

UNIVERSIDAD MARIANO GÁLVEZ DE GUATEMALA



TAREA




**MAVEN + DEPENDENCIAS + VALIDACIÓN DE EXPRESIONES +
OFUSCACIÓN**

1966

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0905-24-15384

PROGRAMACIÓN 3
FEBRERO 2026

DESCARGAR EL ZIP Y EXTRAER TODO LO QUE CONTIENE EN EL

<input type="checkbox"/> Nombre	Fecha de modificación	Tipo	Tam
▼ hoy			
 umg.edu.gt.data-structure.stack	20/02/2026 15:31	Carpeta de archivos	
 stackHandler	20/02/2026 15:15	Carpeta de archivos	
▼ ayer			
<input type="checkbox"/>  _MACOSX	19/02/2026 22:05	Carpeta de archivos	

ENTRAMOS DESDE CMD PARA HACER LO SIGUIENTE

Entramos a la carpeta del proyecto, revisamos sus archivos y nos colocamos en la posición correcta para ejecutar con Maven

```
C:\WINDOWS\system32\CMD x + v - □ x
Microsoft Windows [Versión 10.0.26100.7623]
(c) Microsoft Corporation. Todos los derechos reservados.

C:\Users\aronq>cd "C:\Users\aronq\Downloads\Practica Pilas + Maven"

C:\Users\aronq\Downloads\Practica Pilas + Maven>dir
El volumen de la unidad C es OS
El número de serie del volumen es: F6B6-F327

Directorio de C:\Users\aronq\Downloads\Practica Pilas + Ma
ven
19/02/2026  22:05    <DIR>          .
19/02/2026  22:05    <DIR>          ..
19/02/2026  22:05    <DIR>          stackHandler
19/02/2026  22:05    <DIR>          umg.edu.gt.data-structu
re.stack
19/02/2026  22:05    <DIR>          __MACOSX
                0 archivos            0 bytes
                5 dirs  213,862,342,656 bytes libres

C:\Users\aronq\Downloads\Practica Pilas + Maven>
```

Limpe el proyecto

Descargue dependencias

Compile el código

Compile y ejecute pruebas

Genere los archivos en la carpeta target

```
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ umg.edu.gt.data-structure.stack ---
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-common/3.2.5/maven-surefire-common-3.2.5.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-api/3.2.5/surefire-api-3.2.5.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-logger-api/3.2.5/surefire-logger-api-3.2.5.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-booter/3.2.5/surefire-booter-3.2.5.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-extensions-api/3.2.5/surefire-extensions-api-3.2.5.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/maven-surefire-common/3.2.5/maven-surefire-common-3.2.5.jar (308 kB at 779 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-extensions-spi/3.2.5/surefire-extensions-spi-3.2.5.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-logger-api/3.2.5/surefire-logger-api-3.2.5.jar (14 kB at 31 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/eclipse/aether/aether-util/1.0.0.v20140518/aether-util-1.0.0.v20140518.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-extensions-api/3.2.5/surefire-extensions-api-3.2.5.jar (26 kB at 56 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/eclipse/aether/aether-api/1.0.0.v20140518/aether-api-1.0.0.v20140518.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-api/3.2.5/surefire-api-3.2.5.jar (171 kB at 328 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-common-artifact-filters/3.1.1/maven-common-artifact-filters-3.1.1.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-extensions-spi/3.2.5/surefire-extensions-spi-3.2.5.jar (8.2 kB at 14 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/commons-io/commons-io/2.15.1/commons-io-2.15.1.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-booter/3.2.5/surefire-booter-3.2.5.jar (118 kB at 172 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-shared-utils/3.2.5/surefire-shared-utils-3.2.5.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-common-artifact-filters/3.1.1/maven-common-artifact-filters-3.1.1.jar (61 kB at 80 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/eclipse/aether/aether-api/1.0.0.v20140518/aether-api-1.0.0.v20140518.jar (136 kB at 153 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/eclipse/aether/aether-util/1.0.0.v20140518/aether-util-1.0.0.v20140518.jar (146 kB at 163 kB/s)
```

Maven terminó de compilar, probar y empaquetar el proyecto correctamente, mostrando BUILD SUCCESS.

```
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-shared-utils/3.2.5/surefire-shared-utils-3.2.5.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-common-artifact-filters/3.1.1/maven-common-artifact-filters-3.1.1.jar (61 kB at 80 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/eclipse/aether/aether-api/1.0.0.v20140518/aether-api-1.0.0.v20140518.jar (136 kB at 153 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/eclipse/aether/aether-util/1.0.0.v20140518/aether-util-1.0.0.v20140518.jar (146 kB at 163 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/commons-io/commons-io/2.15.1/commons-io-2.15.1.jar (501 kB at 397 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-shared-utils/3.2.5/surefire-shared-utils-3.2.5.jar (2.4 MB at 939 kB/s)
[INFO] --- jar:3.4.1:jar (default-jar) @ umg.edu.gt.data-structure.stack ---
[INFO] Building jar: C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack\target\umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.jar
[INFO]
[INFO] --- install:3.1.2:install (default-install) @ umg.edu.gt.data-structure.stack ---
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/resolver/maven-resolver-util/1.9.18/maven-resolver-util-1.9.18.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/resolver/maven-resolver-api/1.9.18/maven-resolver-api-1.9.18.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/resolver/maven-resolver-util/1.9.18/maven-resolver-util-1.9.18.jar (196 kB at 645 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/resolver/maven-resolver-api/1.9.18/maven-resolver-api-1.9.18.jar (157 kB at 361 kB/s)
[INFO] Installing C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack\pom.xml to C:\Users\aronq\m2\repository\umg\edu\gt\data-structure\umg.edu.gt.data-structure.stack\0.0.3-SNAPSHOT\umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.pom
[INFO] Installing C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack\target\umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.jar to C:\Users\aronq\m2\repository\umg\edu\gt\data-structure\umg.edu.gt.data-structure.stack\0.0.3-SNAPSHOT\umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.jar
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 8.129 s
[INFO] Finished at: 2026-02-19T23:22:05-06:00
[INFO]
C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack>
```

Ejecute mvn clean package, y Maven está descargando dependencias y empaquetando el proyecto en un archivo JAR.

