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Tracing.java

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1 //=====
2 //      * Letsch Informatik *      www.LetsInfo.ch      CH-8636 Wald
3 //      Beratung, Ausbildung und Realisation in Software-Engineering
4 //=====
5 // Project   : Certificate of Advanced Studies in Software-Engineering for UBS 2011
6 // Modul    : Java - Advanced Concepts
7 // Title    : Übung 2 / "Annotations und Reflection"
8 // Author   : Thomas Letsch
9 // Tab-Width : 2
10 //////////////////////////////////////////////////
11 * Description: Einsatz von Annotation und Reflection am Beispiel von Traceability.
12 * History   : 17.03.07: Initial Version.
13 *          : 18.01.08: bin-Dir, Kosmetik.
14 *          : 21.01.08: filenames sortiert (es ist keine Ordnung spezifiziert
15 *                  für File.list()).
16 *          : 11.06.08: Kosmetik.
17 * CVS      : $Revision: 1.14 $ $Date: 2012/05/03 11:16:17 $
18 //////////////////////////////////////////////////
19 //          1          2          3          4          5          6          7          8
20 //34567890123456789012345678901234567890123456789012345678901234567890
21 //=====
22
23
24 import static java.lang.System.out;
25
26 import java.lang.annotation.ElementType;
27 import java.lang.annotation.Retention;
28 import java.lang.annotation.RetentionPolicy;
29 import java.lang.annotation.Target;
30 import java.io.File;
31 import java.util.ArrayList;
32 import java.util.Arrays;
33 import java.util.List;
34
35
36
37 // Annotations:
38 @Target(ElementType.TYPE)
39 @Retention(RetentionPolicy.RUNTIME)
40 @interface Tracing {
41     Ident ident();
42     Ident[] refs();
43     String contact() default "-";
44 }
45
46
47
48 @interface Ident {
49     IdentType type();
50     int nr();
51 }
52
53
54 enum IdentType { UC, DE, IM}
55
56

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57
58 // Test-Sceanario:
59
60 @Tracing(ident=@Ident(type=IdentType.DE, nr=1),
61         refs=@Ident(type=IdentType.UC, nr=1), @Ident(type=IdentType.UC, nr=2))
62 class DesignClass1 {
63 }
64
65 @Tracing(ident=@Ident(type=IdentType.DE, nr=2),
66         refs=@Ident(type=IdentType.UC, nr=2)),
67         contact="John Smith")
68 class DesignClass2 {
69 }
70
71 @Tracing(ident=@Ident(type=IdentType.DE, nr=3),
72         refs=@Ident(type=IdentType.UC, nr=1))
73 class DesignClass3 {
74 }
75
76 @Tracing(ident=@Ident(type=IdentType.IM, nr=1),
77         refs=@Ident(type=IdentType.DE, nr=1))
78 class ImplClass1 {
79 }
80
81 @Tracing(ident=@Ident(type=IdentType.IM, nr=2),
82         refs=@Ident(type=IdentType.DE, nr=1), @Ident(type=IdentType.DE, nr=2))
83 class ImplClass2 {
84 }
85
86 @Tracing(ident=@Ident(type=IdentType.IM, nr=3),
87         refs=@Ident(type=IdentType.DE, nr=2))
88 class ImplClass3 {
89 }
90
91 @Tracing(ident=@Ident(type=IdentType.IM, nr=9),
92         refs=@Ident(type=IdentType.IM, nr=3)),
93         contact="Tom Miller")
94 class ImplClass9 {
95 }
96
97

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98
99 class TracingTest {
100
101
102
103     private static void printAnnotations(List<Class<?>> pTracingTypes) {
104         for (Class<?> actualClass: pTracingTypes) {
105             print("", actualClass);
106         }
107     }
108
109
110
111     private static void print(String pPrefix, Class<?> pActualClass) {
112         out.print(pPrefix);
113         out.printf("%-13s: ", pActualClass.getName());
114         Tracing t = pActualClass.getAnnotation(Tracing.class);
115         out.printf("Ident: %s:%-4d: ", t.ident().type(), t.ident().nr());
116         String allIdentsStr = "";
117         for (Ident ident: t.refs()) {
118             allIdentsStr = allIdentsStr + getIdentString(ident)+",";
119         }
120         // deleting last ',':
121         allIdentsStr = allIdentsStr.substring(0, allIdentsStr.length()-1);
122         out.printf("Refs: %-12s: ", allIdentsStr);
123         out.println("Contact: " + t.contact());
124     }
125
126
127
128     private static String getIdentString(Ident pIdent) {
129         return String.format("%s:%d", pIdent.type(), pIdent.nr());
130     }
131
132
133
134     private static void searchFor(List<Class<?>> pTracingTypes, IdentType pIT,
135                                 int pNr, String pPrefix) {
136         for (Class<?> actualClass: pTracingTypes) {
137             Tracing t = actualClass.getAnnotation(Tracing.class);
138             for (Ident id: t.refs()) {
139                 if ((id.type() == pIT) && (id.nr() == pNr)) {
140                     print(pPrefix, actualClass);
141                     searchFor(pTracingTypes, t.ident().type(), t.ident().nr(), pPrefix+" ")
142                 }
143             }
144         }
145     }
146
147

