the tree.				
Class	**Method**	**Scenario**	**Input**	**Result**
TreeOfImages	selectRandomNode2	setupScenary3	2000 random nodes selected from the tree.	It is verified that the extreme cases evaluated (1. That after 2000 selections, a node has never been selected and 2. That a single node has been selected the 2000 times.

Objective test: Proving that the size method returns the current weight of the tree.				
Class	**Method**	**Scenario**	**Input**	**Result**
TreeOfImages	size	setupScenary2	None	The method returns 0 since the tree is empty.
TreeOfImages	size	setupScenary3	None	The method returns 7 since that is the number of nodes in the tree.

Objective test: Proving that the getRoot method returns the correct reference.				
Class	**Method**	**Scenario**	**Input**	**Result**
TreeOfImages	getRoot	setupScenary2	None	The method returns null.
TreeOfImages	getRoot	setupScenary3	None	The method returns the current tree node whose Attributo < value > is equal to 5.