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack>cd ..
C:\Users\aronq\Downloads\Practica Pilas + Maven>cd stackHandler
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>mvn clean package
[INFO] Scanning for projects...
[INFO]
[INFO] -----< umg.edu.gt.data-structure:stackHandler >-----
[INFO] Building stackHandler 0.0.1-SNAPSHOT
[INFO] from pom.xml
[INFO]
[INFO] -----[ jar ]-----
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-compiler-plugin/3.14.0/maven-compiler-plugin-3.14.0.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-compiler-plugin/3.14.0/maven-compiler-plugin-3.14.0.pom (9.5 kB at 6.9 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/43/maven-plugins-43.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-plugins/43/maven-plugins-43.pom (7.5 kB at 13 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/junit/junit-bom/5.10.3/junit-bom-5.10.3.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/junit/junit-bom/5.10.3/junit-bom-5.10.3.pom (5.6 kB at 45 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-compiler-plugin/3.14.0/maven-compiler-plugin-3.14.0.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-compiler-plugin/3.14.0/maven-compiler-plugin-3.14.0.jar (83 kB at 274 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-jar-plugin/3.4.2/maven-jar-plugin-3.4.2.pom
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-jar-plugin/3.4.2/maven-jar-plugin-3.4.2.pom (7.7 kB at 58 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-jar-plugin/3.4.2/maven-jar-plugin-3.4.2.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/plugins/maven-jar-plugin/3.4.2/maven-jar-plugin-3.4.2.jar (207 kB at 107 kB/s)
```

Maven terminó de descargar dependencias y confirmó que la construcción del proyecto fue exitosa con BUILD SUCCESS.

```
C:\WINDOWS\system32\CMD
Downloaded from central: https://repo.maven.apache.org/maven2/org/ow2/asm/asm-9.7/asm-9.7.jar (125 kB at 26 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-common-artifact-filters/3.4.0/maven-common-artifact-filters-3.4.0.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/commons/commons-compress/1.26.2/commons-compress-1.26.2.jar (1.1 MB at 215 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-artifact-transfer/0.13.1/maven-artifact-transfer-0.13.1.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/commons/commons-lang3/3.17.0/commons-lang3-3.17.0.jar (674 kB at 133 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-component-annotations/2.0.0/plexus-component-annotations-2.0.0.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-dependency-tree/3.3.0/maven-dependency-tree-3.3.0.jar (43 kB at 8.4 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/resolver/maven-resolver-util/1.4.1/maven-resolver-util-1.4.1.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/codehaus/plexus/plexus-component-annotations/2.0.0/plexus-component-annotations-2.0.0.jar (4.2 kB at 816 B/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-common-artifact-filters/3.4.0/maven-common-artifact-filters-3.4.0.jar (58 kB at 11 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-artifact-transfer/0.13.1/maven-artifact-transfer-0.13.1.jar (159 kB at 29 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/resolver/maven-resolver-util/1.4.1/maven-resolver-util-1.4.1.jar (168 kB at 30 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/com/github/luben/zstd-jni/1.5.6-3/zstd-jni-1.5.6-3.jar (6.7 MB at 397 kB/s)
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 39.211 s
[INFO] Finished at: 2026-02-19T23:28:04-06:00
[INFO] -----
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>
```

Tuve este problema

El JAR falla al ejecutarse porque falta la clase StackLinked, lo que provoca un error NoClassDefFoundError.

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>java -jar stackHandler-0.0.1-SNAPSHOT.jar
Exception in thread "main" java.lang.NoClassDefFoundError: umg/edu/gt/data_structure/stack/manual/StackLinked
    at stackHandler.handler.Main.main(Main.java:8)
Caused by: java.lang.ClassNotFoundException: umg.edu.gt.data_structure.stack.manual.StackLinked
    at java.net.URLClassLoader.findClass(Unknown Source)
    at java.lang.ClassLoader.loadClass(Unknown Source)
    at sun.misc.Launcher$AppClassLoader.loadClass(Unknown Source)
    at java.lang.ClassLoader.loadClass(Unknown Source)
    ... 1 more
```

solucione editando el pom.xml y volviendo a ejecutar

Maven creó un JAR “shaded” con todas las dependencias incluidas y confirmó que todo salió bien con BUILD SUCCESS.

```
i/1.7.32/slf4j-api-1.7.32.jar (42 kB at 65 kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/commons/commons-collections4/4.4/commons-collections4-4.4.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shaded/maven-dependency-tree/3.2.1/maven-dependency-tree-3.2.1.jar (43 kB at 59 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/ow2/asm/asm/9.5/asm-9.5.jar (122 kB at 154 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/vafer/jdependency/2.8.0/jdependency-2.8.0.jar (233 kB at 201 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/commons-io/commons-io/2.13.0/commons-io-2.13.0.jar (484 kB at 384 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/commons/commons-collections4/4.4/commons-collections4-4.4.jar (752 kB at 397 kB/s)
[INFO] Including umg.edu.gt.data-structure:umg.edu.gt.data-structure.stack:jar:0.0.3-SNAPSHOT in the shaded jar.
[WARNING] stackHandler-0.0.1-SNAPSHOT.jar, umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.jar define 1 overlapping resource:
[WARNING]   - META-INF/MANIFEST.MF
[WARNING] maven-shade-plugin has detected that some files are
[WARNING] present in two or more JARs. When this happens, only one
[WARNING] single version of the file is copied to the uber jar.
[WARNING] Usually this is not harmful and you can skip these warnings,
[WARNING] otherwise try to manually exclude artifacts based on
[WARNING] mvn dependency:tree -Ddetail=true and the above output.
[WARNING] See https://maven.apache.org/plugins/maven-shade-plugin/
[INFO] Replacing original artifact with shaded artifact.
[INFO] Replacing C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target\stackHandler-0.0.1-SNAPSHOT.jar with C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target\stackHandler-0.0.1-SNAPSHOT-shaded.jar
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 7.567 s
[INFO] Finished at: 2026-02-20T00:10:13-06:00
[INFO] -----
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>
```

La carpeta target muestra que Maven generó el JAR del proyecto junto con los archivos compilados y las carpetas internas que usa para construir y probar.

```

Directorio de C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\tar
get
10/02/2026 00:10 <DIR> .
10/02/2026 00:10 <DIR> ..
10/02/2026 00:10 <DIR> classes
10/02/2026 00:10 <DIR> generated-sources
10/02/2026 00:10 <DIR> generated-test-sources
10/02/2026 00:10 <DIR> maven-archiver
10/02/2026 00:10 <DIR> maven-status
10/02/2026 00:10 3,431 original-stackHandler-0.0.1-SNAPSHOT.jar
10/02/2026 00:10 9,074 stackHandler-0.0.1-SNAPSHOT.jar
10/02/2026 00:10 <DIR> test-classes
      2 archivos      12,505 bytes
      8 dirs 213,306,306,560 bytes libres

C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>