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148
149     public static void main(String[] pArgs) {
150         if (pArgs.length == 0) {
151             System.err.println("ERROR: no Argument ! (e.g. \"\nUC:2\n)\");
152             System.exit(1);
153         }
154         File binDir = new File("bin"); // Class-Directory
155         List<Class<?>> tracingTypes = new ArrayList<Class<?>>();
156         out.print("\nTesting all Files in the bin-Directory: ");
157         String[] filenames = binDir.list();
158         // File.list() does not guarantee a specific order. So we sort the filenames:
159         Arrays.sort(filenames);
160         for (String filename: filenames) {
161             out.print("\nFile: "+filename);
162             if (! filename.matches(".*\\.class$")) // ".class" at End of Filename ?
163                 continue; // this is not a Classfile
164             String classname = filename.substring(0, filename.lastIndexOf(".class"));
165             out.print(" - loading...");
166             Class<?> c = null;
167             try {
168                 c = Class.forName(classname);
169             } catch (ClassNotFoundException e) {
170                 e.printStackTrace();
171             }
172             Tracing t = c.getAnnotation(Tracing.class);
173             if (t != null) {
174                 out.print(" found Tracing-Annotation!");
175                 tracingTypes.add(c);
176             }
177         }
178
179         // Aufgabe 2.a):
180         out.println("\n\nPrinting all Tracing-Annotations:");
181         printAnnotations(tracingTypes);
182
183         // Aufgabe 2.b):
184         out.println("\n\nSearching for: \""+pArgs[0]+"\"");
185         String[] x = pArgs[0].split(":");
186         String type = x[0];
187         IdentType identType = IdentType.valueOf(type);
188         int nr = Integer.valueOf(x[1]);
189         searchFor(tracingTypes, identType, nr, "");
190
191     } // End of main()
192
193
194
195 } // End of class TracingTest
196
197
198
199

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200 |
201 | /* Session-Log:
202 |
203 | $ java -cp bin TracingTest UC:2
204 |
205 | Testing all Files in the bin-Directory:
206 | File: DesignClass1.class - loading... found Tracing-Annotation!
207 | File: DesignClass2.class - loading... found Tracing-Annotation!
208 | File: DesignClass3.class - loading... found Tracing-Annotation!
209 | File: Ident.class - loading...
210 | File: IdentType.class - loading...
211 | File: ImplClass1.class - loading... found Tracing-Annotation!
212 | File: ImplClass2.class - loading... found Tracing-Annotation!
213 | File: ImplClass3.class - loading... found Tracing-Annotation!
214 | File: ImplClass9.class - loading... found Tracing-Annotation!
215 | File: Tracing.class - loading...
216 | File: TracingTest.class - loading...
217 |
218 | Printing all Tracing-Annotations:
219 | DesignClass1 : Ident: DE:1 : Refs: UC:1,UC:2 : Contact: -
220 | DesignClass2 : Ident: DE:2 : Refs: UC:2 : Contact: John Smith
221 | DesignClass3 : Ident: DE:3 : Refs: UC:1 : Contact: -
222 | ImplClass1 : Ident: IM:1 : Refs: DE:1 : Contact: -
223 | ImplClass2 : Ident: IM:2 : Refs: DE:1,DE:2 : Contact: -
224 | ImplClass3 : Ident: IM:3 : Refs: DE:2 : Contact: -
225 | ImplClass9 : Ident: IM:9 : Refs: IM:3 : Contact: Tom Miller
226 |
227 |
228 | Searching for: "UC:2"
229 | DesignClass1 : Ident: DE:1 : Refs: UC:1,UC:2 : Contact: -
230 | ImplClass1 : Ident: IM:1 : Refs: DE:1 : Contact: -
231 | ImplClass2 : Ident: IM:2 : Refs: DE:1,DE:2 : Contact: -
232 | DesignClass2 : Ident: DE:2 : Refs: UC:2 : Contact: John Smith
233 | ImplClass2 : Ident: IM:2 : Refs: DE:1,DE:2 : Contact: -
234 | ImplClass3 : Ident: IM:3 : Refs: DE:2 : Contact: -
235 | ImplClass9 : Ident: IM:9 : Refs: IM:3 : Contact: Tom Miller
236 |
237 | */
238 |
```