



As it can be seen from the picture the GUI class works by giving the user an actual graphical interface to work with. This interface includes all of the entries with their details (name, initials, extension number) nicely put into a table. Also it allows the user to do things such as look up an entry by using the name of the person or adding a completely new entry and also editing a pre-existing entry.

The testing class is where all of these features are executed to test whether they work properly, the results are sufficient for all of the tasks.

e.g.

(Deleting an Entry)

Name	Initials	Number
Alexis	L.M.V.S	11011
Arya	M.V.P	42000
Bill	A.K	47104
Elisabeth	C.M.N.P	21394
Emilia	B.M.C	98934
Garret	A.M.D	34549
Heart	A.M.F	54321
John	A.M.N.P	24411
Kein	N.A	48003
Kevin	A.T.P	10054
Khaleese	G.O.T	02001
Lanister	S.S.G	00299
Maria	G.T.L.P	80006
Mario	C.H	02219
Mastras	A.P.O	33333
Milo	J.M.N.P	89922
nathan	E.E.P	22012
Paul	W.M.N.P	12345
Peter	X.M.N.P	99905
robert	C.B.M	00522
smith	N.J.I	92834
Snow	G.M.U.P	10101
West	Q.S.W	00122
William	A.M.K.Y	01010

deleted Garret

Name	Initials	Number
Alexis	L.M.V.S	11011
Arya	M.V.P	42000
Bill	A.K	47104
Elisabeth	C.M.N.P	21394
Emilia	B.M.C	98934
Heart	A.M.F	54321
John	A.M.N.P	24411
Kein	N.A	48003
Kevin	A.T.P	10054
Khaleese	G.O.T	02001
Lanister	S.S.G	00299
Maria	G.T.L.P	80006
Mario	C.H	02219
Mastras	A.P.O	33333
Milo	J.M.N.P	89922
nathan	E.E.P	22012
Paul	W.M.N.P	12345
Peter	X.M.N.P	99905
robert	C.B.M	00522
smith	N.J.I	92834
Snow	G.M.U.P	10101
West	Q.S.W	00122
William	A.M.K.Y	01010

(Finding and changing the Extension Number of a person)

Name	Initials	Number
Alexis	L.M.V.S	11011
Arya	M.V.P	42000
Bill	A.K	47104
Elisabeth	C.M.N.P	21394
Emilia	B.M.C	98934
Heart	A.M.F	54321
John	A.M.N.P	24411
Kein	N.A	48003
Kevin	A.T.P	10054
Khaleese	G.O.T	02001
Lanister	S.S.G	00299
Maria	G.T.L.P	80006
Mario	C.H	02219
Mastras	A.P.O	33333
Milo	J.M.N.P	89922
nathan	E.E.P	22012
Paul	W.M.N.P	12345
Peter	X.M.N.P	99905
robert	C.B.M	00522
smith	N.J.I	92834
Snow	G.M.U.P	10101
West	Q.S.W	00122
William	A.M.K.Y	01010

number of Alexis - 11011

changed the phone number of John to 11250

Name	Initials	Number
Alexis	L.M.V.S	11011
Arya	M.V.P	42000
Bill	A.K	47104
Elisabeth	C.M.N.P	21394
Emilia	B.M.C	98934
Heart	A.M.F	54321
John	A.M.N.P	11250
Kein	N.A	48003
Kevin	A.T.P	10054
Khaleese	G.O.T	02001
Lanister	S.S.G	00299
Maria	G.T.L.P	80006
Mario	C.H	02219
Mastras	A.P.O	33333
Milo	J.M.N.P	89922
nathan	E.E.P	22012
Paul	W.M.N.P	12345
Peter	X.M.N.P	99905
robert	C.B.M	00522
smith	N.J.I	92834
Snow	G.M.U.P	10101
West	Q.S.W	00122
William	A.M.K.Y	01010

The timing results of the directory classes are evident below, with significant differences in efficiency between them. The recorded times are for looking up a pre-existing entry and inserting a new one in the directory.

```
@ Javadoc Declaration Console
<terminated> Testing [Java Application] C:\Program Files\Java\jdk1.8.0_181\bin\javaw.exe
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PERFORMANCE :
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Array Directory

Average time for inserting a new entry = 32400.0 ns
Average time for looking up an entry = 7071.1 ns

List Directory

Average time for inserting a new entry = 27400.0 ns
Average time for looking up an entry = 3917.4 ns

Best time for inserting a new entry = 48800.0 ns
Best time for looking up an entry = 190.4 ns

Worst time for inserting a new entry = 43800.0 ns
Worst time for looking up an entry = 3027.8 ns

HashDirectory

Average time for inserting a new entry = 53400.0 ns
Average time for looking up an entry = 3586.2 ns

Best time for inserting a new entry = 36300.0 ns
Best time for looking up an entry = 1881.1 ns

Worst time for inserting a new entry = 18000.0 ns
Worst time for lookign up an entry = 741.2 ns
```