```

Caso

Se ejecuto el JAR correctamente con el parámetro (a+b) y el programa mostró las operaciones de la pila (push, peek, pop) funcionando sin errores

```

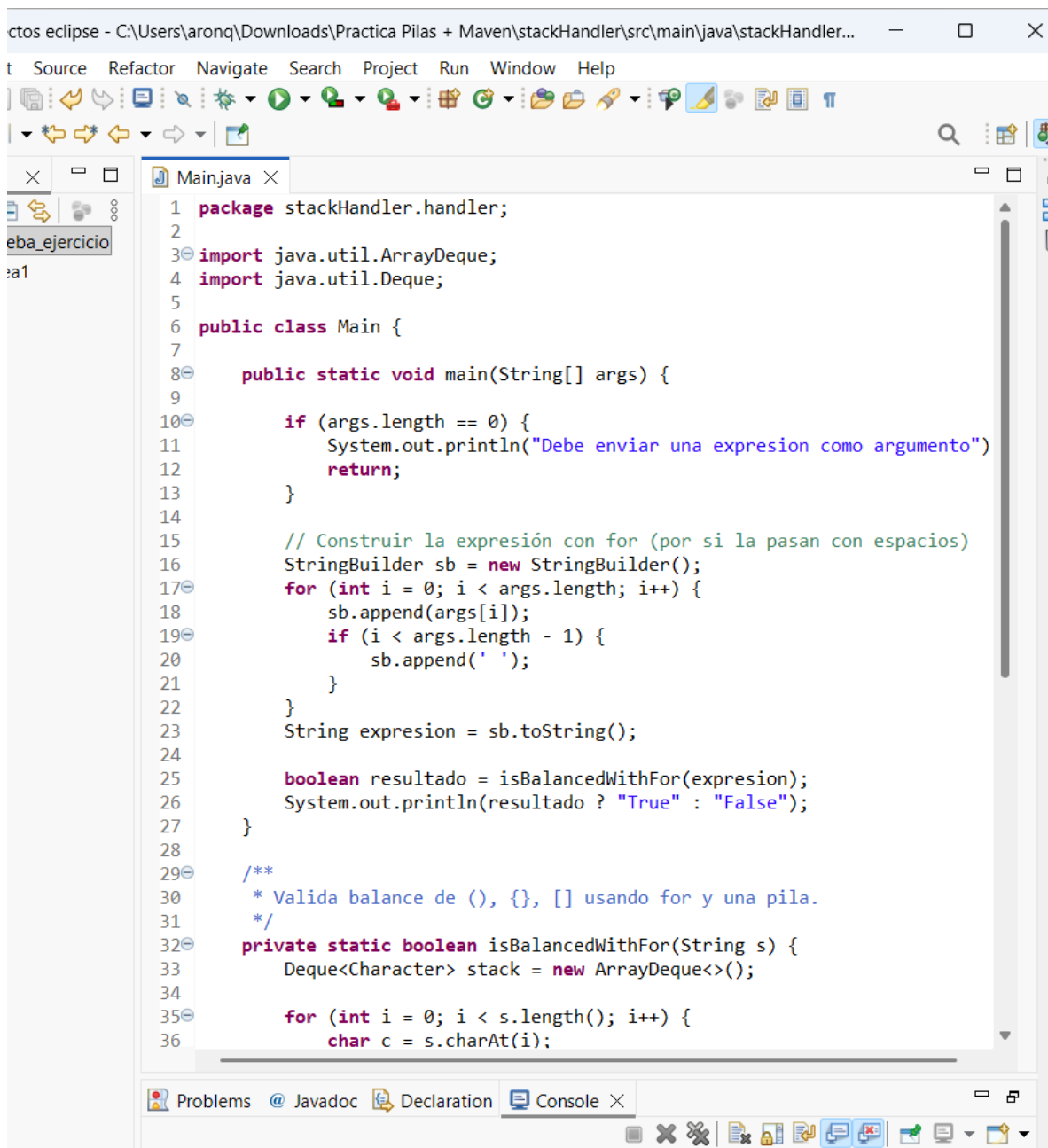
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>java -jar s
tackHandler-0.0.1-SNAPSHOT.jar "(a+b)"
Tamaño? 3
Peek: C
Pop: C
Peek: B
Pop: B
Vacía? false
Pop: A
Vacía? true
Pop: 0

C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>

```

Antes de modificar el main

Se modifíco la clase Main que construye la expresión recibida por argumentos y valida si los paréntesis están balanceados usando una pila.



```
1 package stackHandler.handler;
2
3 import java.util.ArrayDeque;
4 import java.util.Deque;
5
6 public class Main {
7
8     public static void main(String[] args) {
9
10         if (args.length == 0) {
11             System.out.println("Debe enviar una expresion como argumento")
12             return;
13         }
14
15         // Construir la expresion con for (por si la pasan con espacios)
16         StringBuilder sb = new StringBuilder();
17         for (int i = 0; i < args.length; i++) {
18             sb.append(args[i]);
19             if (i < args.length - 1) {
20                 sb.append(' ');
21             }
22         }
23         String expresion = sb.toString();
24
25         boolean resultado = isBalancedWithFor(expresion);
26         System.out.println(resultado ? "True" : "False");
27     }
28
29     /**
30      * Valida balance de (), {}, [] usando for y una pila.
31      */
32     private static boolean isBalancedWithFor(String s) {
33         Deque<Character> stack = new ArrayDeque<>();
34
35         for (int i = 0; i < s.length(); i++) {
36             char c = s.charAt(i);
```

Para que funcione en consola de la siguiente manera

El build se completó correctamente y luego se ejecuto el JAR desde la carpeta target, mostrando resultados distintos según si la expresión estaba balanceada o no.


```
C:\WINDOWS\system32\CMD x + v
.0.3-SNAPSHOT.jar define 1 overlapping resource:
[WARNING] - META-INF/MANIFEST.MF
[WARNING] maven-shade-plugin has detected that some files are
[WARNING] present in two or more JARs. When this happens, only one
[WARNING] single version of the file is copied to the uber jar.
[WARNING] Usually this is not harmful and you can skip these warnings,
[WARNING] otherwise try to manually exclude artifacts based on
[WARNING] mvn dependency:tree -Ddetail=true and the above output.
[WARNING] See https://maven.apache.org/plugins/maven-shade-plugin/
[INFO] Replacing original artifact with shaded artifact.
[INFO] Replacing C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandle
r\target\stackHandler-0.0.1-SNAPSHOT.jar with C:\Users\aronq\Downloads\Pract
ica Pilas + Maven\stackHandler\target\stackHandler-0.0.1-SNAPSHOT-shaded.jar
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 2.638 s
[INFO] Finished at: 2026-02-20T01:18:35-06:00
[INFO] -----

C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>java -jar stack
Handler-0.0.1-SNAPSHOT.jar "(a+b)"
Error: Unable to access jarfile stackHandler-0.0.1-SNAPSHOT.jar

C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>cd target

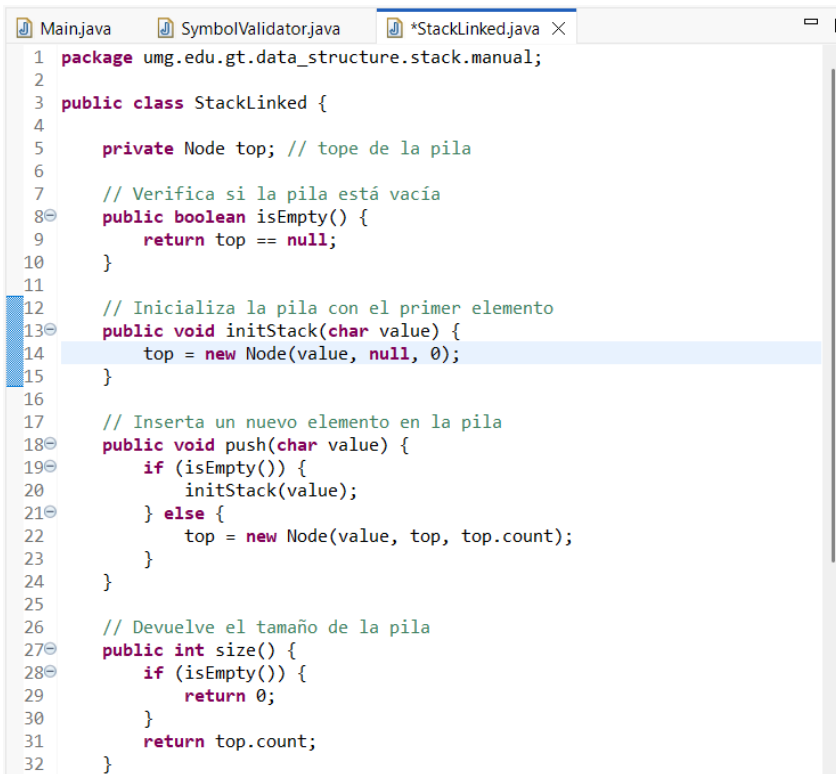
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>java -ja
r stackHandler-0.0.1-SNAPSHOT.jar "(a+b)"
True

C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>java -ja
r stackHandler-0.0.1-SNAPSHOT.jar "([])"
False

C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>
```

Edición de la pila stack para que funcionara correctamente

Se implemento una pila enlazada con métodos para iniciar, insertar, verificar si está vacía y obtener su tamaño.



```

1 package umg.edu.gt.data_structure.stack.manual;
2
3 public class StackLinked {
4
5     private Node top; // tope de la pila
6
7     // Verifica si la pila está vacía
8     public boolean isEmpty() {
9         return top == null;
10    }
11
12    // Inicializa la pila con el primer elemento
13    public void initStack(char value) {
14        top = new Node(value, null, 0);
15    }
16
17    // Inserta un nuevo elemento en la pila
18    public void push(char value) {
19        if (isEmpty()) {
20            initStack(value);
21        } else {
22            top = new Node(value, top, top.count);
23        }
24    }
25
26    // Devuelve el tamaño de la pila
27    public int size() {
28        if (isEmpty()) {
29            return 0;
30        }
31        return top.count;
32    }

```

Se ejecuto el JAR dentro de la carpeta target y el programa evaluó correctamente cada expresión, indicando True o False según si los símbolos estaban balanceados.

```

C:\Users\arong\Downloads\Practica Pilas + Maven\stackHandler>cd target

C:\Users\arong\Downloads\Practica Pilas + Maven\stackHandler\target>java -jar stackHandler-0.0.1-SNAPSHOT.jar "(a+b)*[c-d]"
True

C:\Users\arong\Downloads\Practica Pilas + Maven\stackHandler\target>java -jar stackHandler-0.0.1-SNAPSHOT.jar "([)]"
False

C:\Users\arong\Downloads\Practica Pilas + Maven\stackHandler\target>

```

Cambiar

Es el método que verifica si los paréntesis están bien balanceados.

```
Main.java SymbolValidator.java X
1 package umg.edu.gt.data_structure.stack.impl;
2
3 import umg.edu.gt.data_structure.stack.manual.StackLinked;
4
5 public class SymbolValidator {
6
7     public boolean isBalanced(String s) {
8
9         StackLinked stack = new StackLinked();
10
11         for (char c : s.toCharArray()) {
12
13             // Si es símbolo de apertura
14             if (c == '(' || c == '[' || c == '{') {
15
16                 if (stack.isEmpty()) {
17                     stack.initStack(c); // inicializa si está vacía
18                 } else {
19                     stack.push(c);
20                 }
21
22             // Si es símbolo de cierre
23             } else if (c == ')' || c == ']' || c == '}') {
24
25                 if (stack.isEmpty()) {
26                     return false; // cierre sin apertura
27                 }
28
29                 char top = stack.pop();
30
31                 if (!isPair(top, c)) {
32                     return false;
33                 }
34             }
35         }
36     }
}
```

Ofuscación de stackHandler mediante el comando mvn clean package -Pobfuscate


Ejecute mvn clean package -Pobfuscate, lo que inicia la construcción del proyecto usando el perfil de ofuscación.

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>mvn clean package -Pobfuscate
[INFO] Scanning for projects...
[INFO]
[INFO] -----< umg.edu.gt.data-structure:stackHandler >-----
[INFO] Building stackHandler 0.0.1-SNAPSHOT
```

Le damos enter y todo se realizó correctamente

```
[proguard] Note: the configuration refers to the unknown class 'java.lang.String'
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 5.862 s
[INFO] Finished at: 2026-02-20T15:15:38-06:00
[INFO] -----
```

Vamos a la carpeta donde aparece para comprobar si en verdad lo realizo y en efecto ya nos aparece la carpeta ofuscada

 stackHandler-0.0.1-SNAPSHOT-obf	20/02/2026 15:15	Archivo JAR	4 KB
---	------------------	-------------	------

Prueba de que me funcione el jar

Ejecute el JAR ofuscado dentro de la carpeta target y el programa confirmó que la expresión (a+b) está correctamente balanceada devolviendo True.

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>java -jar stackHandler-0.0.1-SNAPSHOT.jar "(a+b)"
True
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>
```

Y el ofuscado también esta funcionando


```
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>java -jar stackHandler-0.0.1-SNAPSHOT-obf.jar "(a+b)"
True
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler\target>
```

Jar de umg.edu.gt.data-structure.stack

Navege al módulo umg.edu.gt.data-structure.stack y ejecutaste mvn clean package para compilarlo desde esa carpeta.

```
C:\Users\aronq\Downloads\Practica Pilas + Maven>cd umg.edu.gt.data-structure.stack
C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack>mvn clean package
[INFO] Scanning for projects...
[INFO] -----< umg.edu.gt.data-structure:umg.edu.gt.data-structure.stack >-----
```

▼ hoy

 umg.edu.gt.data-structure.stack-0.0.3-... 20/02/2026 15:29 Archivo JAR 7 KB

PARA OFUSCAR EL UMG.EDU.GT.DATA-STRUCTURE.STACK

Ejecute mvn clean package -Pobfuscate dentro del módulo para compilarlo usando el perfil de ofuscación.

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack>mvn
clean package -Pobfuscate
[INFO] Scanning for projects...
```

Todo bien

El proceso de compilación terminó sin errores y Maven confirmó que todo se ejecutó correctamente con el mensaje BUILD SUCCESS.

```
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 5.530 s
[INFO] Finished at: 2026-02-20T15:32:03-06:00
[INFO] -----
```

Revisamos en la carpeta si ya aparece

El archivo generado (umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT-obf.jar) es el JAR ofuscado que Maven creó después de compilar el módulo con el perfil de ofuscación.

 umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT-obf 20/02/2026 15:32 Archivo JAR 3 KB
--

PRUEBA DE REGRESION DESDE CONSOLA umg.edu.gt.data-structure.stack

Instale la versión ofuscada en .m2

```
Directorio de C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack\target
```

```
20/02/2026 15:32 <DIR> .
20/02/2026 15:31 <DIR> ..
20/02/2026 15:31 <DIR> classes
20/02/2026 15:31 <DIR> generated-sources
20/02/2026 15:31 <DIR> generated-test-sources
20/02/2026 15:32 <DIR> maven-archiver
20/02/2026 15:31 <DIR> maven-status
20/02/2026 15:32 1,121 proguard-map.txt
20/02/2026 15:32 1,549 proguard_seed.txt
20/02/2026 15:31 <DIR> test-classes
20/02/2026 15:32 2,906 umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT-obf.jar
20/02/2026 15:32 6,439 umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.jar
4 archivos 12,015 bytes
8 dirs 211,020,042,240 bytes libres
```

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack\target>
```

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\umg.edu.gt.data-structure.stack>mvn clean
install -Pobfuscate
[INFO] Scanning for projects...
```

```
Directorio de C:\Users\aronq\Downloads\Practica Pilas + Maven
```

```
19/02/2026 22:05 <DIR> .
20/02/2026 16:55 <DIR> ..
20/02/2026 15:15 <DIR> stackHandler
20/02/2026 18:59 <DIR> umg.edu.gt.data-structure.stack
19/02/2026 22:05 <DIR> __MACOSX
0 archivos 0 bytes
5 dirs 211,033,260,032 bytes libres
```

```
C:\Users\aronq\Downloads\Practica Pilas + Maven>cd stackHandler
```

```
C:\Users\aronq\Downloads\Practica Pilas + Maven\stackHandler>mvn clean package
[INFO] Scanning for projects...
```

Instale la versión ofuscada en .m2

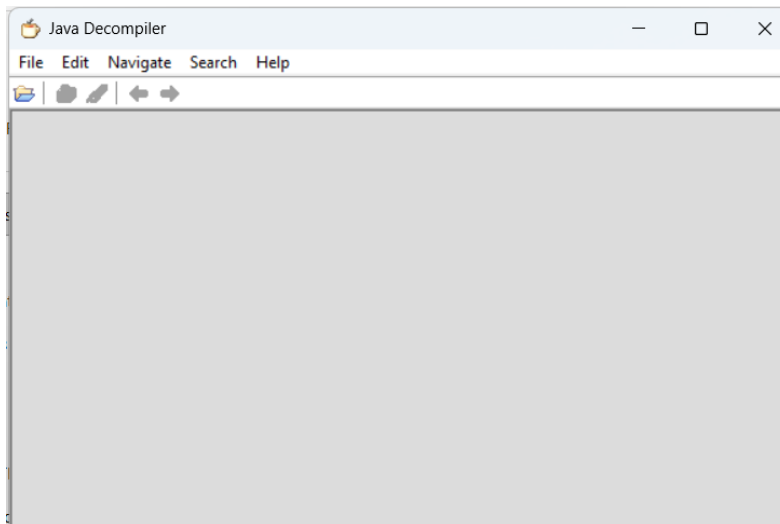
```
du.gt.data-structure.stack-0.0.3-SNAPSHOT.jar
```

```
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 5.333 s
[INFO] Finished at: 2026-02-20T18:59:29-06:00
[INFO] -----
```

CONCLUSION BREVE SOBRE COMPORTAMIENTO

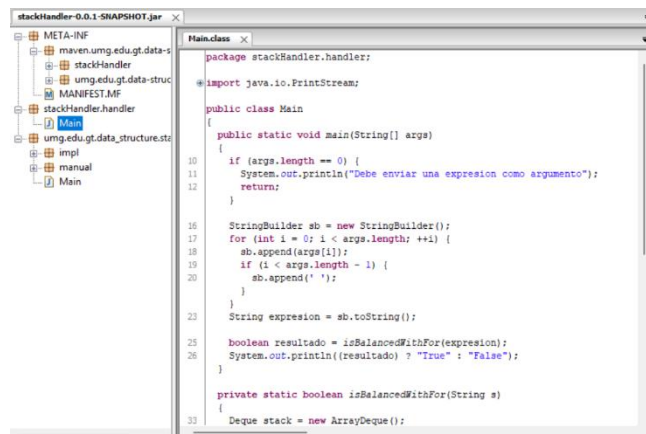
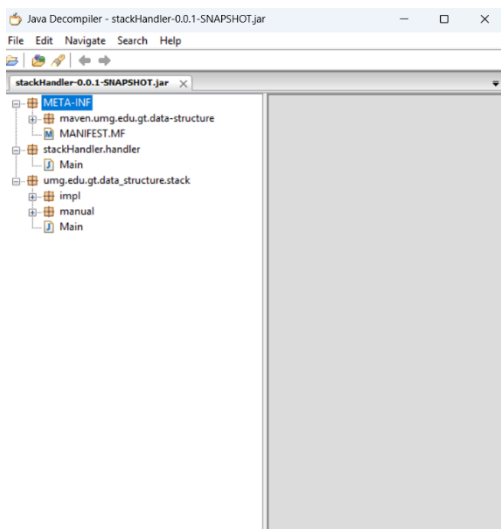
En el módulo umg.edu.gt.data-structure.stack se generó sin inconvenientes el JAR ofuscado usando el perfil configurado en Maven. Después, el proyecto stackHandler se recompiló utilizando esta versión ofuscada como dependencia. La compilación finalizó correctamente y el programa mantuvo el mismo funcionamiento al ejecutarse desde la consola. Esto demuestra que el proceso de ofuscación no afectó la lógica ni el desempeño de la librería.

INGENIERIA INVERSA



ING INVERSA DEL ARCHIVO JAR NORMAL DE STACKHANDLER

Lo que aparece en esa captura (Java Decompiler mostrando el contenido de un .jar) es decompilación, que es una forma de ingeniería inversa orientada a leer/inspeccionar el código a partir del bytecode.



```

Main.class SymbolValidator.class
package umg.edu.gt.data_structure.stack.impl;

import java.util.ArrayDeque;

public class SymbolValidator
{
    public boolean isBalanced(String s)
    {
        9 Deque stack = new ArrayDeque();
        10 for (char c : s.toCharArray()) {
        11     if ((c == '(') || (c == '[') || (c == '{')) {
        12         stack.push(Character.valueOf(c));
        13     } else if ((c == ')') || (c == ']') || (c == '}')) {
        14         if (stack.isEmpty()) return false;
        15         char top = ((Character)stack.pop()).charValue();
        16         if (!isPair(top, c)) return false;
        17     }
        18     return stack.isEmpty();
        19 }

    private boolean isPair(char open, char close) {
        23 return ((open == '(' && close == ')') || (open == '[' && close == ']' || (open == '{' && close == '}')));
    }
}

```

```

Main.class SymbolValidator.class Node.class
package umg.edu.gt.data_structure.stack.manual;

public class Node
{
    char value;
    Node next;
    int count;

    Node(char value, Node next, int count)
    {
        9 this.value = value;
        10 this.next = next;
        11 this.count = (count + 1);
    }
}

```

Java Decompiler - StackLinked.class

File Edit Navigate Search Help

stackHandler-0.0.1-SNAPSHOT.jar

META-INF

- maven.umd.edu.gt.data-structure
- stackHandler
- umg.edu.gt.data-structure
- MANIFEST.MF
- stackHandler.handler
- Main
- umg.edu.gt.data-structure
- impl
- SymbolValidator
- manual
- Node
- StackLinked
- Main

```

Main.class SymbolValidator.class Node.class StackLinked.class
package umg.edu.gt.data_structure.stack.manual;

public class StackLinked
{
    private Node top;

    public boolean isEmpty()
    {
        8 return (this.top == null);
    }

    public void initStack(char value) {
        12 this.top = new Node(value, this.top, 0);
    }

    public void push(char value) {
        16 this.top = new Node(value, this.top, this.top.count);
    }

    public int size() {
        20 return this.top.count;
    }

    public char pop() {
        24 if (isEmpty())
        {
            return '0';
        }
        26 char value = this.top.value;
        28
    }
}

```

Java Decompiler - Main.class

File Edit Navigate Search Help

stackHandler-0.0.1-SNAPSHOT.jar

META-INF

- maven.umd.edu.gt.data-structure
- stackHandler
- umg.edu.gt.data-structure
- MANIFEST.MF
- stackHandler.handler
- Main
- umg.edu.gt.data-structure
- impl
- SymbolValidator
- manual
- Node
- StackLinked
- Main

```

Main.class SymbolValidator.class Node.class StackLinked.class Main.class
package umg.edu.gt.data_structure.stack;

import java.io.*;

public class Main
{
    public static void main(String[] args)
    {
        8 StackLinked stack = new StackLinked();

        11 stack.initStack('A');
        12 stack.push('B');
        13 stack.push('C');

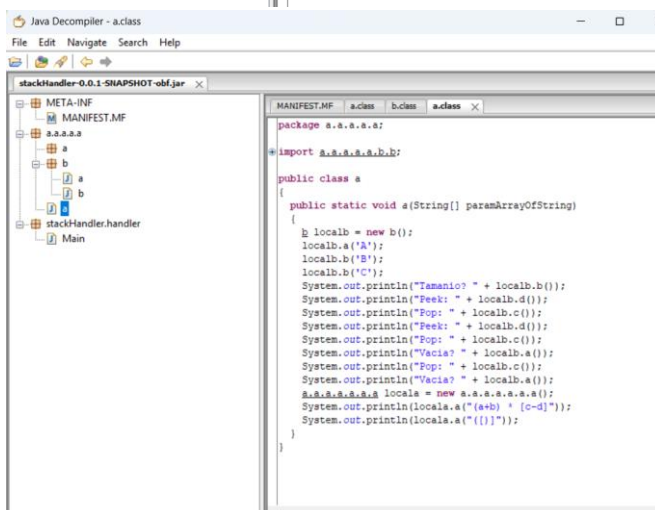
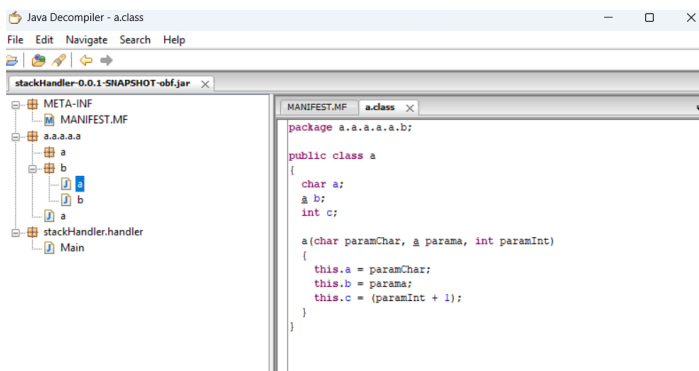
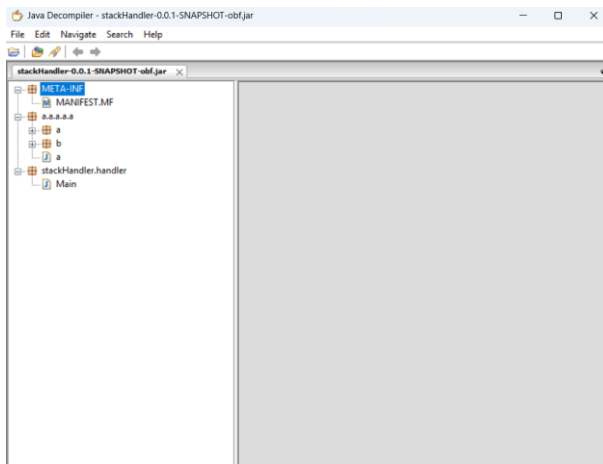
        15 System.out.println("Tamaño? " + stack.size());
        16 System.out.println("Peek: " + stack.peek());
        17 System.out.println("Pop: " + stack.pop());
        18 System.out.println("Peek: " + stack.peek());
        19 System.out.println("Pop: " + stack.pop());
        20 System.out.println("Vacia? " + stack.isEmpty());
        21 System.out.println("Pop: " + stack.pop());
        22 System.out.println("Vacia? " + stack.isEmpty());

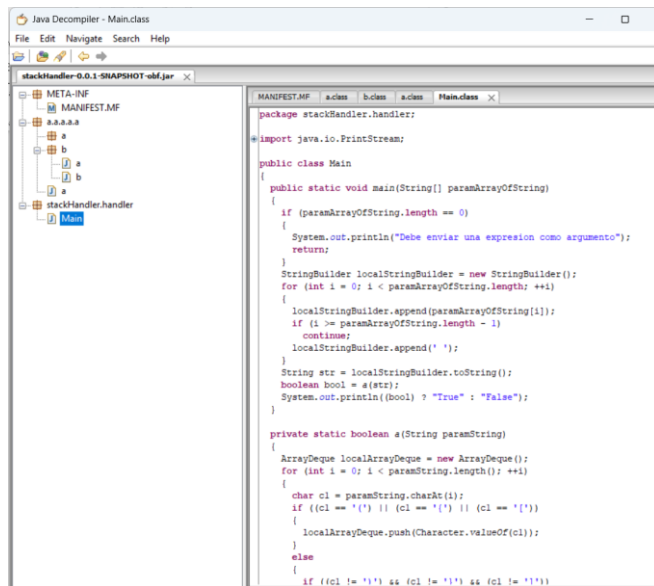
        25 SymbolValidator symbolValidator = new SymbolValidator();
        26 System.out.println(symbolValidator.isBalanced("(a(b) * [c-d]"));
        27 System.out.println(symbolValidator.isBalanced("{}"));
    }
}

```

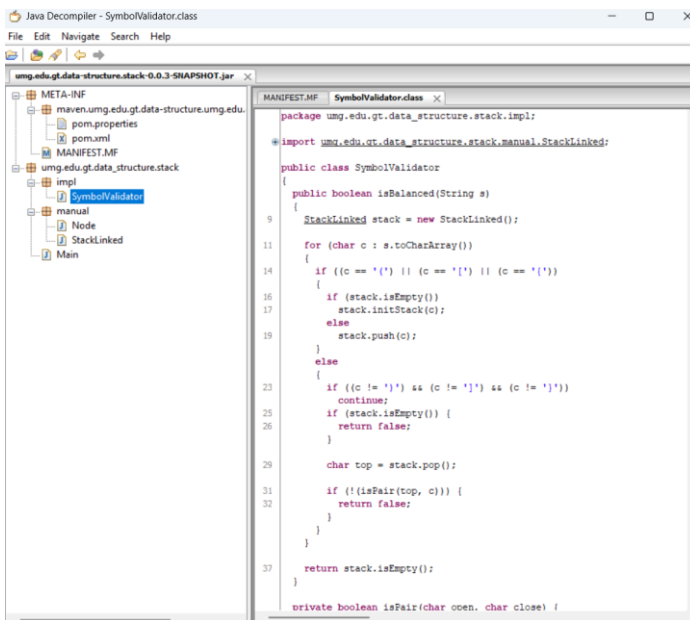
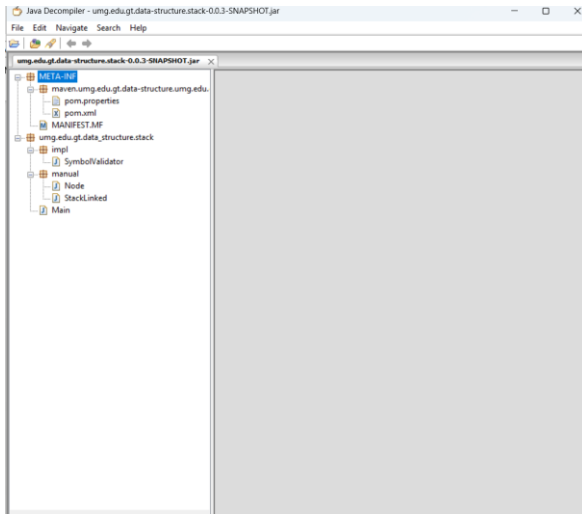
ING. INVERSA DEL ARCHIVO JAR OFUSCADO DEL STACKHANDLER

La captura evidencia ingeniería inversa (se abrió el .jar en un decompilador) y también muestra que la ofuscación se aplicó





ING INVERSA DEL JAR UMG.EDU.GT.DATA-STRUCTURE.STACK\TARGET



Java Decompiler - Node.class

File Edit Navigate Search Help

umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.jar

META-INF

- maven.umg.edu.gt.data-structure.umg.edu.
 - pom.properties
 - pom.xml
 - MANIFEST.MF
- umg.edu.gt.data-structure.stack
 - impl
 - SymbolValidator
 - manual
 - Node
 - StackLinked
 - Main

```
package umg.edu.gt.data-structure.stack.manual;

public class Node
{
    char value;
    Node next;
    int count;

    Node(char value, Node next, int count)
    {
        this.value = value;
        this.next = next;
        this.count = (count + 1);
    }
}
```

Java Decompiler - StackLinked.class

File Edit Navigate Search Help

umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT.jar

META-INF

- maven.umg.edu.gt.data-structure.umg.edu.
 - pom.properties
 - pom.xml
 - MANIFEST.MF
- umg.edu.gt.data-structure.stack
 - impl
 - SymbolValidator
 - manual
 - Node
 - StackLinked
 - Main

```
package umg.edu.gt.data-structure.stack.manual;

public class StackLinked
{
    private Node top;

    public boolean isEmpty()
    {
        return (this.top == null);
    }

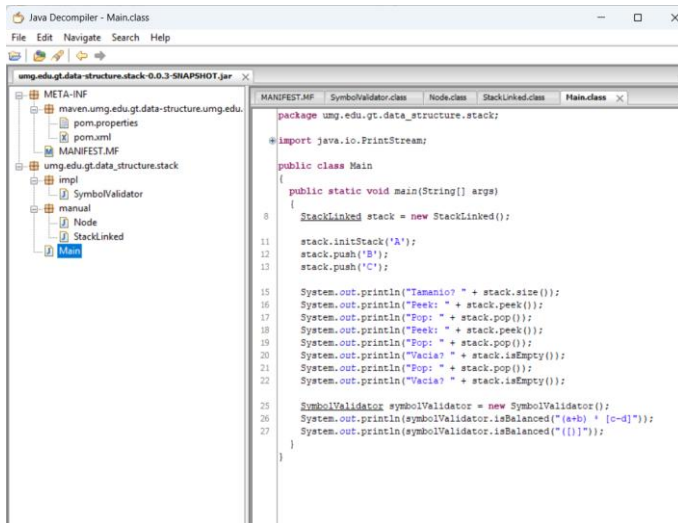
    public void initStack(char value)
    {
        this.top = new Node(value, null, 0);
    }

    public void push(char value)
    {
        if (isEmpty())
            initStack(value);
        else
            this.top = new Node(value, this.top, this.top.count);
    }

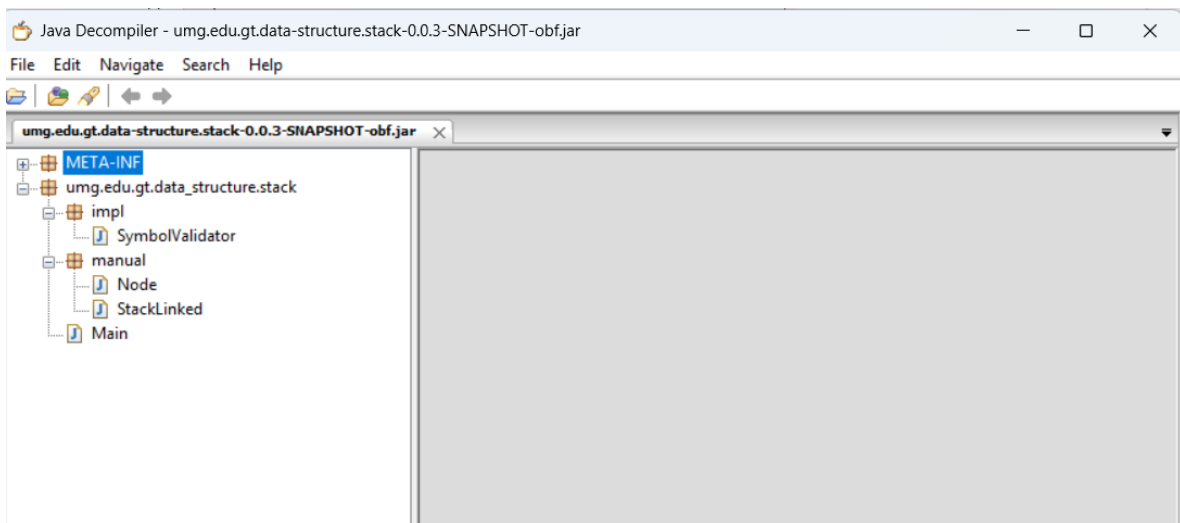
    public int size()
    {
        if (isEmpty()) {
            return 0;
        }
        return this.top.count;
    }

    public Node getNodeInit()
    {
        return this.top;
    }

    public char pop()
    {
    }
}
```

INGENIERIA INVERSA DEL UMG.EDU.GT.DATA-STRUCTURE.STACK\TARGET OFUSCADO



Java Decompiler - SymbolValidator.class

File Edit Navigate Search Help

umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT-obf.jar

META-INF
umg.edu.gt.data-structure.stack
impl
SymbolValidator
manual
Node
StackLinked
Main

SymbolValidator.class

```
package umg.edu.gt.data-structure.stack.impl;

import umg.edu.gt.data-structure.stack.manual.StackLinked;

public class SymbolValidator
{
    public boolean isBalanced(String paramString)
    {
        StackLinked localStackLinked = new StackLinked();
        for (char c1 : paramString.toCharArray())
            if ((c1 == '(') || (c1 == '[') || (c1 == '{'))
            {
                if (localStackLinked.isEmpty())
                    localStackLinked.initStack(c1);
                else
                    localStackLinked.push(c1);
            }
            else
            {
                if ((c1 != ')') && (c1 != ']') && (c1 != '}'))
                    continue;
                if (localStackLinked.isEmpty())
                    return false;
                char c2 = localStackLinked.pop();
                if (!isPair(c2, c1))
                    return false;
            }
        return localStackLinked.isEmpty();
    }

    private boolean isPair(char paramChar1, char paramChar2)
    {
        return (((paramChar1 == '(') && (paramChar2 == ')')) || ((paramChar1 ==
```

Java Decompiler - Node.class

File Edit Navigate Search Help

umg.edu.gt.data-structure.stack-0.0.3-SNAPSHOT-obf.jar

META-INF
umg.edu.gt.data-structure.stack
impl
SymbolValidator
manual
Node
StackLinked
Main

SymbolValidator.class Node.class

```
package umg.edu.gt.data-structure.stack.manual;

public class Node
{
    char value;
    Node next;
    int count;

    Node(char paramChar, Node paramNode, int paramInt)
    {
        this.value = paramChar;
        this.next = paramNode;
        this.count = (paramInt + 1);
    }
}
```

